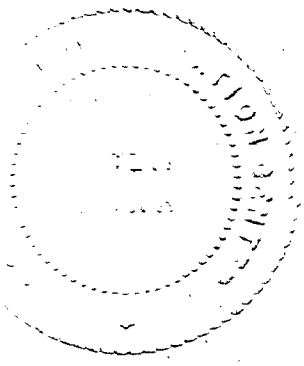
FINAL REPORT

COASTAL ZONE MANAGEMENT GRANT
CONTRACT NO. G77-017B (1960)
CITY OF SEATTLE

FINAL REPORT

COASTAL ZONE MANAGEMENT GRANT
CONTRACT NO. 306-5B
City of Seattle



to the

Office of Coastal Zone Management
National Oceanic and Atmospheric Administration

and the

Shorelands Division
Department of Ecology
State of Washington

by the

Environmental Management Division
Department of Community Development
City of Seattle

June 1977

CZM 306 - 5B Final Report

INTRODUCTION

This final report for Washington Coastal Zone Management grant contract No. 306-5B for the City of Seattle covers a period of thirteen months, from June 1, 1976 to June 30, 1977.

Purpose

The purpose of the project was to improve implementation of the Shoreline Master Program, by providing funds for processing shoreline applications and by developing information by which to monitor and evaluate both the management and provisions of the Shoreline Master Program.

Analysis of data on compliance, shoreline land use, and shoreline permits provides a management tool for monitoring and evaluating how the Master Program works.

Workshops and training sessions were designed to improve permit processing and to provide essential background information for persons involved with permit review, design or decision-making in City shoreline area projects.

The Speaker's Kit provides similar information presented for community councils and other groups.

The compendium of construction standards will assist in evaluating applications and will also be useful to applicants.

Printing of the Shoreline Master Program and its map are intended to extend the distribution and coverage of the Shoreline Master Program.

Finally, the official maps prepared earlier were updated to reflect later decisions by the City Council.

Report Organization

The report is organized according to the elements in the contract and in that order. A description of the work element is followed by a copy of the work product. For the official map update, before and after prints are included as an example. For the speaker's kit, the general text and list of slides (but not the slides themselves) are included. These are available on loan, of course.

Project Team

The persons basically responsible for the work in each element are listed below. The lead person is named first, followed by others who participated in the project. Overall grant management was by Rosemary Horwood under Robert F. Hintz, Division Director.

	Element	Lead person; others
1.	Compliance	Ed Schein, Jan Lutz
2.	Permit Processing	Paul Edgar, Hermia Ip, Mark Schlosser, Janeen Smith
3.	Permit Analysis	John Crull, David Woodruff
4.	Construction Standards	Michael Bonoff; Claudia Denney, Graphics
5.	Workshops	Janeen Smith, Jan Lutz, Wolf Bauer
6.	Land Use Study	John Crull, Venerando deGuzman
7.	Shoreline Master Program	Rosemary Horwood, John Crull, Claudia Denney, Dawn Whitworth
8.	Shoreline Map	John Crull
9.	Update Official Maps	John Crull
10.	Clerical	Olga Stiffler

Summary of Project

There were nine separate but related elements in this project. All of them supported the completion of the Seattle Master Program and its administration. Adoption of the Master Program occurred during the grant period. Some of the elements provide a framework for monitoring the administration and the effectiveness of the SMP.

Element 1 laid the foundation for, set up procedures and began inspections and enforcement.

Element 2 involved support of permit processing.

Element 3 coded and automated shoreline permit data and analyzed the five years data available.

Element 4, the Design and Construction Standards Compendium, gathered data and produced a short handbook providing the basic information for policy analysis.

Element 5, Workshops and Training of City Personnel, provided information to City staff involved in work relating to shorelines.

Element 6, Land Use Data, provides essential base data for analysis of the shorelines in terms of human activities.

Elements 7 and 8 provided wide distribution of copies of the Seattle Master Program and accompanying map, for general public use.

Element 9 involved correction and updating of the official shoreline maps to agree with Council decisions.

Summary of Contacts with Other Agencies

The nature of the work program was such that extensive contacts with other agencies were not necessary.

However, during the preparation of the Design and Construction Standards Compendium, Element 4, a contacts seeking information were made with the following:

1. U.S. Army Corps of Engineers, Seattle
2. U.S. Army Corps of Engineers, North Central Region
3. U.S. Department of Fish and Wildlife
4. University of Washington, Instutute for Marine Studies
5. Washington State Department of Fisheries
6. Washington State Department of Game
7. Washington State Department of Ecology
8. Port of Seattle
9. City of Seattle Building Department
10. City of Seattle Engineering Department

The Workshops and Training Sessions, Element 5, involved contacts with City Departments of Building, Engineering and Parks.

Element 6, Land Use, and Element 3, Information System, involved contacts with the University of Washington Urban Data Center and the City of Seattle Office of Management and Budget Management Information System. In addition, the Licenses and Fire Departments were closely involved in data collection.

Finally, frequent contacts were made with the Washington State Department of Ecology.

ABSTRACT

Coastal Zone Management Project - Washington

Title: Element 1 - Compliance

Author: Ed Schein and Rosemary Horwood

Subject: Compliance

Date: June 1977

Local Planning Agency: Department of Community Development

Source of Copies: Same

DOE Contract Number: G 77-017B (1960)

Number of Pages: 36

Abstract: The following report describes the record keeping procedures, filing, inspection and check-back systems in effect since March, 1977. It also documents the number of inspections and violations. The time has been too short for final disposition of more than a few cases. None have gone as far as judicial procedures.

Lake Union was selected as the point of beginning because work during the summer of 1976 had shown that there were significant violations in that area. In addition, a great number and variety of permits had been issued for the area, so that it offers good case study possibilities.

MW:ss
061607

ABSTRACT

Coastal Zone Management Project - Washington

Title: Element 2 - Permit Processing, Improvements

Author: Rosemary Horwood

Subject: Shoreline Permit Processing

Date: June 1977

Local Planning Agency: Department of Community Development

Source of Copies: Same

DOE Contract Number: G 77-017B (1960)

Number of Pages: 2

Abstract: Shoreline Permit application processing is a major activity of the Division, and this report summarizes the work. Nearly 100 permits were received and processed during the year; two were appealed. A wide variety of uses are proposed by applicants from residential to industrial uses; permits are tabulated by value and number received per month.

MW:ss
061607

ABSTRACT

Coastal Zone Management Project - Washington

Title: Element 3 - Permit Record Analysis

Author: Rosemary Horwood and John Crull

Subject: Shoreline Permit Data

Date: June 1977

Local Planning Agency: Department of Community Development

Source of Copies: Same

DOE Contract Number: G 77-017B (1960)

Number of Pages: ---

Abstract: Analysis of the nearly 400 permits processed from 1971 to December 31, 1976, has provided a large amount of data by which to evaluate the Shoreline Management Program and to provide factual information for policy development and amendment of the Master Program. Virtually all information provided on the application was automated and geocoded so that computer produced maps of the data could be made.

MW:ss
061607

ABSTRACT

Coastal Zone Management Project - Washington

Title: Element 4 - Shoreline Structures, Design & Construction Standards Compendium

Author: Michael Bonoff

Subject: Standards for construction in the intertidal zone.

Date: June 1977

Local Planning Agency: Department of Community Development

Source of Copies: Same

DOE Contract Number: G 77-017B (1960)

Number of Pages: ——

Abstract: This report contains a glossary and an annotated bibliography of sources of construction data in addition to sketches presenting basic construction principles with correct and incorrect methods of construction in the intertidal area.

MW:ss
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ABSTRACT

Coastal Zone Management Project - Washington

Title: Element 5 - Workshops, Training of City Personnel

Author: Rosemary Horwood

Subject: Training of personnel for application intake and for management of public works on shorelines.

Date: June 1977

Local Planning Agency: Department of Community Development

Source of Copies: Same

DOE Contract Number: G 77-017B (1960)

Number of Pages: 1 + 1 + 50

Abstract: With the completion of the Seattle Shoreline Master Program, implementation became a top priority. Several groups need to be well informed about the Program in order to assure optimum operation of the regulations and the achievement of shoreline goals. Intake personnel, public works (Parks and Engineering) and the general public were the target groups. A different kind of material was prepared for each group. Training sessions were held for Building Department personnel involved with application intake. A workshop seminar was held for other City personnel. A Speaker's Kit with text and slides was prepared for community group use.

MW:ss
061607

ABSTRACT

Coastal Zone Management Project - Washington

Title: Element 6 - Land Use Study of Shorelines

Author: Rosemary Horwood and John Crull

Subject: Analysis of shoreline land use related to Shoreline Master Program.

Date: June 1977

Local Planning Agency: Department of Community Development

Source of Copies: Same

DOE Contract Number: G 77-017B (1960)

Number of Pages: 30

Abstract: There had been no time for a detailed study of land use prior to development of the Seattle Master Program, so it had to be written in the absence of detailed information about the numbers, types and characteristics of shoreline uses. This automated study of over 1200 separate establishments provides detailed information on type of activity, location, age of structure, auxiliary uses, name and address of firm. The data are geocoded so that mapped data may be produced. Maps indicate a strong degree of clustering of symbolic uses in certain locations.

A detailed methodology, prepared by John Crull, is available.

MW:ss
061607

ABSTRACT

Coastal Zone Management Project - Washington

Title: Element 7 - Shoreline Master Program

Author: City Council/Department of Community Development

Subject: Text of shoreline regulations adopted by City Council and approved by DOE.

Date: June 1977

Local Planning Agency: Department of Community Development

Source of Copies: Same

DOE Contract Number: G 77-017B (1960)

Number of Pages: xxiv, 85, map

Abstract: This is the text of the adopted and approved regulations developed from the Citizens' Advisory Committee recommendations through Council hearings and review by the Department of Ecology.

The Citizens' Advisory Committe goals and policies and definitions are also included, as well as a small scale map showing shorelines of statewide significance.

A copy of the map, which is the subject of Element 8, was slipped into each copy distributed. All public and institutional libraries, all community and interest groups and professional groups were sent copies. In addition, copies are available to the public.

MW:ss
061607

ABSTRACT

Coastal Zone Management Project - Washington

Title: Element 8 - Shoreline Environment Map

Author: John Crull

Subject: Location of shoreline environments regulating uses and activities of Seattle shorelines.

Date: June 1977

Local Planning Agency: Department of Community Development

Source of Copies: Same

DOE Contract Number: G 77-015B (1960)

Number of Pages: 1, folded

Abstract: This map was printed separately from the text so that it could be used as a ready reference or as a wall map. It is in color and designed for easy reading. A copy was slipped into each Master Program.

MW:ss
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ABSTRACT

Coastal Zone Management Project - Washington

Title: Element 9 - Update, Correct Official Maps

Author: John Crull

Subject: Updating of official maps to reflect text changes by City Council

Date: June 1977

Local Planning Agency: Department of Community Development

Source of Copies: Same

DOE Contract Number: G 77-017B (1960)

Number of Pages: 6

Abstract: The official maps prepared under the previous grant required changes because Council reviewed and changed a number of shoreline designations after the maps had been prepared. Several examples of such changes, with before and after copies, are appended.

MW:ss
061607

Element 1

Element 1 - COMPLIANCE

Introduction

The original grant amount of $4,500 was intended to cover field checking, methods and legal steps. A preliminary survey done as part of this project revealed a high violation rate. It was clear that establishing a compliance function would be of greater long-term value than further study, in that field checking might as well be focussed on enforcement as well as further study. The compliance function could use legal procedures that are already established in the Building Department, and their inspection methods could readily be adapted to the Shoreline Master Program.

The period of compliance work has been from March through June, but is expected to continue into the next grant period until January 1, 1978.

It must be recognized that this compliance function does not cover shoreline exemptions which are granted by the Building Department as part of the intake process. Records of the exemptions granted are not available. And, as yet, we do not have a good method of finding violators who have simply neglected to apply for permits, including the clients of the "silent piledriver."

The following report describes the record-keeping procedures, filing, inspection, and check-back systems. It also documents the number of inspections and the violations. The time has been too short for final disposition of more than a few cases. None have gone as far as judicial procedures.

Lake Union was selected as the point of beginning because previous work had shown that there was a high rate of violations in that area. In addition, a great number and variety of permits have been issued for the area so that it offers good case study possibilities.

CZM 306 - 5B Final Report

Work to Date

The goal of the Shoreline Compliance Manager is not restricted to finalizing individual permits and checking for violations. He is concerned about overall effects of permits issued, successes or failures of master program requirements, and continuous monitoring of the results of shoreline management.

As of June 23, 1977, 53 Shoreline Management Act permits have been reviewed. From this total, 8 projects have not been started, 9 projects are in progress, 23 projects have been completed, and on 13 projects a site inspection has not been completed. Out of this total, 17 have final approvals, two are in violation, and four are being looked at.

So far, most completed projects are in compliance, maybe because of the vigilance of the community in the area inspected (the East and North shore of Lake Union). Watching for violators without permits will be the most difficult task and will only be successful with experience within the various shoreline areas of the city. Therefore an observant community will continue to be the most effective group to spot violators of the Seattle Shorelines Master Program.

LAKE UNION • SOUTH SHORE — LAKE OF WATER • LAND AREA — DEPARTMENT OF BUILDING LOG FOR SHORELINE MANAGEMENT ADMINISTRATION

VALLEY STREET — STREET

COMPLIANCE - BY SHORELINE COMPLIANCE MANAGER • SEATTLE BUILDING DEPARTMENT

SMA NO. — OWNER/LESSEE

ADDRESS

PROJECT DESCRIPTION

Seattle Department of Building
Department of Buildings
[illegible] Municipal Building, Seattle, Washington 98104
Alfred Petty, P.E. Superintendent
Wes Uhlman, Mayor

PROJECT CONDITIONS

SITE INSPECTION DATE	NOT STARTED	IN PROGRESS	COMPLETED (CONFIRMED) IN COMPLIANCE	APPROVAL	VIOLATION(S)	VIOLATION DESCRIPTION(S)	COMPLIANCE DATE	SITE INSPECTION 2 DATE	NO CHANGE	IN PROGRESS	VIOLATION(S) CORRECTED	# OF VIOLATION(S) NOT CORRECTED	CRIMINAL COMPLAINT/SUMMONS DATE	COURT DISPOSITION DATE	VIOLATION NOTICE	VIOLATION CRIMINAL CITATION	FINAL INSPECTION COMPLIANCE/ SENTENCE DATE	IN COMPLIANCE
4-7-77			X		X	(21A.89)(23.42(a)) 1. NO SCREENING REVISION 5/19/77 2. PARKING NOT SET BACK 5' FROM PROPERTY LINE (EXTRA STALLS MARKED OUTBOARD FROM PLANTING) 3. NO PUBLIC MOORAGE (WILL BE IN BY JUNE 1) REVISION 5/19/77 4. NO GAZEBO (21A.38) 5. NO SIGNING FOR PUBLIC ACCESS	6-1-77	6-8-77			3	2						

76-06 H.C. HENRY INVESTMENT CO, 1114 VALLEY STREET, CONSTRUCT RESTAURANT, PUBLIC DOCK, GAZEBO, ACCESS PARKING, PUBLIC ACCESS TRAIL REVISION 5/19/77

1. REGULATED PUBLIC ACCESS
2. ACCESSORY PARKING SCREENING
3. " " 5' SET BACK
4. " " INTERIOR LANDSCAPING
5. PUBLIC ACCESS SIGNS
6. ADHERE TO APPROVED PLANS

LOG SHEET COPIES - ALL AREAS INSPECTED TO 6/15/77

...T SHORE THRV 1400

Owner / Leasee	Address	Project Description	Project Conditions	DATE Completed/ in Progress	Violation/ Approval	Violation description(s)	Compliance date	2nd Inspection	Criminal C Summons da
ST. VINCENT DE PAUL	1001 FAIRVIEW AVE N.	REMOVE PIER & BLDG CONSTRUCT 26 SLIP MARINA FOR 90' & LONGER BOATS, 60'x235' BLDG ON PILING; RIPRAP SHORE & CONSTRUCT 69 CAR PARKING LOT	21A.32, .33, .34, .35, .36, .74, .89, .96 & 21A.104 1. AVOID 8" OVERFLOW SANITARY SEWER LINE 2. REMOVE DEBRIS FROM WATER 3. STOP AUTO REPAIR & SALVAGE 4. NO OUTDOOR SORTING OF GOODS 5. SEPARATE OIL FROM WATER RUNOFF 6. PROVIDE PUBLIC ACCESS DURING DAY 7. DON'T CHANGE CONDITIONS	4/7/77 - NOT STARTED					
MARINE POWER & EQUIP. CO.	1135 FAIRVIEW AVE N.	CONSTRUCT: 100'x350' BARGE FABRIC. PLANT 90 CAR ACCESS. LOT. 450' x 140' CONC. APRON 40'x100' WING (ACCESSORY OFFICES) 5-5 PILE DOLPHINS FOR MOORAGE	21A.25(c), .35, TABLE 2C.2, TABLES .74, .89, .96, .104 (1) APPROVED LANDSCAPE PLAN (2) REDUCE GLARE IF CAUSED BY PAINTED BLDG SURFACE	7/7/77: NOT STARTED					
GUNN-WRIGHT PROPERTIES	1163 - 1199 FAIRVIEW AVE. N.	INSTALL TEMP. METEOROLOGICAL DATA STATION.	(1) SIGN EXPLAINING TOWERS (2) 1 YR DURATION (3) NO APPROVED AIR TRAFFIC INCREASE FOR LK. UNION	4/7/77 COMPLETE & IN COMPLIANCE	APPROVAL				NA

SHORE (1500 - ~~2800~~ 1999)

	Owner Leasee	Address	Project Description	Project Conditions	DATE Completed/ in Progress	Violation/ Approval	Violation description(s)	Compliance date	2nd Inspection	Criminal Summons (d
5	CITY-DEPT. ENGRG.	1501 - 2601 FAIRVIEW AVE E	PLACE FAIRVIEW A "BIKEWAY"	PROVIDE ACCESS VIA STREET END "MINI PARKS"	4/7/77 COMPLETE & IN COMPLIANCE	APPROVAL				N/A
7	SEA-FIRST BANK	1535 - 1555 EASTLAKE AVE E.	(FILES INCOMPLETE)		4/13/77 NOT STARTED PERMIT NOT ISSUED BY DCD - ISSUED BY COURT					
	COOLIDGE PROPELLER CO.	1608 FAIRVIEW AVE E.	CONST. ADDITION TO EXIST. MANUFACTURING PLANT TO HOUSE AIR FILTER EQUIPMT.	NONE	4/12/77 COMPLETE & IN COMPLIANCE	APPROVAL				N/A
					4/29/77 INVESTIGATION DUMP SITE OPPOSITE PROJECT SITE - ON SHORELINE	OWNER SAID NO DUMPING AT THIS SITE FOR 5 YRS. (ON CITY RIGHT-OF-WAY) NO FUTURE DUMPING PLANNED.	PHOTOS TAKEN - WILL INSPECT PERIODICALLY			
3	FRED DOBBS	1611 FAIRVIEW AVE E.	NEW ACCESS BRIDGE & MEZZANINE ON EXISTING BOAT MOORAGE	OBTAIN STREET USE PERMIT FOR CONSTRUCTION IN FAIRVIEW AVE. E.	4/12/77 - NOT STARTED					

	Owner Lessee	Address	Project Description	Project Conditions	DATE Completed/ in Progress	Violation/ Approval	Violation description(s)	Compliance date	2nd Inspection	Criminal Summons d
	SHORE	(2000 - 2599)								
D	MICHAEL E. & DORIS P. TAYLOR	2019 FAIRVIEW AVE E (HOUSEBOAT E)	CONST. 2ND STORY ADDTN. TO FLOATING HOME.	NONE	4/12/77 COMPLETE & IN COMPLIANCE	APPROVAL				
72	SHERRE L. LOCHRY	2031 FAIRVIEW AVE E. (HOUSEBOAT I K.C. 87)	CONST. STORAGE LOFT & LIVING ROOM ADDITION.	REMOVE IMMEDIATELY DEBRIS ENTERING WATER	4/12/77 NOT COMPLETED - IN COMPLIANCE TO DATE					
73	ELIZABETH FURSE	2031 FAIRVIEW AVE E (HOUSEBOAT E)		SAME AS ABOVE	4/12/77 NOT COMPLETED - IN COMPLIANCE TO DATE					
74	CITY, PARKS DEPT.	2100 FAIRVIEW AVE. E	CONST 8'X16'X15' HIGH ADDTN. TO HOUSEBOAT CONST. 16'X60' FLOATING PIER & RAMP-ENTRANCE	NONE	4/12/77 COMPLETE & IN COMPLIANCE	APPROVAL				N/A
3	JAMES JESSUP	2219-35 FAIRVIEW AVE E. HOUSEBOAT 7 & 9 HOUSEBOAT 7 & 10	CONST. 4 NEW FLOATING HOMES IN EXIST. FLOATING HOME MOORAGE.	NONE	4/12/77 HOUSEBOAT 7&10 (2235) COMPLETE 6L. HOUSEBOAT 9 (2219) COMPLETE 7/6L. HOUSEBOAT #7 (2219) NO CHANGES	APPROVAL APPROVAL				N/A N/A
12	GORDON JEFFERY ~~JAMES JESSUP~~	2219-35 FAIRVIEW E. PROVIDE 13 OR 14 ADDITIONAL HOUSEBOAT SPACES ON STATE LEASE LAND		APPROPRIATE LEASES WITH DNR	4/12/77 COMPLETE & IN COMPLIANCE	APPROVAL				N/A
59	GLENN CHINN & M. TSUTAKAWA	2219 FAIRVIEW AVE. E. #13	RECONSTRUCT HOUSEBOAT	NONE	1/12/77 NOT STARTED					
5	CADRANELL YACHT LANDING	2370 FAIRVIEW AVE E.	CONST. 4 STORY, 37 UNIT APT. BLDG. CONST. 8 ADDTL. OPEN MOORAGE SPACES.	① ONLY OPEN MOORAGE ② 9 OFFSTREET PARKING SPACES ACROSS FAIRVIEW E. FOR SLIP RENTERS.	4/12/77 COMPLETE & IN COMPLIANCE	APPROVAL				N/A
5	HAROLD J. JOHNSON	2521-25 MINOR AVE. E (2519-21 FAIRVIEW AVE E)	CONST. 4 STORY, 34 UNIT APT. BLDG.	NONE	4/12/77 COMPLETE & IN COMPLIANCE	APPROVAL			NA	
1	CADRANELL YACHT LANDING	2370 FAIRVIEW AVE. E.	CONST. ~~32~~ 24 OPEN BOAT MOORAGES	① APPLICANT DOESN'T ALLOW LIVE ABOARDS ② LAVATORIES WELL MARKED	4/12/77 4/28/77 COMPLETE & IN COMPLIANCE	APPROVAL			NA	
2	ROBERT J. CADRANELL	2501 FAIRVIEW AVE. E.	RENOVATE E. FACE OF RESTAURANT & ENTRY CANOPY	NONE	4/28/77 COMPLETE & IN COMPLIANCE	APPROVAL			NA	

Owner Lessee	Address	Project Description	Project Conditions	DATE Completed/ In Progress	Violation/ Approval	Violation description(s)	Compliance date	2nd Inspection	Criminal Summons
[illegible] ROANOKE BAY ASSOC.	2623 YALE AVE E.	CONSTRUCT MOORAGE FOR 20 HOUSEBOATS & 15 PUBLIC BOATS. REDUCE DREDGING FROM 2500 CU. YDS. TO 300 CU. yds. & BULKHEAD CHANGED TO RIPRAP ON N. 100FT & SW 100 FT. OF PROPERTY SHORELINE	(1) CONTAIN DREDGE SPOILS @ RIPRAP (2) NO DEBRIS OR SEDIMENTARY MATERIALS ENTERING WATER.	4/28/77 IN PROCESS					
HAMLIN PIER COMPANY	2715-2727 FAIRVIEW AVE E.	CONSTRUCT HOUSE BOAT DOCK & RESTORE BLDG.	(1) PROTECT HISTORICAL CHARACTER OF BLDG IN RESTORATION. (2) NO REDUCTION IN EXISTING MOORAGE SPACE.	5/12/77 COMPLETE IN COMPLIANCE	APPROVAL	←			NA
3. HAMLIN PIER COMPANY	2727 FAIRVIEW AVE E.	CONSTRUCT PIER EXTENSION W/ FINGER PIERS PROVIDING NEW MOORAGE FOR 31 BOATS	(1) SAILBOATS ONLY MAX. 35 FT. (2) NO RESIDENT USE OF MOORAGE. (3) ALLOW MOORAGE TENANTS TO USE ACCESS, PARKING LOT (4) VIEW OBSCURING FENCE FOR PARKING LOT	5/12/77 IN PROGRESS - MOORAGES OCCUPIED (5) LANDSCAPING FOR PARKING LOT (6) MATERIAL OR EQUIP. FOR OIL-SPILL CLEANUP BE PROVIDED. (7) CONST. & DEMO. DEBRIS REMOVED FROM WATER. (8) MINIMIZE TURBIDITY DURING CONSTRUCTION.				(1)	
4. LAKE UNION TERMINALS INC.	88 E. HAMLIN ST.	CONSTRUCT SHED	NONE	5/12/77 COMPLETE & IN COMPLIANCE	APPROVAL	←			NA
3 11 (6/15/77 [illegible]) 40 E. ALLISON ST.	A.D. MONROE	ADD TO BARGE, REMODEL EXTERIOR [illegible] PLACE 260 CU. YDS. FILL UNDER ADDITION. PLACE FLOAT ON S. SIDE OF BARGE.	- (1) STRUCTURE "MEETS POLICIES FOR LAKE UNION" (2) PLANS REVIEWED BY BLDG. DEPT. FOR CONSISTENCY. (3) NECESSARY STREET USE PERMITS OBTAINED (4) NO FUTURE ADDITION S. OF BARGE	5/12/77 IN PROGRESS	VIOLATION	1. NO SMA PERMIT FOR 2 CONCRETE FLOATS 2. NO BLDG. PERMIT FOR ABOVE. 3. NO CERTIFICATE OF OCCUPANCY	7/6/77		
31 J.P. NELSON	10 E. ALLISON ST.	REPLACE 5 OLD COVERED MOORAGES (1) 6 NEW COVERED MOORAGES & ONE 72 FT. PIER FOR OPEN MOORAGE	(1) PILE DRIVING ONLY BETWEEN 7AM & 6PM (2) ANY NEW DEVELOPMENT ON UPLAND OF SITE SET BACK 7FT. FROM N. PROPERTY LINE FOR VIEW CORRIDOR	5/19/77 IN PROGRESS					

LAKE UNION - EAST SHORE — BODY OF WATER - LAND AREA

FAIRVIEW AVE. E. (2600-3099) — STREET - AVENUE

DEPARTMENT OF ECOLOGY LOG FOR SHORELINE MANAGEMENT

SUBSTANTIAL DEVELOPMENT PERMIT COMPLIANCE - BY SHORELINE COMPLIANCE MANAGER

Seattle Department of Buildings

503 Municipal Building, Seattle, Washington 98104.

Alfred Petty, P.E. Superintendent
Wes Uhlman, Mayor

SMA NO. OWNER/LESSEE ADDRESS PROJECT DESCRIPTION	PROJECT CONDITIONS	SITE INSPECTION: DATE	NOT STARTED	IN PROGRESS	COMPLETED (OCCUPIED)	IN COMPLIANCE	APPROVAL	VIOLATION (S)	VIOLATION DESCRIPTION(S)	COMPLIANCE DATE	SITE INSPECTION #2: DATE	NO CHANGE	IN PROGRESS	VIOLATION(S) NOT CORRECTED	VIOLATION(S) CORRECTED	CRIMINAL COMPLAINT/SUMMONS DATE	COURT DECISION: DATE	VIOLATION UPHELD	VIOLATION DISMISSED	FINAL INSPECTION: COMPLIANCE/SENTENCE DATE	NOT IN COMPLIANCE	IN COMPLIANCE
77-14 CITY OF SEATTLE E. ALLISON ST. ON L. UNION	1. APPROVAL OF UPLAND DISPOSAL SITE BY DCD 2. APPROVAL OF SEWER PROTECTION MEASURES FROM ENGINEERING DEPT.	5/11/77	X																			

LAKE UNION - EAST SHORE — BODY OF WATER - LAND AREA | DEPARTMENT OF ECOLOGY FORM FOR SHORELINE MANAGEMENT

FAIRVIEW - FUHRMAN AVE. E. (3100-3400) STREET - AVENUE | SUBSTANTIAL DEVELOPMENT PERMIT COMPLIANCE - BY SHORELINE COMPLIANCE MANAGER

Seattle Department of Buildings
503 Municipal Building, Seattle, Washington 98104
Alfred Petty, P.E. Superintendent
Wes Uhlman, Mayor

SMA NO. OWNER/LESSEE ADDRESS PROJECT DESCRIPTION	PROJECT CONDITIONS	SITE INSPECTION: DATE	NOT STARTED	IN PROGRESS	COMPLETED (OCCUPIED)	IN COMPLIANCE	APPROVAL	VIOLATION (S)	VIOLATION DESCRIPTION(S)	COMPLIANCE DATE	SITE INSPECTION #2: DATE	NO CHANGE	PROGRESS	VIOLATION(S) NOT CORRECTED	VIOLATION(S) CORRECTED	CRIMINAL COMPLAINT/SUMMONS DATE	COURT DECISION: DATE	VIOLATION UPHELD	VIOLATION OVERTURNED	FINAL INSPECTION: COMPLIANCE / EXTENSION	DATE	NON-COMPLIANCE
252 (3 REVISIONS) JAMES A. JESSUP 3123 FAIRVIEW AVE. E. CONSTRUCT 3 STORY OFFICE BLDG. WITH BASEMENT & SURFACE PARKING FOR 10 VEHICLES	1. BLDG BULK REDUCED (NARROWER AT SHORELINE & STREET) 2. PROVIDE 10 PARKING SPACES 3. BLDG. 5' FROM SHORELINE TO ALLOW PATH ALONG BULKHEAD. 4. PROVIDE PUBLIC COURT SPACE AT NW CORNER	5/19/77		X																		
76-46 RICHARD W. WRIGHT 3133 FAIRVIEW AVE. E. REMOVE EXISTING PIER & PILINGS & OVER-WATER PAINT SHOP. CONSTRUCT DRYDOCK, COVERED BOAT REPAIR AREA, AND CONNECTING PIER ON PILINGS.	1. PROVISIONS FOR CONTROL OF OIL DISCHARGE PRETREATMENT REQUIRED BEFORE ENTERING METRO SYSTEM. 2. DREDGE SPOILS PLACED UPLAND SUBJECT TO PERMIT TERMS & CONDITIONS REGARDING DISPOSAL SITE	5/19/77		X																		
268 MARIT E. K. LEWIS 3304 FUHRMAN AVE E. CONSTRUCT BOAT REPAIR WORKSHOP AND 1 STORY DUPLEX APARTMENT PARTLY OVER WORKSHOP.	NO CONDITIONS	5/19/77			X	X	X															
303 WASH. ST. DEPT. OF HIGHWAYS 3400 FUHRMAN AVE. E. DEVELOP PARK FOR PASSIVE RECREATION: 1800 CU. YDS. FILL (ABOVE HIGH WATER) CONTOURING, STEPS, PLANTINGS, PUTTING SAND ON BEACH	ALL TREES PLANTED MINIMUM OF 5 FT. FROM SIDE SEWERS LESS THAN 10 FT. BELOW SURFACE, UNLESS IMPOSSIBLE TO RELOCATE.	5/12/77			X																	

LAKE UNION - NORTH SHORE — BODY OF WATER - SMA AREA

NE NORTHLAKE WAY — (500-900) STREET-AVENUE

Seattle Department of Buildings

503 Municipal Building, Seattle, Washington 98104

Alfred Petty, P.E. Superintendent
Wes Uhlman, Mayor

DEPARTMENT OF ECOLOGY LOG FOR SHORELINE MANAGEMENT

SUBSTANTIAL DEVELOPMENT PERMIT COMPLIANCE - BY SHORELINE COMPLIANCE MANAGER

SMA NO., OWNER/LESSEE ADDRESS PROJECT DESCRIPTION	PROJECT CONDITIONS	SITE INSPECTION: DATE	NOT STARTED	IN PROGRESS	COMPLETED OCCUPIED	IN COMPLIANCE	APPROVAL	VIOLATION (S)	VIOLATION DESCRIPTION(S)	COMPLIANCE DATE	SITE INSPECTION #2: DATE	NO CHANGE	IN PROGRESS	VIOLATION (S) NOT CORRECTED	VIOLATION (S) CORRECTED	CRIMINAL COMPLAINT/SUMMONS DATE	COURT DECISION: DATE	VIOLATION UPHELD	VIOLATION OVERTURNED	CASE DISMISSED	FINAL INSPECTION: COMPLIANCE/SENTENCE DATE	NOT IN COMPLIANCE
302 WASH. STATE DEPT. OF HIGHWAYS 601 NE NORTHLAKE WAY DEVELOP PARK: NEW BANK PROTECTION, WOODEN DECK OVER SEWER OUTFALL, GRADING, LANDSCAPING, & PROVISION OF PATH & SERVICE ROAD	NONE	5/19/77			X	X	X															
152 HERBERT FRIEDMAN 660 NE NORTHLAKE WAY ALTER & ADD TO EXISTING TAVERN	NONE	6/13/77			X	X	X															
77-11 ELLESSCO BUILDING PRODUCTS 704 NE NORTH LAKE WAY CONSTRUCT TWO ONE-STORY TO EXISTING COMMERCIAL STRUCTURE, PROVIDING DISPLAY SPACE & ADDITIONAL WAREHOUSE SPACE	50% LOT COVERAGE (VARIANCE GRANTED TO ALLOW 53.4% COVERAGE)	6/13/77	X																			
280 CITY OF SEATTLE 600-1700 NE NORTHLAKE WAY CONSTRUCT 2 LANE ROADWAY, PLANTED MEDIAN STRIP, LEFT TURN LANES AT SOME INTERSECTIONS, 8FT PAVED SHOULDER FOR EMERGENCY STOPS & BICYCLE TRAFFIC; 4 LANES WIDE E. OF BROOKLYN AVE. E.	1. PERMIT COVERS PHASE I ONLY. 2. OIL SEPARATORS OR LIKE DEVICES REQ'D. TO REMOVE POLLUTANTS FROM ROADWAY DRAINAGE PRIOR TO DISCHARGE INTO LAKE.	6/13/77	INSPECTION NOT COMPLETED																			

...UNION - NORTH SHORE — DEPT OF PARKS - PARK AREA — DEPARTMENT OF ECOLOGY LOG FOR SHORELINE MANAGEMENT

N. NORTHLAKE WAY (2100 -) STREET-AVENUE

SUBSTANTIAL DEVELOPMENT PERMIT COMPLIANCE - BY SHORELINE COMPLIANCE MANAGER

Seattle Department of Buildings

503 Municipal Building, Seattle, Washington 98104

Alfred Petty, P.E. Superintendent
Wes Uhlman, Mayor

SMA NO. OWNER/LESSEE ADDRESS PROJECT DESCRIPTION	PROJECT CONDITIONS	SITE INSPECTION: DATE	NOT STARTED	IN PROGRESS	COMPLETED (OCCUPIED)	IN COMPLIANCE	APPROVAL	VIOLATION (S)	VIOLATION DESCRIPTION(S)	COMPLIANCE DATE	SITE INSPECTION #2: DATE	NO CHANGE	IN PROGRESS	VIOLATION(S) NOT CORRECTED	VIOLATION(S) CORRECTED	CRIMINAL COMPLAINT/SUMMONS DATE	COURT DECISION: DATE	VIOLATION UPHELD	VIOLATION OVERTURNED	FINAL INSPECTION: COMPLIANCE/SENTENCE DATE	NON-COMPLIANCE	COMPLIANCE
209 CITY OF SEATTLE 2100 N. NORTHLAKE - 300 NE NORTHLAKE WAY CONSTRUCT AN ASPHALT BIKEWAY PATH	NONE																					
232 CITY OF SEATTLE 2253 N. NORTHLAKE WAY, WATERWAY 18 CONSTRUCT 200 FT. FLOAT SECURED BY PILING	PROVIDE PUBLIC ACCESS TO FLOAT																					
216 PUGET SOUND YACHT CLUB 2321 N. NORTHLAKE WAY REBUILD & EXTEND EXISTING PIER	ALL DEMOLITION & CONSTRUCTION DEBRIS ENTERING WATER SHOULD BE REMOVED.																					
6 SEATTLE MARINA INC. 2401 N. NORTHLAKE WAY CONSTRUCT A RESTROOM	NONE																					
175 SEATTLE MARINA 2435 N. NORTHLAKE WAY CONSTRUCT OPEN STORAGE RACK FOR BOATS, DECKING & NEW BULKHEAD, REMOVAL OF EXIST. MOORAGE AND ENLARGED COVERED MOORAGE	PROVIDE 18 NEW PARKING STALLS																					

LAKE UNION - NORTH SHORE — BODY OF WATER - LAND AREA

N. NORTHLAKE WAY (1600 - 2099) — STREET - AVENUE

DEPARTMENT OF ECOLOGY LOG FOR SHORELINE MANAGEMENT

SUBSTANTIAL DEVELOPMENT PERMIT COMPLIANCE - BY SHORELINE COMPLIANCE MANAGER

Seattle Department of Buildings

503 Municipal Building, Seattle, Washington 98104.

Alfred Petty, P.E. Superintendent
Wes Uhlman, Mayor

SMA NO. OWNER/LESSEE ADDRESS PROJECT DESCRIPTION	PROJECT CONDITIONS	SITE INSPECTION: DATE	NOT STARTED	IN PROGRESS	COMPLETED (OCCUPIED)	IN COMPLIANCE	APPROVAL	VIOLATION (S)	VIOLATION DESCRIPTION(S)	COMPLIANCE DATE	SITE INSPECTION #2: DATE	NO CHANGE	IN PROGRESS	VIOLATION (S) NOT CORRECTED	VIOLATION (S) CORRECTED	CRIMINAL COMPLAINT/SUMMONS DATE	COURT DECISION: DATE	VIOLATION UPHELD	VIOLATION DISMISSED	FINAL INSPECTION: COMPLIANCE/SENTENCE DATE	NOT IN COMPLIANCE
46 CITY OF SEATTLE 1717 N. NORTHLAKE PLACE CONSTRUCT HELICOPTER HANGER FOR STORAGE & REPAIR																					
173 CITY OF SEATTLE 1901 N. NORTHLAKE WAY DEVELOP A LAKE UNION PARK	NONE																				
30 WASHINGTON NATURAL GAS CO. 2000 N. NORTHLAKE WAY FILL & EXCAVATE APPROX 20,000 CU. YDS. FOR SITE PREPARATION WORK FOR PARK	NONE	6/13/77			X	X	X														

Your City, Seattle

Department Operating Instruction

Subject: SHORELINE DISTRICT COMPLIANCE INSPECTION		Number
		Effective
		Supersedes
Approved:	Department: BUILDING	Page 1 of 2

1.0 PURPOSE:

1.1 To provide a systematic procedure for the inspection and followup of shoreline management permits to assure compliance with conditions imposed under the Shoreline Master Program.

2.0 ORGANIZATIONS AFFECTED:

2.1 Building Department, Code Enforcement Division.

3.0 REFERENCES:

3.1 Department Operating Instruction for Enforcement of Code Violations.

3.2 Department Operating Instruction 800-I-3203.

3.3 Seattle Shoreline Master Program.

3.4 Zoning Ordinance 86300 as amended.

4.0 POLICY:

4.1 It shall be the policy of the department to inspect and followup on any violations of conditions placed on shoreline permits.

5.0 DEFINITIONS:

N/A

6.0 RESPONSIBILITY:

6.1 It shall be the responsibility of the ~~Coastal Zone~~ SHORELINE COMPLIANCE Manager to assure that this procedure is implemented.

6.2 It shall be the responsibility of the Code Compliance Officer to take any necessary legal action.

7.0 PROCEDURE:

7.1 The ~~Coastal Zone~~ SHORELINE COMPLIANCE Manager shall review all shoreline permits that have been issued to date and group them by location for purposes of efficient inspection.

7.2 A file shall be set up for each permit by address to a cross reference by permit number.

7.3 Enter project information on Department of Ecology log prior to inspection.

7.4 Make field inspection, take photos (entering information on photograph log), and check for compliance with the approved shoreline plans.

7.5 Enter appropriate information in Department of Ecology log and on the Inspector's Report form in the ~~Coastal Zone~~ SHORELINE COMPLIANCE Management file.

7.6 Developed photos are to be dated, address noted, name of inspector on the back of each individual photo, and filed.

7.7 If the project is in compliance, this shall be noted on the log and in the individual file.

7.8 If not, the ~~Coastal Zone~~ SHORELINE COMPLIANCE Manager shall follow the procedure for the enforcement of Code Violations and continue to follow up through the procedure for the preparation and filing of the criminal complaint and summons if voluntary compliance is not achieved.

7.9 Every three months, the Department of Ecology log shall be forwarded to the Department of Community Development.

8.0 APPENDIX:

8.1 Letter of notification.

8.2 Department of Ecology log sheet

8.3 Photo log sheet.

8.4 REPORT OF INSPECTOR FORM

8.1) LETTER OF NOTIFICATION

Seattle
Department of Buildings

Alfred Petty, P.E. Superintendent
Wes Uhlman, Mayor

RE:

The purpose of this letter is to notify you that the property at _____ is in violation of the City of Seattle Shoreline Master Program, Ordinance 86300 as amended Section _____.

You may clear this violation, thereby avoiding criminal charges, by completing the following corrective measures:

On _____, 19____, a reinspection of the property will be made, and if the violation has been corrected at that time no legal action will be taken against you. However, if the violation remains uncorrected when resinspection is made, a criminal complaint will be filed, and you will be summoned to appear in Municipal Court.

If you need assistance or additional information to complete the corrections, you may call Mr. Edward W. Schein, Coastal Zone Manager, Department of Community Development, 625-4541 between 7:30 AM and 8:30 AM, or from 3:00 PM to 3:30 P.M. on any Tuesday, Wednesday or Thursday.

Very truly yours,

ALFRED PETTY, P.E.
Superintendent of Buildings

by
EDWARD W. SCHEIN
Coastal Zone Manager

EWS:kao

Seattle Department of Buildings, 503 Municipal Building, Seattle, Washington 98104

8.2

BODY OF WATER - LAND AREA

STREET - AVENUE

SMA NO. OWNER/LESSEE

ADDRESS

PROJECT DESCRIPTION

Seattle
Department of Buildings

503 Municipal Building, Seattle, Washington 98104

PROJECT CONDITIONS

DEPARTMENT OF ECOLOGY LOG FOR SHORELINE MANAGEMENT

SUBSTANTIAL DEVELOPMENT PERMIT COMPLIANCE - BY SHORELINE COMPLIANCE MANAGER

SITE INSPECTION

DATE | NOT STARTED | IN PROGRESS | COMPLETED (OCCUPIED) | IN COMPLIANCE | APPROVAL | VIOLATION (S)

Alfred Petty, P.E. Superintendent
Wes Uhlman, Mayor

VIOLATION DESCRIPTION(S)

COMPLIANCE DATE

SITE INSPECTION #2

DATE | NO CHANGE | IN PROGRESS | VIOLATION (S) NOT CORRECTED | VIOLATION (S) CORRECTED

CRIMINAL COMPLAINT/SUMMONS DATE

COURT DECISION

DATE | VIOLATION UPHELD | VIOLATION DISMISSED

FINAL INSPECTION

COMPLIANCE/SENTENCE DATE | IN COMPLIANCE | NOT IN COMPLIANCE

(8.3)

11		SMA #, ADDRESS, DETAILS, OK/NOT OK DATE
12		1
13		2
14		3
15		4
16		5
17		6
18		7
19		8
20		9
21		10

3/16/17 EWS

PHOTO LOG - SED

PHOTO LOG SEATTLE BUILDING DEPARTMENT

(0.4)

REPORT OF INSPECTOR ______ PERMIT No. ______

Date of Visit	Made by	REMARKS

CSS. 5.82 BC 42

DEPARTMENT OF ECOLOGY REPORT - HOW FILES ARE SET UP

INDEX TO FILE DRAWER NUMBER ONE

1. Department of Ecology Log (SMA's logged in by water body, general location on water body, and address)

2. Current Inspection Area Cards & Lists (from DCD card files - used to locate ALL SMA's within area)

3. New Permits to Inspect (issued from May, 1977 on -- also see Folder 8)

4. Potential Violations to Check (reported by other departments or the public)

5. Inspection Complete-Update DOE Log (usually logged in immediately after return from day of site inspections)

6. Projects in compliance, waiting for photos (photos not developed yet)

7. Additional Site Inspection Necessary (e.g., inspect from water)

8. Check with Other Departments (after site inspection - to clarify SMA conditions)

9. Check Building Department Permit & Plans (after site inspection - to clarify SMA conditions.

10. Re-file(SMA shoreline compliance information to be re-filed in DCD master SMA files)

11. Uncompleted Projects to Reinspect (filed by water body and re-inspected in approximately 6 months)

12. First Notice Violations (first letter sent to owner listing violations and compliance date)

13. Second Notice Violations (second letter sent to owner listing violations and extended compliance date)

14. Applicants Questioning Violations (for quick reference when phone calls expected)

15. Criminal Complaint/Summons Issued (violations have not been corrected by extended compliance date)

16. Shoreline Compliance Tally (Number of SMA's reviewed; status: not started, in progress, completed; and final action: approval, violation)

Compliance Records

The following pages are examples of the records for one case. The system is parallel to the Building Department compliance record system, thus providing for efficient administration procedures as well as adequate legal records.

List of Forms

1. Standard Operating Procedure and Appendix (Section 8), including:

    8.1 Letter of notification
    8.2 Department of Ecology log sheet
    8.3 Photo log sheet
    8.4 Report of inspector form

2. Inspector's Report, SMA Inspection File

3. Shoreline permit

4. Cover letter for shoreline permit

5. Building permit record for address

6. Building permit for construction pursuant to shoreline permit

7.a, 7.b
Inspection, photographs and identification

8. Vicinity map and parking plan

9. Moorage plan

10. Photographs taken prior to permit

PROCESS USED TO CHECK COMPLIANCE OF SPECIFIC SHORELINE PERMIT - SMA 278
2727 Fairview Avenue E.

1. Review all SMA permits along east shore of Lake Union and begin DOE log sheet for 2600-3099 Fairview Avenue E. (1) Use DCD multiple reference card files to triple check all possible SMA permits in area.

2. Review SMA 278 and fill out DOE log including project conditions (1) that must be carried out.

2b Review Shoreline Master Program sections applicable to this development, and include any conditions on DOE log.

2c Check "Potential Violations" folder for additional sites to check.

3. Obtain copy of SMP permit and attached letters or reports stating background information on conditions imposed. (Check file folder on "New Permits Received") (3) (4)

3b Pull approved site plans and any photos from file for use during site inspection. Attach to blank inspector's report and SMA permit copy.

4. Site inspect all projects on this log sheet (using log sheet copy as easy (9) (10) reference for conditions imposed (1) including 2727 Fairview Avenue E.; take photos of project showing progress in areas where conditions have been imposed.

5. Make notes on inspector's report of observations regarding conditions imposed, number of photos taken, and any questions that must be answered. (2)

6. Try to talk with owner, contractor, or resident at site to state purpose of site inspection, and record name and comments received. (2)

7. Use Photo log to record each location and description of photo, date, SMA No. and address. (7a)

8. After returning to office, immediately update original sheet of DOE log. (1)

9. Place Inspector's report and attached SMA permit, plans and old photos in folder marked "Check Building Department permit and plans." File 9 (11)

9b When photos are developed, transfer photo log information to back of photo, sign and place with inspection information. (7b)

10. After reviewing plans at Building Department, call owner to let him know where project is currently not in compliance, so he will have a chance to comply before project is complete.

11. Record owner's answers to each condition required. (2)

12. Place inspection information in folder marked "Uncompleted Projects to Reinspect" for checking within 6 months. File 11 (11)

Process used to check compliance of specific Shoreline Permit SMA 278 (continued)

13. Enter SMA 278 inspection results in "Shoreline Compliance Tally" folder. File 16 (11)

REPORT OF INSPECTOR 2727 Fairview Ave. E. PERMIT No. 278

Date of Visit	Made by	REMARKS
4/28/77	EMS	Parking area photographed (5 photos). Gravelled, but no fencing or new trees. Hedge exists on S. & W.- low hedge on North. Property line, but doesn't screen at this time.
5/12/77	EMS	No view obscurring fence for parking lot exists. Tood 2 photos of car parked in lot. Appears to be in same spot as before.
		Talked with Jessup's office staff - 278 not finished. Electrical permit not applied for yet.
		One 42' sailboat moored W. of pier (stall 27)
		22 boats moored at present/ 3 photos taken
		10 photos taken total
5/18/77	EMS	Check bldg. permits to see if certificate of occupancy has been issued. Look to see if parking landscaping revised.
6/9/77	EMS	#565491(bldg.permit #) Plans say landscape plan in DCD files.
		(Notation by Rosemary Horwood 8/20/76) Permit not finaled but does not include floating pier. No landscape plans in Bldg.Dept.SMAfiles
6/15/77	EMS	Landscape plan zerox in DCD SMA files show 8 trees & 4'high fence on N.,S.,&W. sides & gravel drain basin and tiles along W.prop.line
		Called Jessup's office (owner) 322-2121 - will call back
		Jessup called - I reviewed each condition with him. His response:
		1. Sailboats only 35' - all interior moorages much less - very rarely exterior stalls might have over 35' for stopover only. Not for permanent moorage.
		2. No resident use of moorage - he assumes this means live aboards & he is enforcing this condition even though personally opposed to i
		3. Encourage tenants to use access. parking lot. See attached lease agreement clause to be sent.
		4. View obscuring fence for parking lot - surrounding residents, especially on N. want laurel hedge rather then fence.
		5. Landscaping for parking lot - trees will be installed at same ti as those at 3123 Fairview Ave. E. office bldg. by same owner.
		6. Material or equip. for oil-spill cleanup provided - Existing floats completely trap all floating materials from leaving area (W.orN.) Sign with phone number to call if oil spilled(for cleanup service) will be placed on office outside wall.
		7. No turbidity or construction or demolition bebris noticed during inspection.
		8. Gravel drain basin (drywell) with tiles along W. prop. Line of access. parking lot was installed & working well in heavy rains.
		Check for compliance in 6 months

CITY OF SEATTLE
DEPT. OF COMMUNITY DEVELOPMENT

JAN 16 1976

CITY OF SEATTLE

OFFICE OF ENVIRONMENTAL MGMT.

PERMIT NO. SMA 278

PERMIT FOR SHORELINE MANAGEMENT SUBSTANTIAL DEVELOPMENT

Application No. SMA 278 Date Received 6/26/75 Date Approved 1/14/76

Pursuant to Section 14, Chapter 286, Laws of 1971, Ex. Sess., and Section 4 of Ordinance #100423, a permit is hereby granted to :

Owner: The Hamlin Pier Company
Address: c/o J.A. Jessup, AIA, Architect, 2727 Fairview Ave. E. Seattle, WA. 98102

Applicant: James A. Jessup, AIA, Architect
Address: 2727 Fairview Ave. E., Seattle, Wa. 98102

Construct pier extension with finger piers providing new moorage spaces for 31 boats. The pier will provids electrical and water hookups for each moorage. Parking will be provided for 20 cars.
upon the following property: 2727 Fairview Ave. E.

Seattle, King County, Washington.

Development pursuant to this permit shall be undertaker pursuant to the following terms and conditions: SEE ATTACHED LETTER FROM THE DEPARTMENT OF COMMUNITY DEVELOPMENT.

This permit is granted pursuant to Section 4 of Ordinance #100423 and the Shoreline Management Act of 1971 and nothing in this permit shall excuse the applicant from compliance with any other federal, state or local statutes, ordinances or regulations applicable to this project.

This permit may be rescinded pursuant to Section 9 of Ordinance #100423 and Section 14 (7) of the Shoreline Management Act of 1971 in the event the permittee fails to comply with any condition hereof.

Construction pursuant to this permit will not begin or be authorized until forty-five (45) days from the date of final approval and grant of the permit by the Superintendent of Buildings or until all review proceedings initiated within forty-five days from the date of final approval by the City have been terminated.

Alfred Petty

January 14, 1976
(Date)

(Superintendent of Buildings)

Further conditions of this permit:

Your
Seattle
Community Development

Paul E. S. Schell, Director
Wes Uhlman, Mayor

January 14, 1976

Mr. Alfred Petty, P.E.
Superintendent of Buildings
City of Seattle

Subject: SMA #278

Dear Mr. Petty:

Pursuant to Ordinance 100423, we have reviewed Application No. 278, filed by James A. Jessup for a Substantial Development Permit to construct a pier extension and moorage for 31 boats at 2727 Fairview Avenue E., Seattle.

In accordance with provisions of the State Environmental Policy Act, we have examined possible environmental effects and prepared a Declaration of No Significant Impact for the project (copy attached). The finding of no significant impact is based in part upon the applicant's representation that the moorage will be restricted to sailboats only, generally no longer than 35 feet; that residential use of the proposed moorage will not be permitted; and that moorage tenants will be encouraged to utilize the upland accessory parking lot.

We have determined that the proposed development is consistent with the provisions of the Shorelines Master Program and Section 4 of Ordinance 100423.

We therefore authorize the granting of a Substantial Development Permit for work described in SMA 278 and attached approved plans, subject to the following conditions:

(1) That a view-obscuring fence be provided on those boundaries of the parking area adjoining residential structures;

(2) That a parking plan incorporating landscaping be submitted to the Department of Community Development for approval prior to issuance of a Building Permit;

(3) That materials or equipment for cleanup of minor oil spills be provided;

(4) That floating construction or demolition debris be removed from the water; and

(5) That work be carried on in a manner to minimize water quality problems such as turbidity.

Very truly yours,

Paul E. S. Schell
Director

PESS:os

2701-27 Fairview E. Card #4 LOT 3 to 7 incl. BLK. 49 ADD. Lake Union Shorelands 30W SEE HOUSING INSPECTION DIVISION HAMLIN PIER CO.

FM. S. E. 197

BUILDING PERMIT No.	DATE	EST. COST	WORK	STO.	SIZE	CONST.	OCCUPANCY
464654	1958	600	Alter existing building	2		Vn	Apartments, Shop
470836	1958	8,000	Drive piling & install boat moorages				Boat Moorages
471295	1958	600	Complete work on #464654, revised plan			Vn	Apartments (4)
481232	1959	10	Complete work on " & 471295				"
523685	1967	50	Relocate houseboat from 2143 N. Northlake Way; KCA 95			VN	Houseboat
528327	1968	50	Relocate houseboat fr. 2319-(D) Fairview E.				"
542675	1971	3,000	Repair exist bldg.	2		VN	H-Apts. F-2
547644	1973	25,000	K.C.A. #694 Const. floating home.	2		VN	I-Floating home
549151	6-22-73	2000	Const. finger piers, Alt. exist Float. home moorage			VN	Float. Home Moorage & Offic
549817	8-15-73	27,000	Const floating home	2		VN	I-Floating home
089	9-10-73	500	(E.I. Worksheet Filed) Alt. & Const. wall 1st fl.	2		VN	I-Floating hom
550207	9/17/73	29,000	E.I. WORKSHEET FILED. Const. floating home.	2		VN	I-OFD
550589	10/30/73	35,000	Const. floating home. KCA #661. (E.I. WORKSHEET FILED).	2		VN	I-Floating Home
551087	12/14/73	22,000	E.I. WORKSHEET FILED. Const floating home KCA 700	2		VN	I-Floating Home
551473	2-8-74	500	Alt. por. 1st flr. E.I. EXEMPTION	2		VN	G-Office
552076	3/29/74	3000	Alt. int. exist. bldg. Const. deck & ext. stairway.	2		V-1 Hr.	G-Office
552128	4-4-74	10	Complete work under permit 547644 E.I. WORKSHEET FILED	2		VN	I-Floating home
552892	6/6/74	10	Renewal permit #549151.			VN	Floating Home Moorage & office
553575	7/26/74	21,000	Const. floating Home. KCA 705 E.I. EXEMPT	2		VN	I-Floating Home.
559							
555742	2-25-75	10	Complete work authorized under permit 551087 (KCA 700) (EI WORKSHEET)	2	no bsmt	VN	I floating home
555860	3-6-75	24,000	Construct new houseboat KCA 711	2			I floating home
557127	6-13-75	25,000	Const new houseboat KCA 714 Sp 4	2			I Floating home
2603	1-27-76	50	per attached plans				sign
563535	5-19-76	30,000	Const. new two-story floating home	2		VN	I - OFD
65491	8-24-76	35,000	Drive piles for floating pier & const. office bldg.	1		VN	F-2 Office F-3 Boat Moorage
566778	11-1-76	2,500	Alter pn of int of exist bldg	2	no bsmt	VN	F-2 Office
ERMIT No.	DATE	COST	WORK	STO.	SIZE	CONST.	OCCUPANCY
54035	9/9/74	5,000	Alter interior of exist blg. & const. deck add. e.i. exempt	2		V N	G-Offices.
554237	9/26/74	10	Renewal of 549151	2 no bsmt.		VN	I=OFD Floating Home.
1908	5-20-76	150	Erect & maint. info. sign on public prop.				Sign

Owner owes City Treasurer $90.00. Do not issue until paid. See central letter file

ORIGINAL

30W
KROLL PAGE NUMBER

23900 90.00
RECEIPT NUMBER AMOUNT

27358 155.90
RECEIPT NUMBER AMOUNT

CITY OF SEATTLE
DEPARTMENT OF BUILDINGS
BUILDING — USE PERMIT
NOT VALID UNLESS SIGNED BY SUPERINTENDENT OF BUILDINGS

INDEX CARD

565491

565491
PERMIT NUMBER

$15.00
FILING FEE

$230.90
PERMIT FEE

STATE LEASE LANDS ADJ. TO

At 2727 FAIRVIEW AVE. E. (Number) (Street), on Lot 3,4,5,6,7 Block 49

of LAKE UNION SHORELANDS Addition. Lot is ____ x ____ Alley ____

Zoning	Height Limit	Fire Zone	Owner's Value	Bldg. Dept. Value	Life of Permit	Plans Filed	Clerk
CG	60'	III	$25,000		1YR	Yes / No	N.E.

Occupancy and Group	Occupant Load	No. Stories	Basements	No. Dwelling Units	Occupancy Certificate Required
F-2 Office; F-3 Boat Moorage		1	No	NONE	Yes / No

Type Constr.	Bldg. Size: New / Add / Alter	Total Area	Width of Streets	Lot has Reached Maximum Coverage
V.N				Yes / No

Permission is hereby given to do the following described work, according to the conditions hereon and according to the approved plans and specifications pertaining thereto, subject to compliance with the Ordinances of the City of Seattle.

TO DRIVE PILES FOR FLOATING PIER; CONST. OFFICE BLDG.; FIRE EXTINGUISHERS AS REQ'D PER S.F.D PER PLANS.
SEE BUILDING PERMIT # 565491 FOR ACCESSORY OFF-ST PARKING @ 2716 YALE TERRACE EAST.

STARTING CONSTRUCTION WITHOUT A BUILDING PERMIT IS PUNISHABLE BY FINE AND IMPRISONMENT

Owner HAMLIN PIER CO Address SAME Ph. 322-2121

Contractor OWNER Ph. ____
Struct. Engineer ____
Architect JAMES JESSUP Ph. ____

I have read the conditions of this permit and I agree that I will do the work described above in conformance with the Building Code and the approved plans.

Address SAME Signed HAMLIN PIER (Owner)

Application made 6/14, 1976 By ____ (Owner's Authorized Agent)

Permit issued 8-24, 1976 SUPERINTENDENT OF BUILDINGS. By ____

Additional Permits Are Required for:
Electrical
Boiler
Furnace
Elevator
Sign or Billboard
Grading
Wrecking
Plumbing
Flamable Liquid Storage
Oil Burner
Use of Public Areas
Curb or Walk Crossing
Sewer
Street Grades
Roof Area
Water

APPROVAL OF OTHER CITY DEPTS. CONTRACTOR'S LICENSE NO.

SMA 76-278

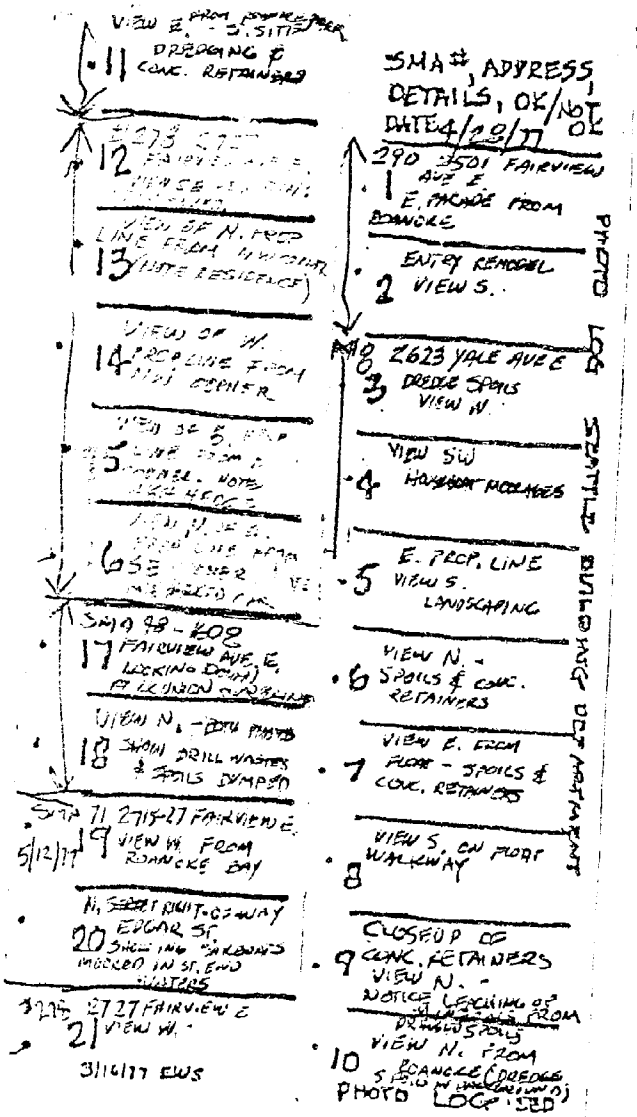
U.S. ARMY CORPS ENG. 071-OYB-1-002713

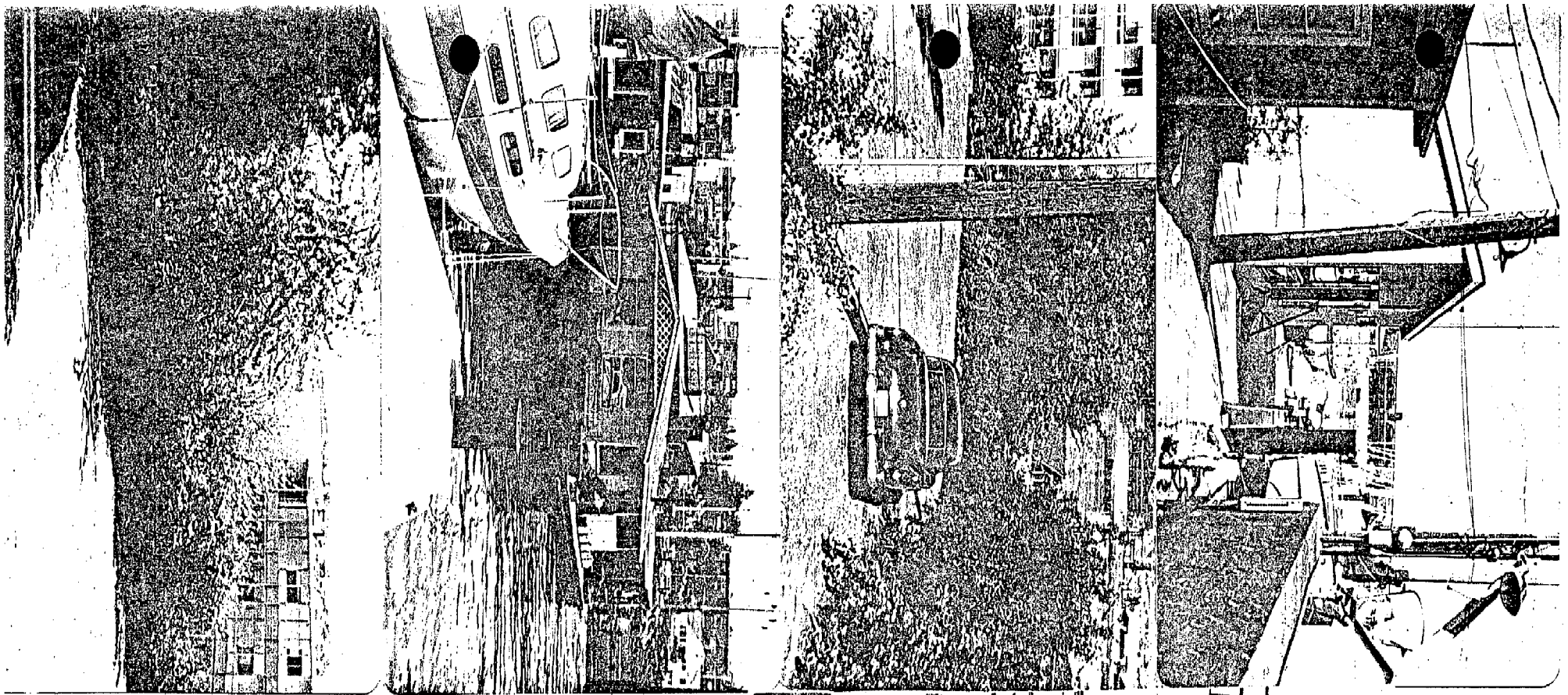
SIDE SEWER PERMIT

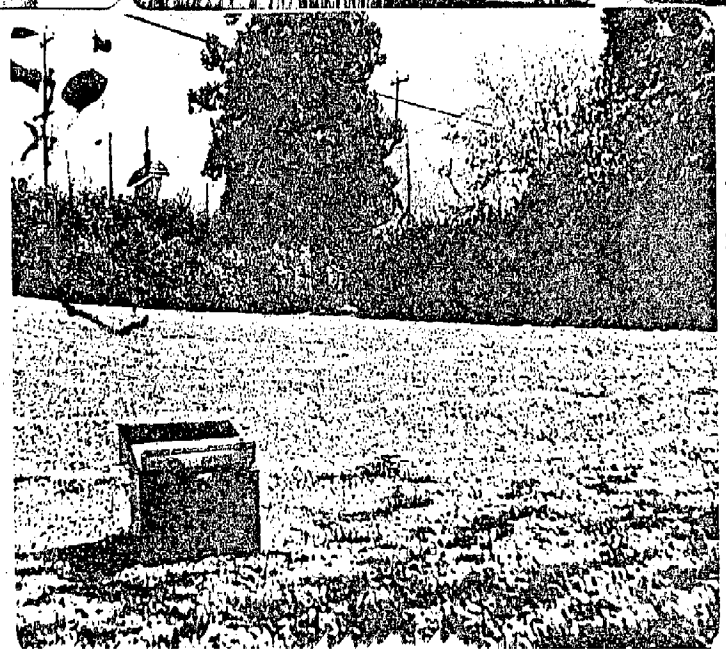
S.E.P.A. ACTION	
Catagorical Exemption	Worksheet Filed

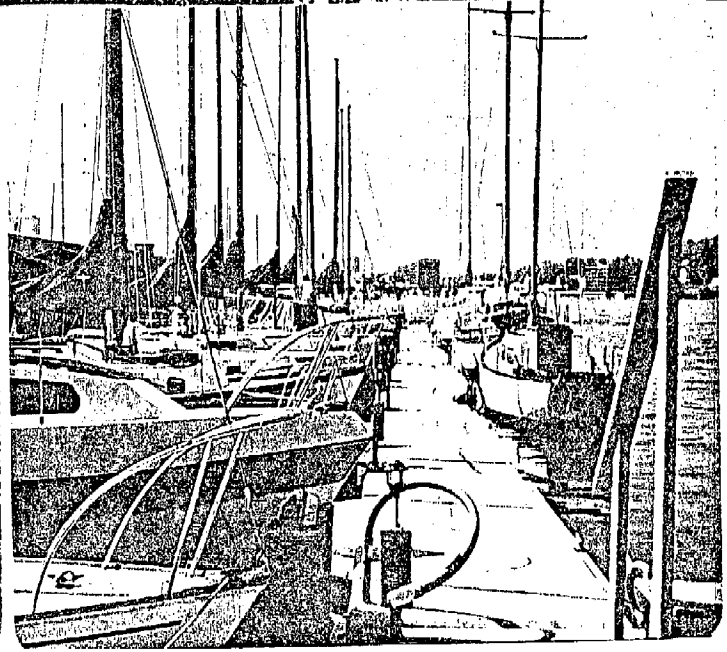
CERTIFICATE OF OCCUPANCY MUST BE ISSUED PER SEC. 306 BEFORE PREMISES ARE OCCUPIED

(7a)


SMA #, ADDRESS, DETAILS, OK/NOT OK
DATE 4/20/11
PHOTO LOG
SEATTLE BOULEVARD DRY DOCK
2901 3501 FAIRVIEW AVE E
1 E. FACADE FROM ROANOKE
ENTRY REMODEL
2 VIEW S.
2623 YALE AVE E
3 DREDGE SPOILS VIEW W.
VIEW SW
4 HOUSEBOAT MOORAGES
E. PROP. LINE
5 VIEW S. LANDSCAPING
VIEW N. -
6 SPOILS & CONC. RETAINERS
VIEW E. FROM
7 FLOAT - SPOILS & CONC. RETAINERS
VIEW S. ON FLOAT WALKWAY
8
CLOSEUP OF
9 CONC. RETAINERS VIEW N. -
10 VIEW N. FROM S ROANOKE (DREDGE
PHOTO LOG - SEA
11 DREDGING &
12
13
14
5
6
SMA 98-408
17 FAIRVIEW AVE. E. LOOKING DOWN)
18 SHOWN DRILL WASTES & SPOILS DUMPED
SMA 71 2715-27 FAIRVIEW E.
5/12/11 19 VIEW W. FROM ROANOKE BAY
20 EDGAR ST
2715 27 27 FAIRVIEW E
21 VIEW W.
3/14/11 EWS







SMA 278 2727 FAIRVIEW AVE E. 5/12/77
VIEW W. FROM EXISTING DOCK. —
OFFICE ON S. SIDE BEYOND
UTILITY POLE

Edward H. Schein

#278 2727 FAIRVIEW AVE E. 5/12/77
ACCESSORY PARKING - VIEW W.
CAR APPEARS ~~PARKED~~ UNMOVED FROM
4/28/77 INSPECTION. NOTE LICENSE
PLATE (OUT OF STATE)

Edward H. Schein

SMA 278 - 2727 FAIRVIEW AVE E. 5/12/77
VIEW S. ON NEW FLOAT PIER
(NOTE: 32' SAILBOAT (NO MASTS) BACK ON
W. SIDE OF PIER IS 40+FT LONG.
OVER 35' MAX.

Edward H. Schein

SMA 278 · 2727 FAIRVIEW AVE E. 5/12/77
VIEW E. FROM S. END OF FLOAT PIER -
EDGAR ST. R.O.W.

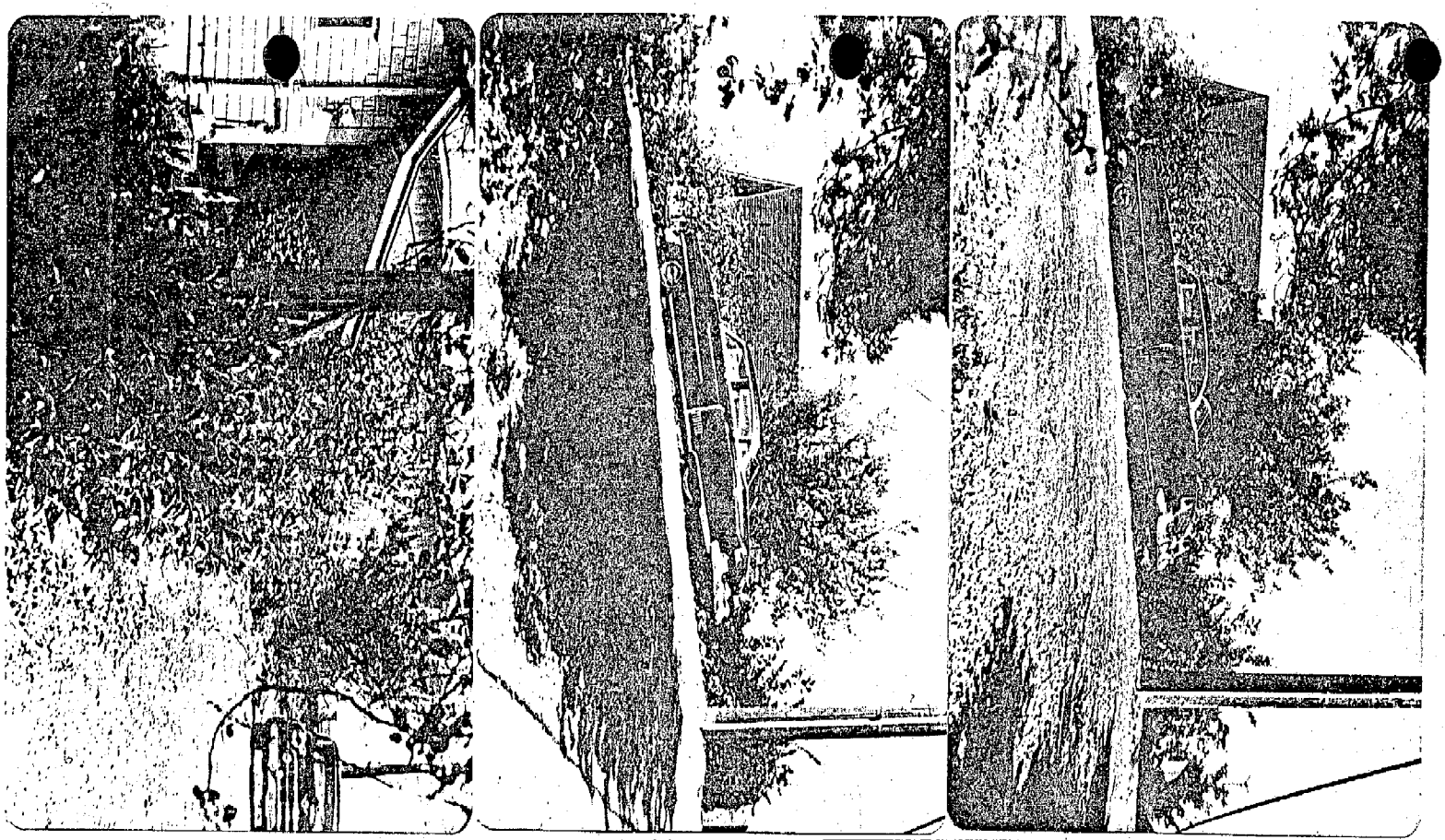
Edward H. Schein

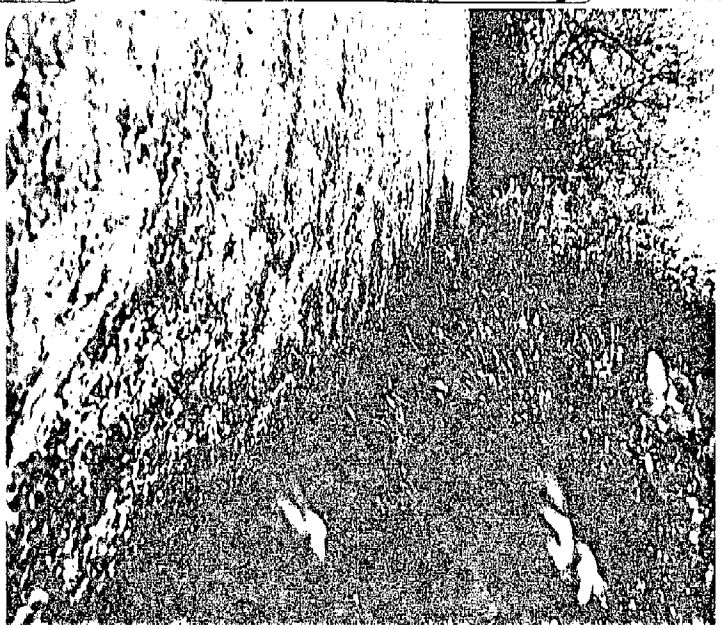
SMA 278 - 2727 FAIRVIEW AVE E. 4/28/77
ACCESSORY PARKING - VIEW SE.
EXISTING TREE SAVED.

Edward H. Schein

SMA 278 2727 FAIRVIEW AVE E. 4/28/77
VIEW OF S. PROPERTY LINE FROM
NE CORNER.
NOTE HIGH HEDGE

Edward H. Schein





#278 2727 FAIRVIEW AVE E. 5/12/77

ACCESSORY PARKING - VIEW N. OF E. PROPERTY LINE FROM SE CORNER. CAR APPEARS UNMOVED FROM 4/28/77 INSPECTION.

Edward H. Schein

SMA 278 - 2727 FAIRVIEW AVE. E. 4/28/77

VIEW OF W. PROPERTY LINE FROM NW CORNER

(NOTE NO PROVISION FOR WATER RUNOFF)

Edward H. Schein

SMA 278 2727 FAIRVIEW AVE E. 4/28/77

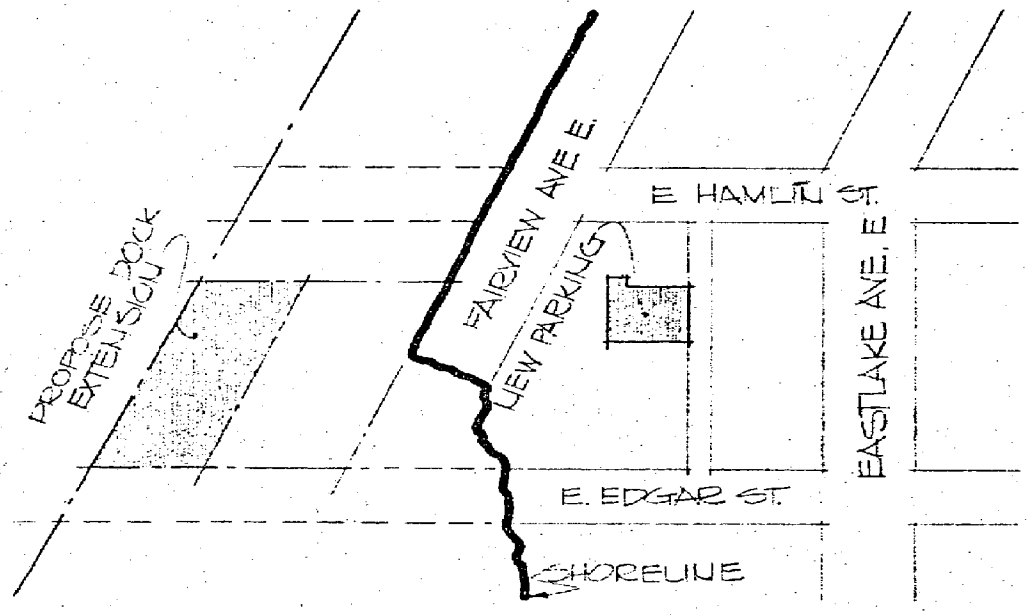
VIEW N. OF E. PROPERTY LINE FROM SE CORNER. NOTE ONE PARKED CAR.

Edward H. Schein

SMA 278 - 2727 FAIRVIEW AVE E. 4/28/77

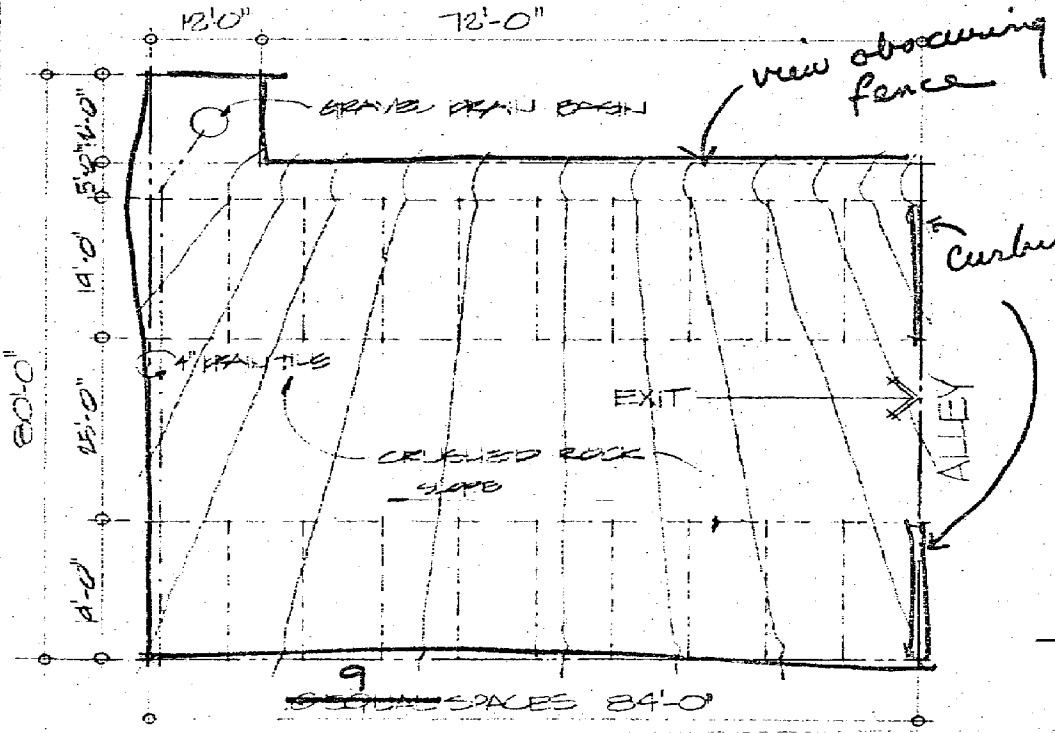
N. PROPERTY LINE FROM NW CORNER (NOTE RESIDENCE) & LOW HEDGE

Edward H. Schein



VICINITY PLAN
NO SCALE

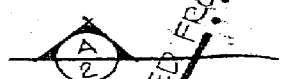
N

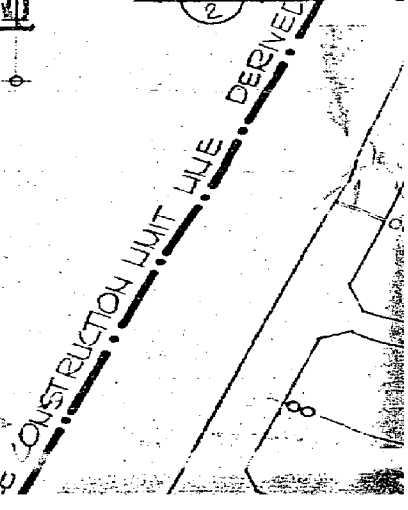


LEGAL DESCRIPTION:
LOT 3, BLOCK 19 UNRECORDED REPLAT
CITY OF SEATTLE.

NEW PARKING PLAN
SCALE 1" = 20'-0"

N

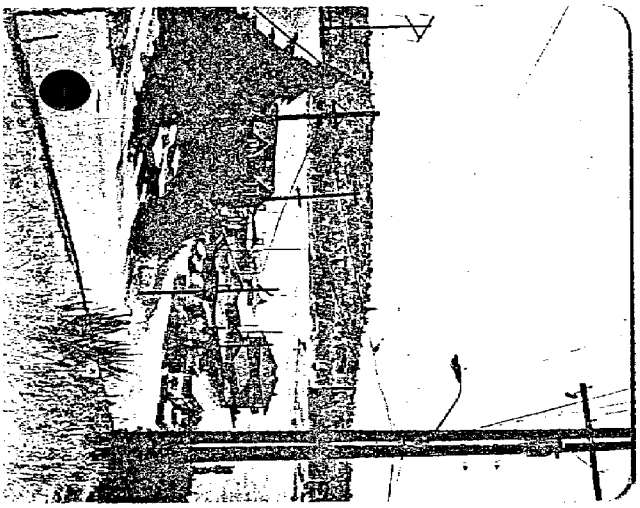


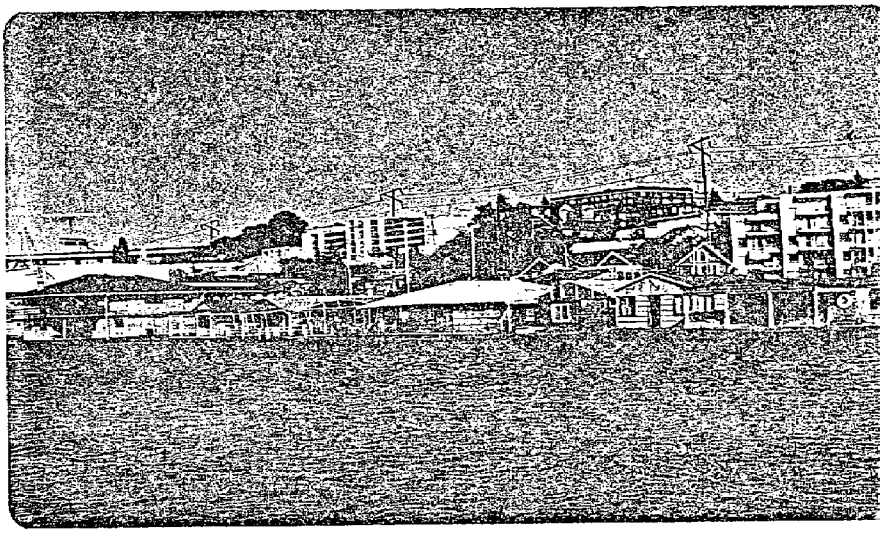


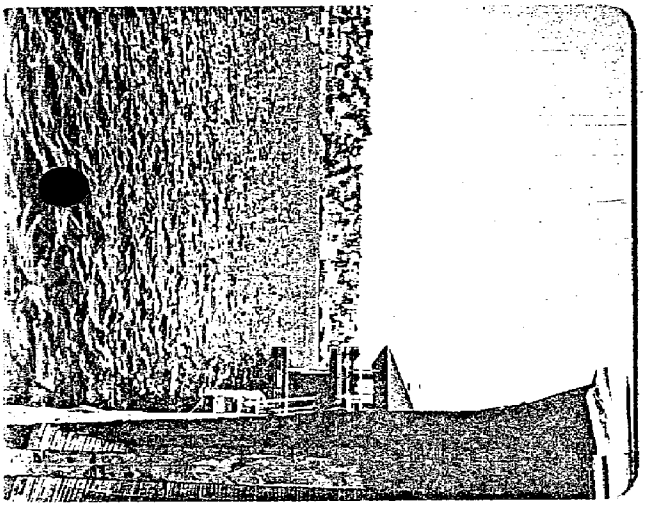
PLOT PLAN

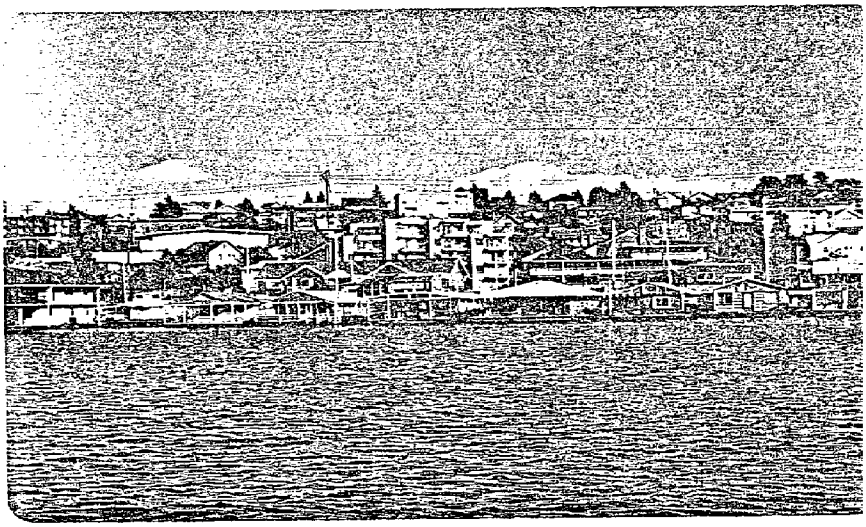
9

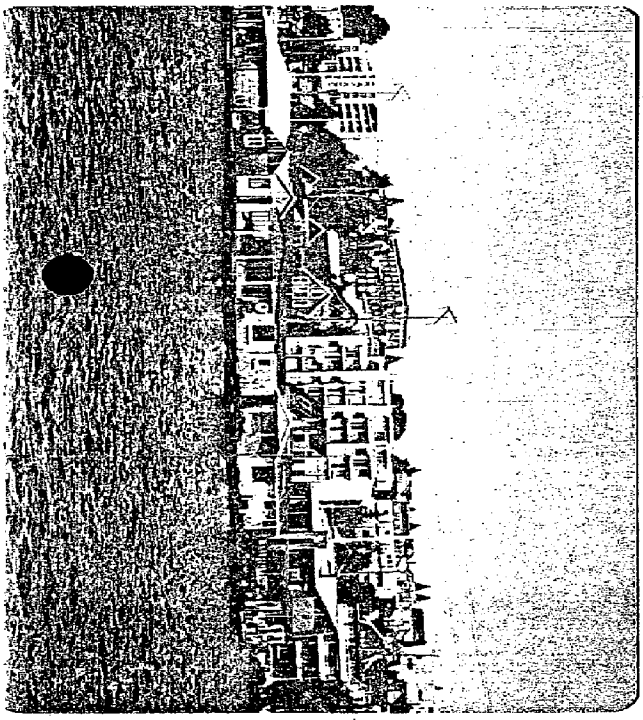
119.51' STATE LEASE LINE
104'-0"
14'-0"
14'-0"
14'-0"
18'-0"
14'-0"
* ELECTRICAL OUTLETS & HOSE BIBS LOCATED @ EACH MOORAGE
EXISTING PIER
VARIES
8 EXISTING HOUSEBOATS
10' WALL TO WALL (TYPICAL)
CHANNEL WIDTH

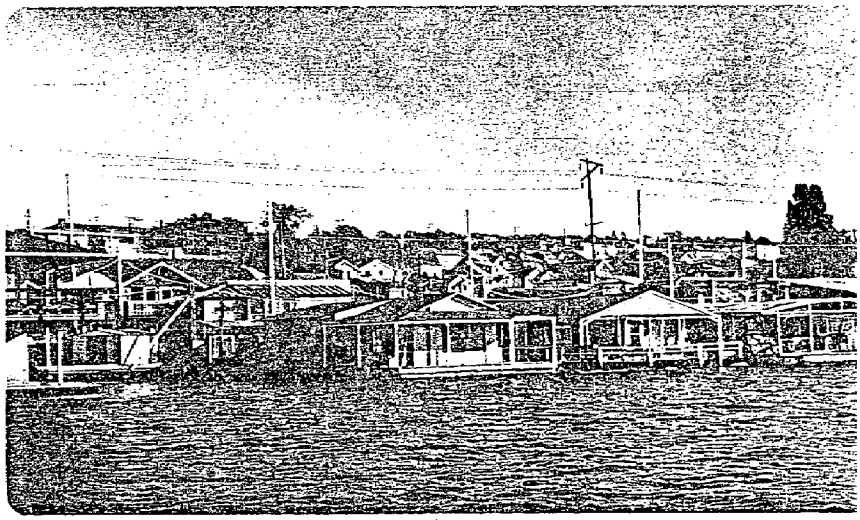






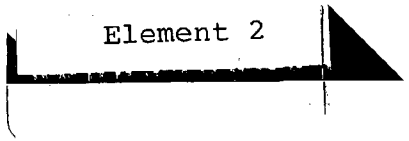






PHOTOS TAKEN PRIOR TO ISSUANCE

9/25/75


Element 2

Element 2 - REPORT ON PERMIT PROCESSING

Introduction

During the 13 months reporting time, action was taken on 96 shoreline development permits. Of these, 90 received favorable approval, two were denied, and four withdrawn. Twenty-seven revisions were given to projects that had previously received approval. During the year, 96 permit applications were received. There were 26 permit applications on hand at the beginning and 25 on hand on the closing date of this period.

Two permits required Environmental Impact Statements. One, for Chiyoda Chemical, is complete. The Pier 69 project is awaiting the completion of the Final EIS, the Draft being completed. The remaining permits required Declarations of Non-Significance, most of which were written by staff. Three remaining permits also required variances. One was granted, one denial has been appealed, and one is in process with no decision to date.

Two permits have been challenged through appeals to the Shorelines Hearings Board. The Rock appeal involving a single family residence was decided in favor of the Department. Another appeal on a large Condominium (Salant) is to be heard this summer. Four appeals have been made to the City's Hearing Examiner in opposition to the Department's SEPA determination. Of the three heard, all decisions have concurred with the Department's findings.

The permits continue to involve a wide spectrum of uses. Moorages and residential buildings continue to be frequent. Houseboat remodeling, restaurant, marine terminal and marine-oriented facilities are other uses that are commonly sought.

Problems have been varied. The lack of parking and the difficulty of providing more spaces on the Central Waterfront and along Lake Union has continued to require zoning variances. An updated policy is being requested of the Office of Policy Planning to address this matter. Recent newspaper accounts have made the new air service to Victoria operating from Lake Union a hot topic. At this time a shoreline permit has not been applied for although that intention was stated by the operators of Air West Canada in a recent letter.

The newness of the Shoreline Program and resultant interpretations has continued to be a problem in reviewing applications. There are many "vagrant" proposals that don't fit the mold envisioned by the Program. However, this is not uncommon with new legislation or programs. The attached tables show permits by value and number received by month over the past year.

Element 2 (continued)

Value of Permits approved, withdrawn and denied:

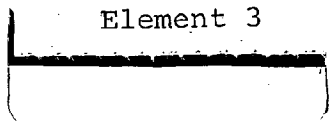
1976	June	$ 788,200	($800,000)	(Withdrawn)
	July	1,261,800	(3,000)	(Denied)
	August	1,138,600		
	September	15,050,800		
	October	403,000		
	November	5,360,000	(25,000)	(Withdrawn)
	December	2,735,250		
1977	January	$ 3,395,000		
	February	2,820,283		
	March	1,160,000	(480,000)	(Withdrawn)
	April	6,440,000		
	May	577,000	(50,000)	(Denied)
	June	808,000		

GRAND TOTAL APPROVED:	$41,937,133
Total Denied	53,000
Total Withdrawn	1,305,000
Current (unfinished)	26,035,205

Permits Received:

1976	June	5
	July	5
	August	2
	September	11
	October	10
	November	8
	December	8
1977	January	5
	February	8
	March	11
	April	7
	May	6
	June	7

The total value of permits processed during the past 13 months is $46,821,253. During the past two quarters, the value has been $15,400,000, which represents a decline from the first two quarters of the grant period.


Element 3

Element 3 - SHORELINE PERMIT ANALYSIS: A MANAGEMENT TOOL

Introduction

Purpose: The major purposes of this study were to determine

a) what the permit records show with reference to meeting the goals of the Shoreline Master Program and the Shorelines Management Act, and

b) how the shoreline program itself and the management of permits may be improved.

In brief, we are investigating whether the permit system of shoreline management is working toward the goals envisioned by the Citizens Committee and the City Council. Also, means of improving management of the permit system aside from its substantive considerations may be revealed by study of how the permit system has worked.

To chart progress requires a concept of measures and values, together with appropriate data. The data base available was the permit file for nearly 400 permits issued from late 1971 until December 1976, a little more than five years. This was automated and geocoded so that maps, cross tabulations, bar charts and straight printout were all available. An annual update, adding data for subsequent years, will provide an increasingly useful barometer of change and reliable and consistent evaluation techniques.

Measures: Obviously the best measures of shoreline management are related to the goals of the State Act and the Seattle Shoreline Master Program. Is management in fact progressing toward those goals? If not, either management is not performing well or according to the mandate, or, the tools given to management are not sufficient to achieve the goals set by the public and the legislature, or the goals themselves may not be achievable.

We have assumed that, at the least, some progress toward the official goals could be made under the permit system. Study of the data could, however, prove otherwise.

Goals as a Basis for Program Evaluation

State Shoreline Management goals are contained in the Act; local goals are contained in Resolution 25173. The Citizens Committee which wrote the Shoreline Goals and Policies did not prioritize their goals, nor did the Council when they adopted them, so that

we must assume them to be equal in value. Furthermore, it must be recognized that many of the adopted goals and policies can not be implemented with the single, and limited tool at hand, essentially the permit system. Therefore, we have selected those goals which can readily be quantified and which have some potential for partial implementation through the limited and largely passive strategy of processing applications for shoreline permits.

With respect to administration, an obvious but incomplete measure is the time required for processing permits. This has the really major disadvantage that quality of review and decision-making is ignored completely. Part of the purpose of this work has been to seek other means of evaluation that may provide better measures of goal achievement. The table on the following page lists selected goals and evaluative measures which can be developed from the permit data.

Following the table are findings and conclusions from the permit data. A series of maps showing locations of permits by various characteristics is appended.

Element 3 - continued

In the table below, shoreline goals are listed with measures which are available through the permit and land use data.

	Goal	Measure
1.	Increase water dependent uses.	a) Compare permits for water-dependent uses with total, by year. b) Compare water dependent uses on shoreline. c) Compare location of water dependent uses/land use/permits.
2.	Increase public access to shoreline.	Compare total number of permits providing public access by year; compare number of private permits providing public access by year.
3.	Increase recreation and open space.	List permits providing access, open space by year. List increase in public access points.
4.	Preserve views.	List permits providing view corridor.
5.	Limit land fill and bulkheading	List and locate permits requiring fill, bulkheading by year.
6.	Encourage compatible uses.	Compare permitted uses with adjacent property uses.

Water Dependency

Four categories and the number of permits for each are:

Water-dependent, with public access	86
Water-dependent, without public access	179
Non-water-dependent, with public access	22
Non-water-dependent, without public access	108

It appears that attention to public access has been lacking in the case of non-water-dependent permits. However, the public access requirement did not begin until late in 1974, and about two-thirds of the permits were on upland sites from which there is no direct access to water from the site. Less than half the permits are for uses classified as non-water-dependent. However, the definitions, both State and local, assume that Port of Seattle permits are all water-dependent and that single-family residences are water-dependent. When adjustments are made for these two categories the proportions change.

Uses/Activities

The first thing that is apparent is the range and variety of activities for which permits are requested on the shoreline. The three-digit code of uses was modified from the Standard Industrial Code (SIC), and has 140 categories, each of which occurs at least once in the permit files. However, the land use code for the Land Use Study, Element 6, is more detailed, using four digits with some 300 different types of activity, each of which also occurs at least once on the Seattle shoreline. Both current and proposed uses were recorded from the permit applications. About half the properties had more than one current use; up to five such uses were recorded on a single site.

Permits Received by Zone and Year Compared with Length of Shoreline by Zone

Permits were tabulated by zone and year of receipt. The overall percentages show over half the permits in M, IG and IH zones for all years. Those zones have about 41% of water frontage. Single-family residence zone permits accounted for 15.7% of the permits, although 45.6% of the shoreline is so zoned. This figure is somewhat skewed because parks and some other uses frequently are zoned single family.

Conditional Uses and Variances

In the five years of data, only five conditional uses and five variances were reported on different permits. Three of these permits required both a conditional use and a variance.

Permits by Zone

Of the 395 permits, by far the largest average percentage (59%) are in M. IG and IH zones, largely because much of the shoreline is so zoned. Permits for the M zone have tended to increase over the five year period, while IG and IH zone permits have remained relatively stable. Single family residential zone permits average 15.7%, all other residential 10%, totaling about a sixth of the total.

In 1972, however, residential zone permits were 36.5% of the total. That year also saw the largest number of applications. The year 1977 (which is not included in the data) may be equal to or slightly greater than the 1972 total, if the present rate continues.

Other Permits Required

Action requiring a shoreline permit frequently also requires other permits. Up to 10 additional permits theoretically could be required for a proposed development. Actually, most shoreline actions tend to require only one or two additional permits, typically a building permit and a Corps of Engineers permit for in or over water. Six is the maximum number of auxiliary permits we have recorded, and that only once. The types of other permits are, for the City: demolition, building, dredging, grading, fill, and zoning; for the State: DOE and Game; for the Federal level: the Army Corps of Engineers, EPA, and Fisheries. A few cases could also require Coast Guard approval if navigational aids are involved.

Note on Other Uses of Permit Data

The time consuming hand calculation of elapsed time between the date an application is received and the date of action could be included in the annual update. The time saved would amount to more than 2-days work each year at a cost of a few cents in machine time. A by-product will be comparison between processing times for permits of different cost, type, ownership or location.

Another use of the data is for inspection and compliance. The present system of chronological permit filing requires a great deal of time to locate permits in the same vicinity. A printout by address will provide an automatic listing and quick comparison for any given area, as well as an inspection route for the compliance officer.

Permit Data (continued)

If the permit record also included inspection time and dates, an annual evaluation of the inspector's productivity would be generated.

Purpose of Permit

In general, the uses proposed in a permit application tend toward greater intensity but somewhat less diversification than the current land use activities on the site. The purpose of about 70% of all permits is repair, upgrading or expansion of existing facilities. About 30% represent major change of use. Of these, one-third, or 10% of all permits, were for undeveloped land. Where more than one use existed or was proposed, they tend to be closely related, as for example, boat sales, moorage and repair. Dredging was the subject of 15 permits, landfill 36. Both were usually linked to other actions. Repairs were a major purpose during 1976, although seldom listed in earlier permits. Upgrading single-family residence waterfront facilities by bulkheading and piers accounted for slightly over 10% of permits, while a change of use from single to multiple residence was the purpose of 3% of the permits.

Access

Only 19% of all permits provided any sort of public access. However, water-dependent uses, particularly port/industrial permits, are exempt from the public access requirement, as are single-family and duplex or triplex residences. These taken together constitute about half of all permits; furthermore, the access requirement was not begun until 1975. Nevertheless, the amount of public access provided is low and does not appear to have furthered the SMP Goals.

Applicant-Property Relationship

Most frequently, (58% of the time), the applicant is the owner of the property. In 29% of the cases, however, an architect or other agent does the application work. Lessees and contract purchasers are least likely to be applicants, with a combined total of 12.4% of all permits.

Mapped Permit Data

The attached copies of maps are made from a cathrode ray tube display of permit data show selected permit data with reference to the street address location of the permit.

Map 1 - All Permits

Map 1 shows all permits. The "addresses" for Carkeek, Discovery, Green Lake and Magnuson (Sand Point) Parks are inland, as is the University of Washington, because the assigned geographic coordinates are related to the entire park or campus. The high degree of clustering for all permits is partly due to a variety of factors, such as:

a) BN ownership along Puget Sound north of Golden Gardens
b) Park lands along Lake Washington at Madrona, and Leschi and Seward Park areas
c) University of Washington ownership along the north side of Portage Bay and on Union Bay.

These ownerships largely preclude further development in those areas. Clustering also indicates strong demand for space in specific areas which have certain locational advantages.

Map 2 - Permits with Shoreline Access or Viewpoint

These are highly patterned and relatively few in number.

Maps 3a, b, c - Time Series/Water-dependendy

These maps show permits by whether or not the uses are water dependent. The non-water dependent permits predominate in every year.

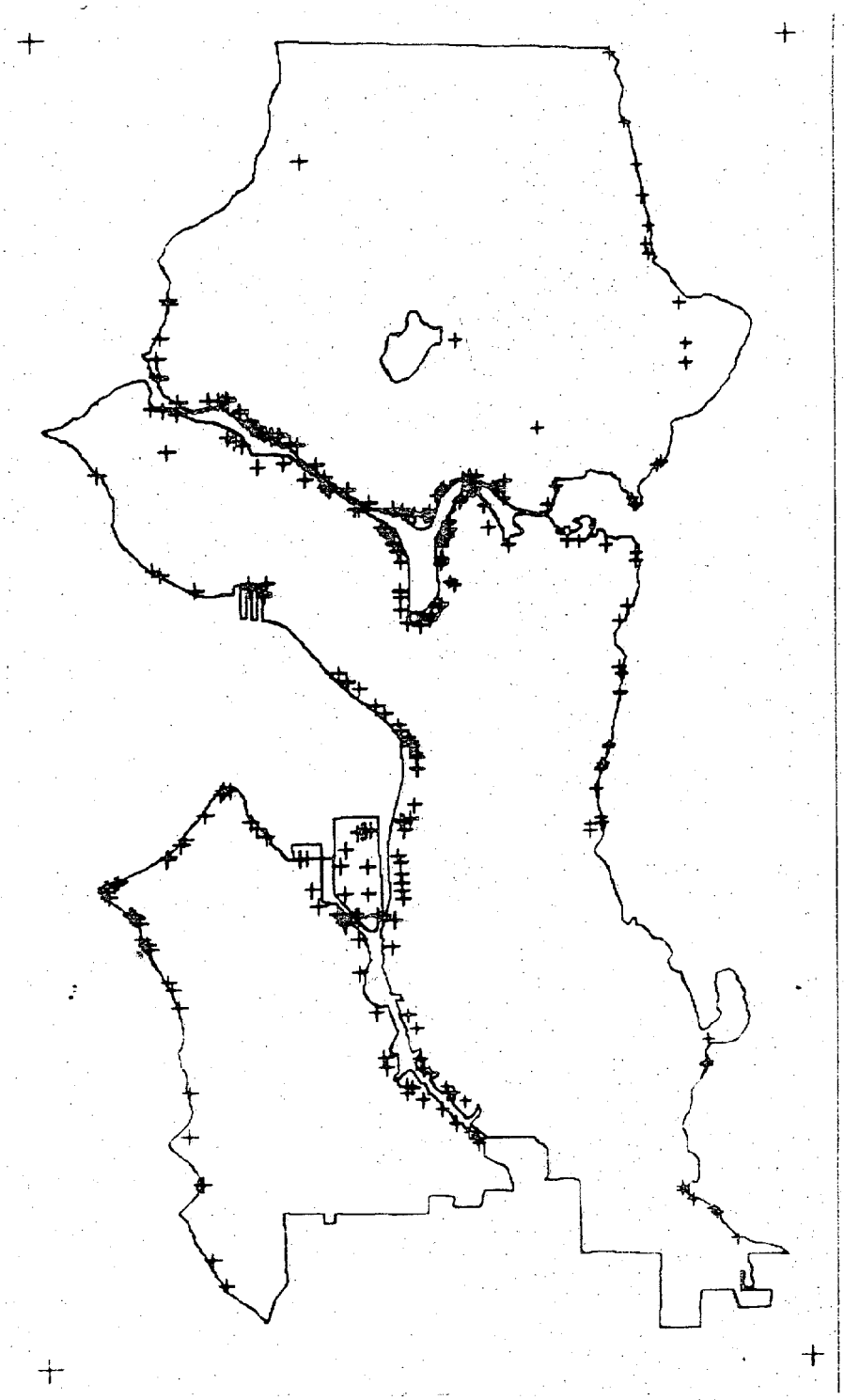
Conclusions from Permit Data

The data provide for the first time accurate detail on the clientele, the rate, the range of activities, the purposes and the locations of shoreline development since the Shoreline Act became effective.

These figures make it possible to predict, within reasonable ranges, the most likely types of development, rate of application, and location of permits; and given the same conditions, what directions shoreline development can be expected to take.

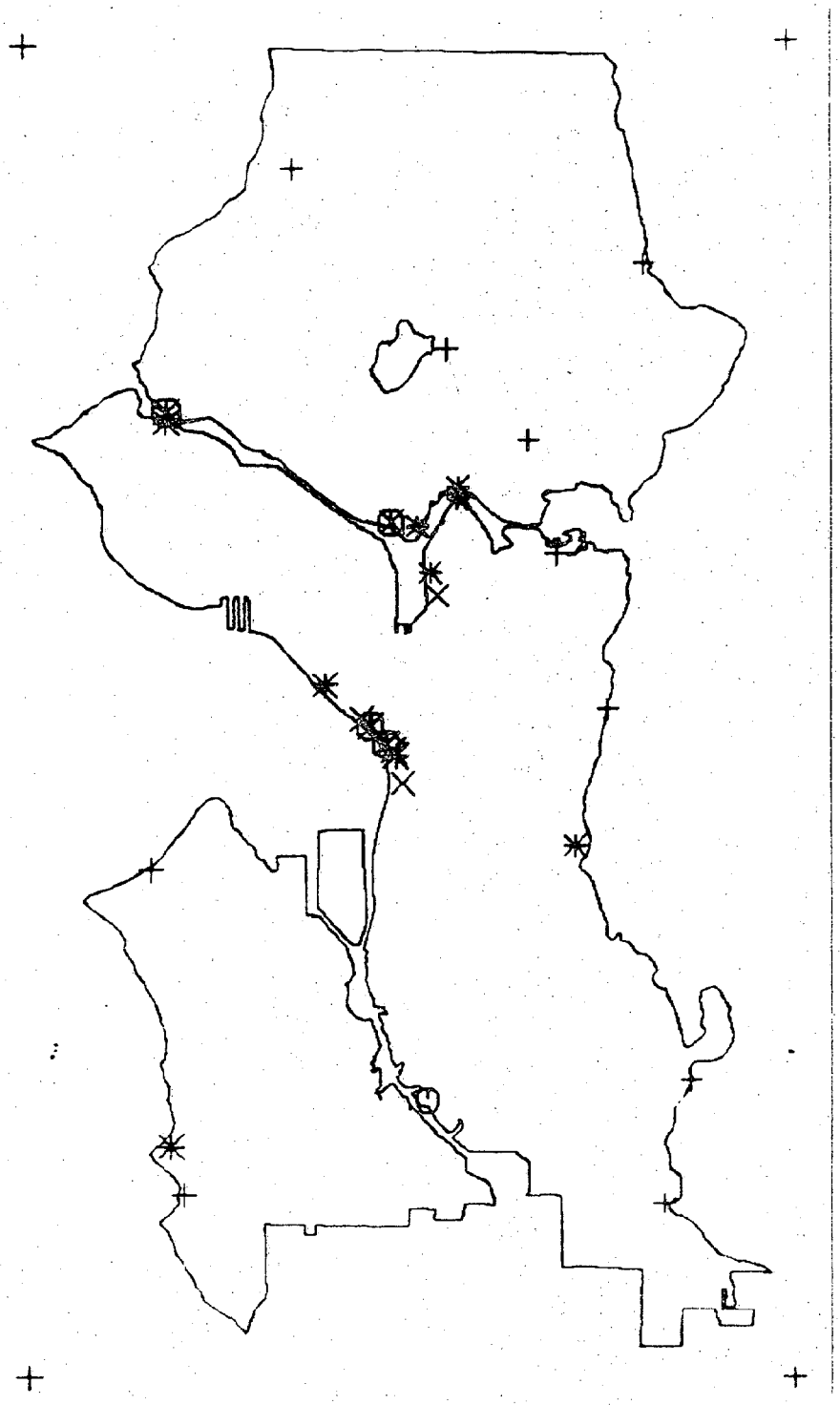
When compared with land use data, new shoreline development since the Act tends to be slightly more oriented toward water dependent uses. Except for 1974, the pace of development has seen a gradual increase. When the 1977 data are added, the increase will be more evident.

The permit system does not appear to have had much effect on shoreline development, although when we are able to study shoreline building permits issued prior to the Act, we may be more certain. Therefore, if the goals promulgated by the citizens and the Council are to be met, other means of achieving them should be considered.



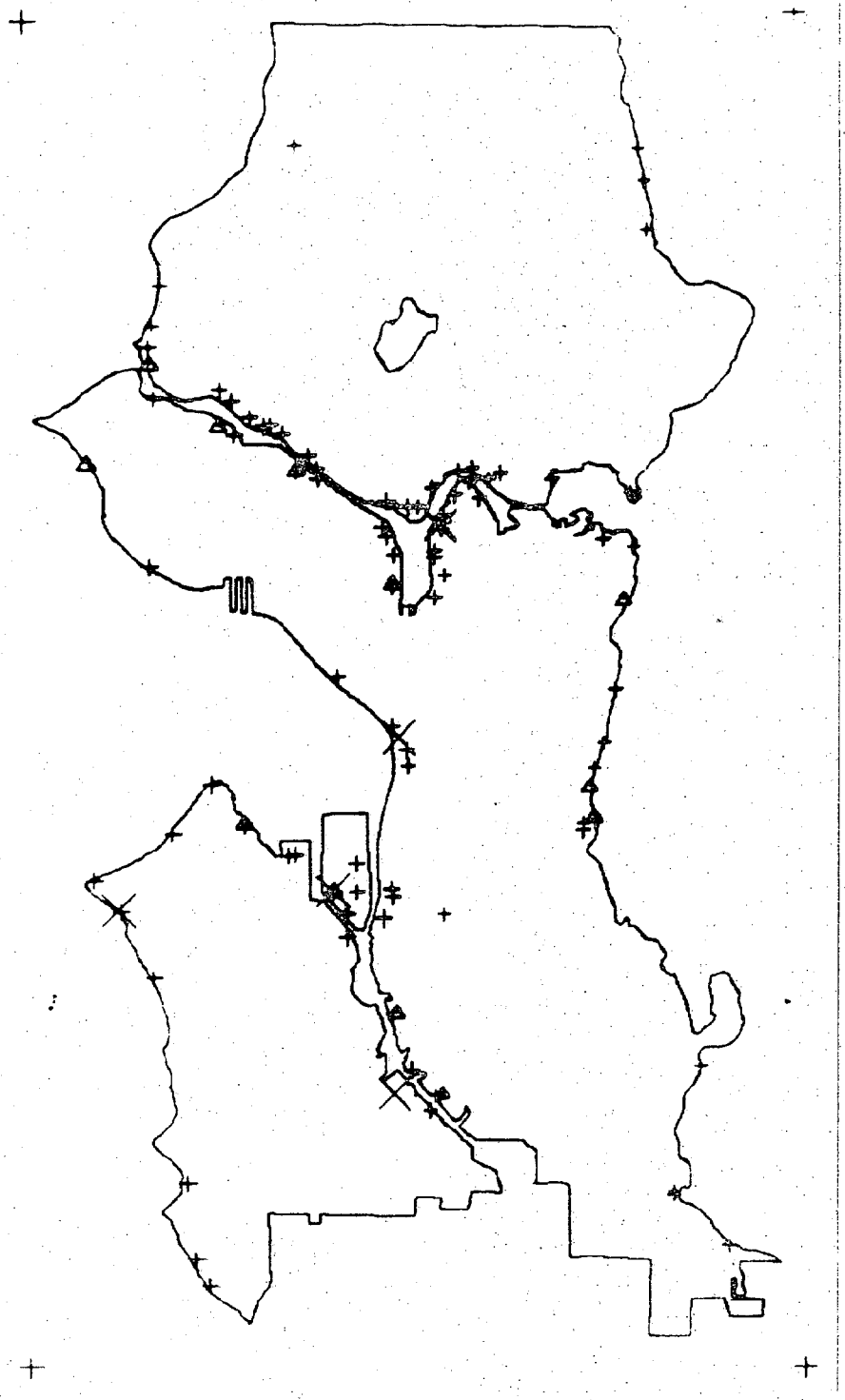
SHORELINE PERMITS 1971 - 1976

ALL PERMITS



SHORELINE PERMITS 1971 - 1976

PERMITS WITH
+ - BEACH ACCESS
X - WATERFRONT VIEWPOINT
O - ELEVATED VIEWPOINT



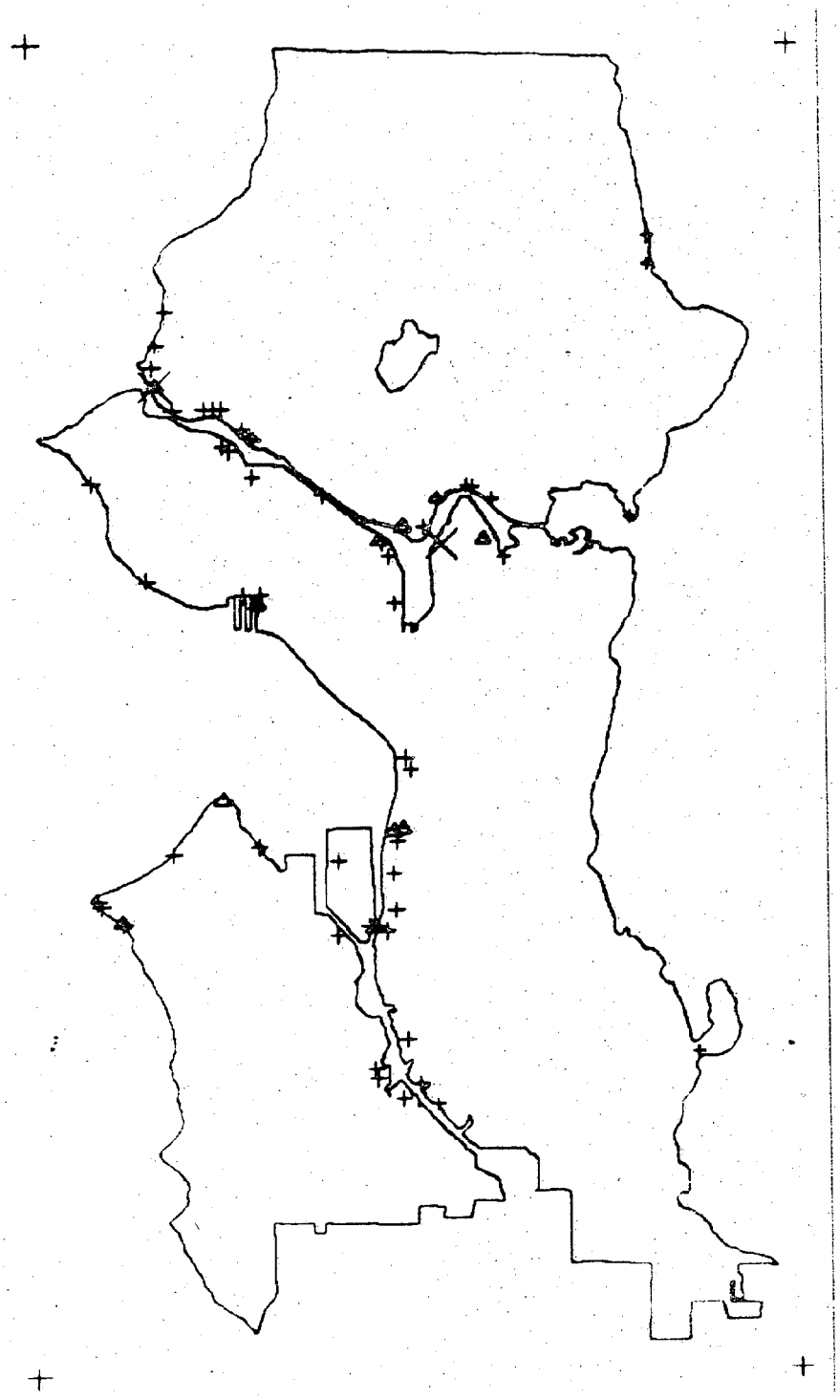
SHORELINE PERMITS 1971 - 1976

1971 AND 1972 PERMITS -- FIRST ACTION

+ - GRANTED

X - DENIED

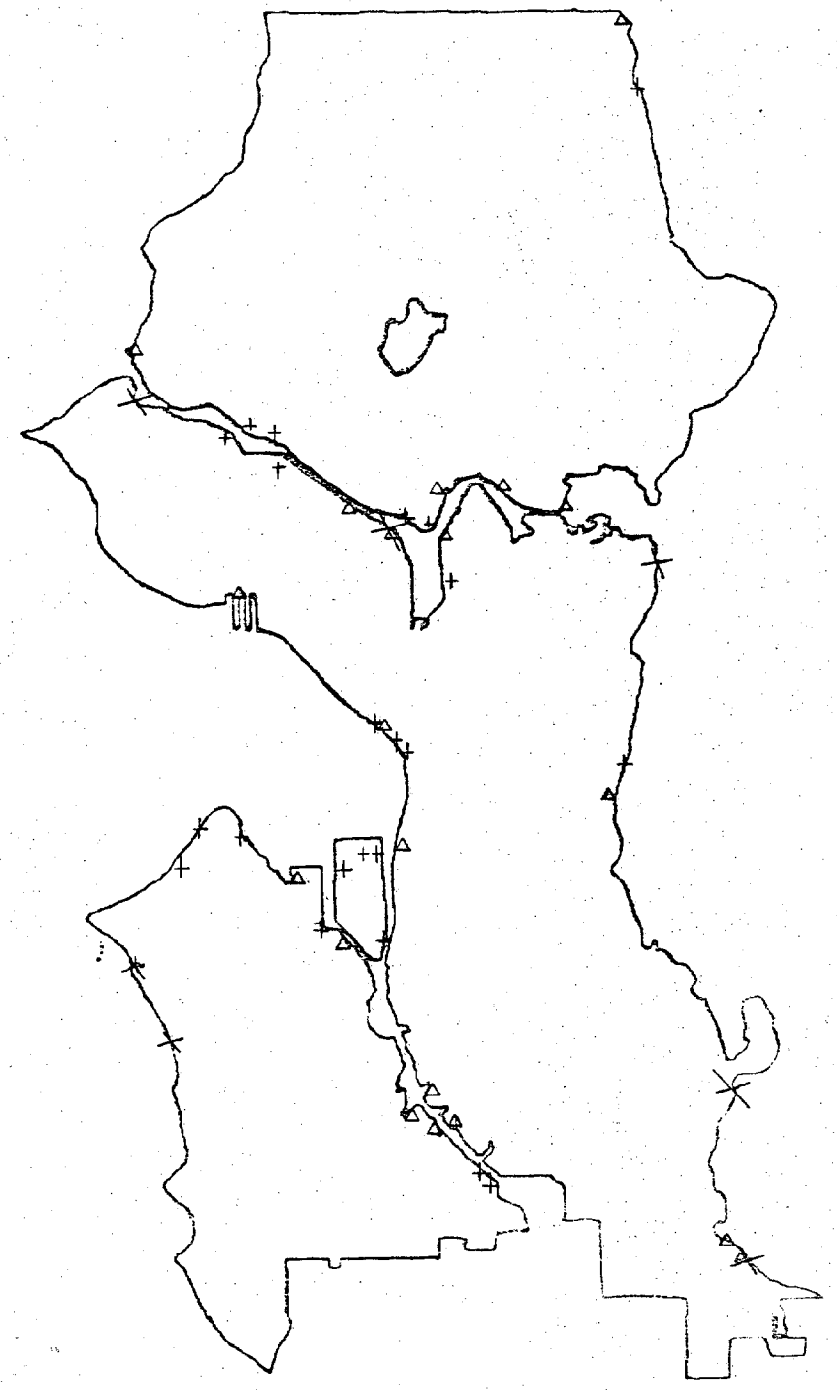
△ - GRANTED WITH CONDITIONS



SHORELINE PERMITS 1971 - 1976

1973 PERMITS – FIRST ACTION

+ - GRANTED
X - DENIED
△ - GRANTED WITH CONDITIONS



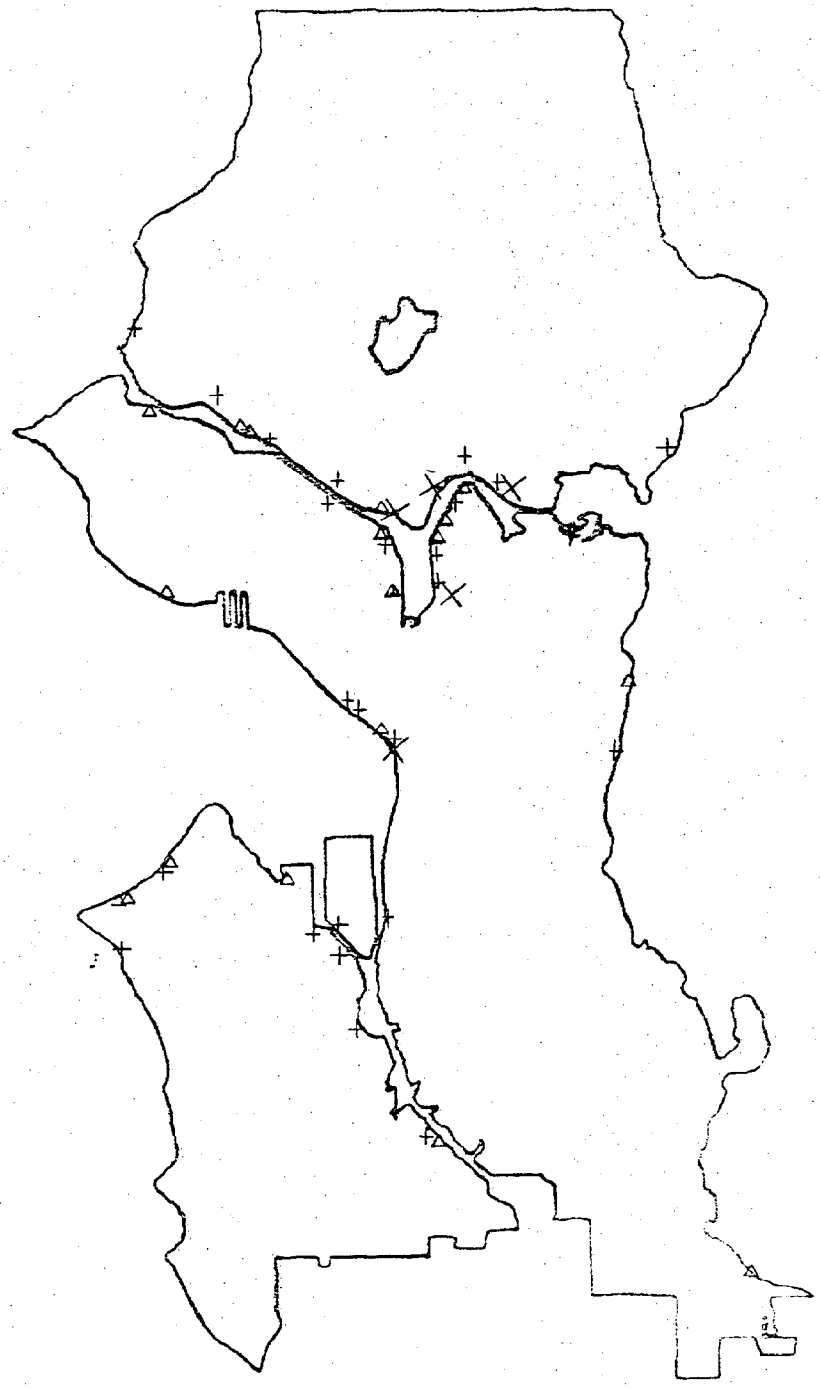
SHORELINE PERMITS 1971 - 1976

1974 PERMITS — FIRST ACTION

+ - GRANTED

X - DENIED

△ - GRANTED WITH CONDITIONS



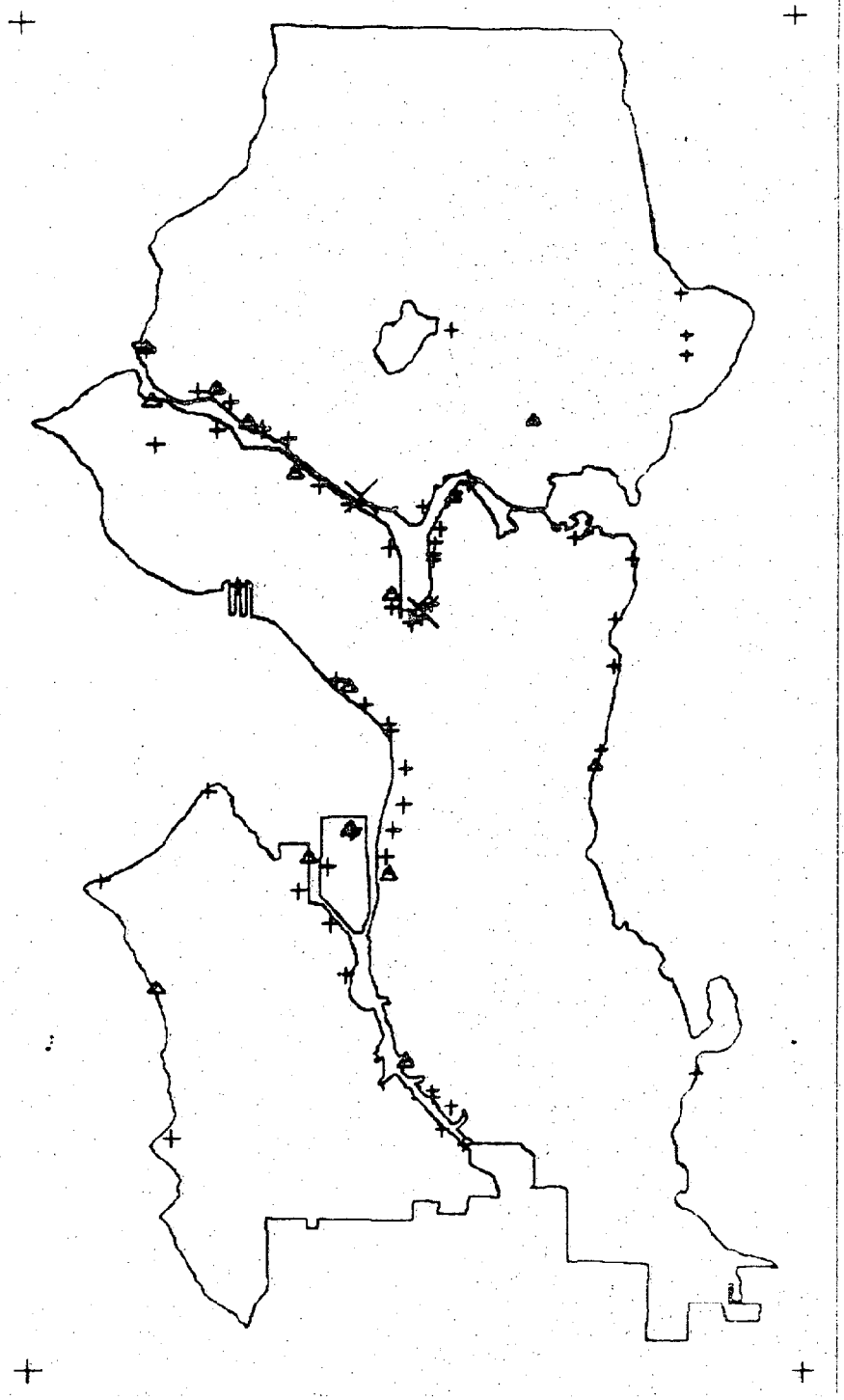
SHORELINE PERMITS 1971 - 1976

1975 PERMITS – FIRST ACTION

+ - GRANTED

X - DENIED

△ - GRANTED WITH CONDITIONS



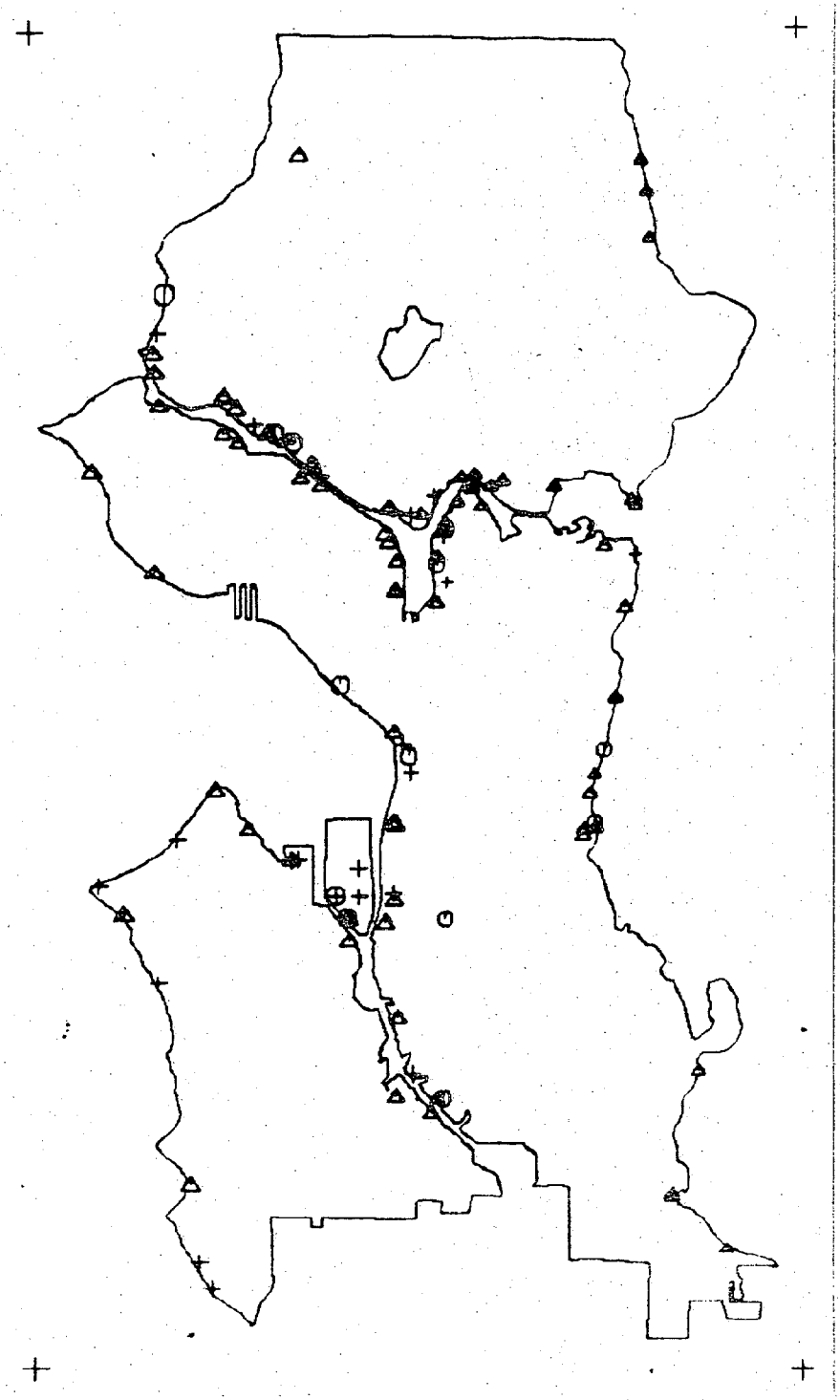
SHORELINE PERMITS 1971 - 1976

1976 PERMITS - FIRST ACTION

+ - GRANTED

X - DENIED

△ - GRANTED WITH CONDITIONS



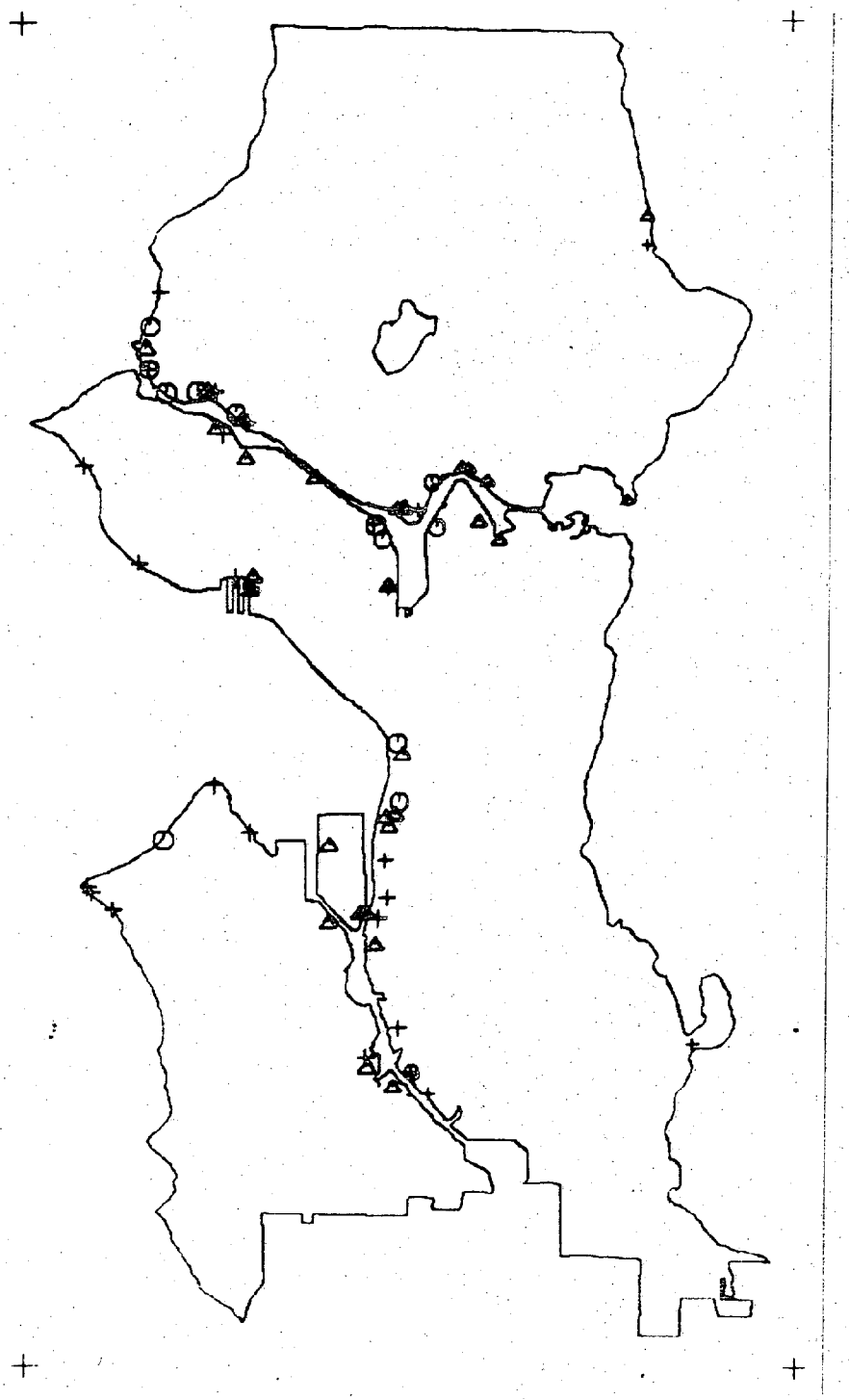
SHORELINE PERMITS 1971 - 1976

1971 AND 1972 PERMITS

0 - OVER WATER

\+ - ON LAND

△ - BOTH



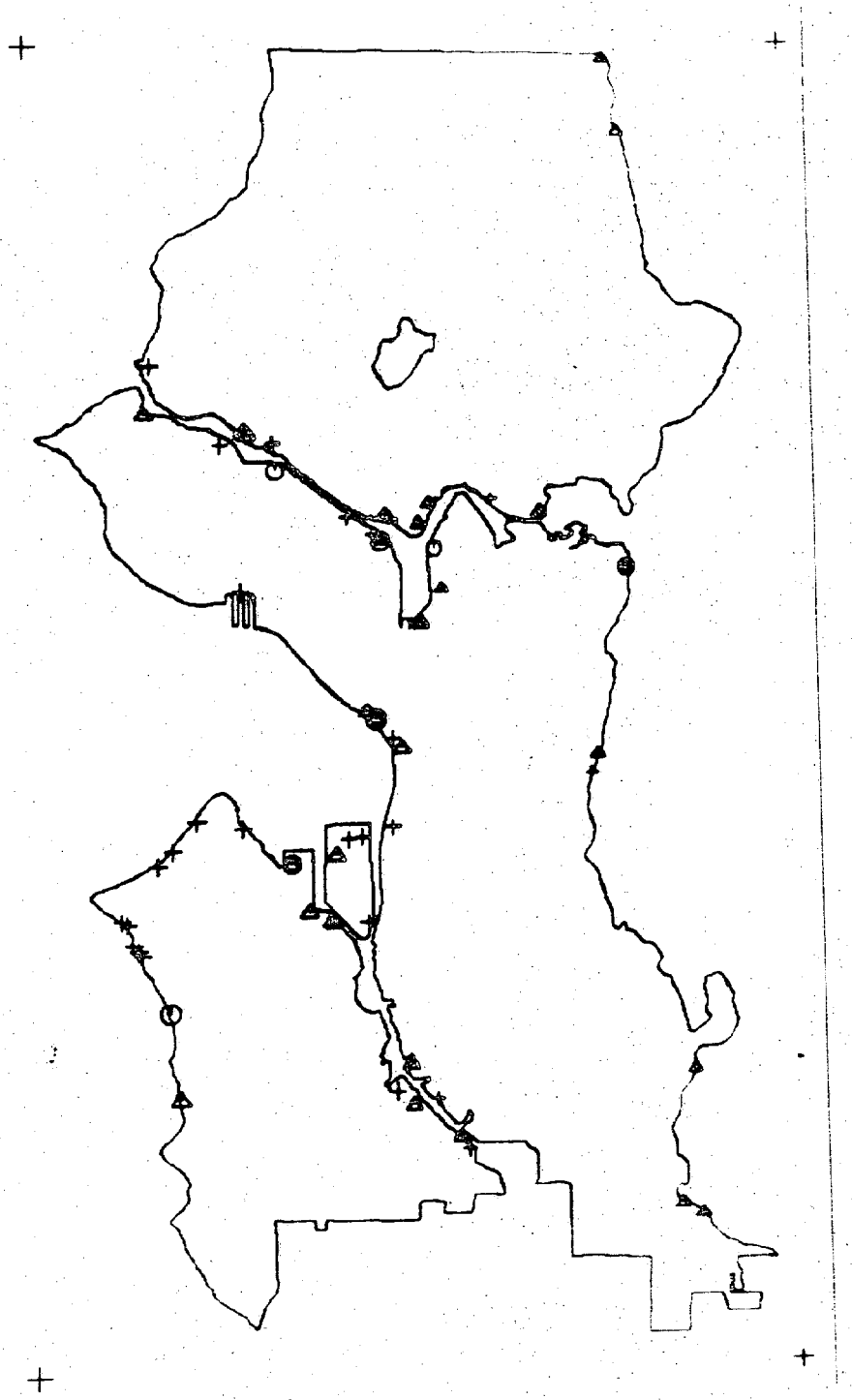
SHORELINE PERMITS 1971 - 1976

1973 PERMITS

0 - OVER WATER

\+ - ON LAND

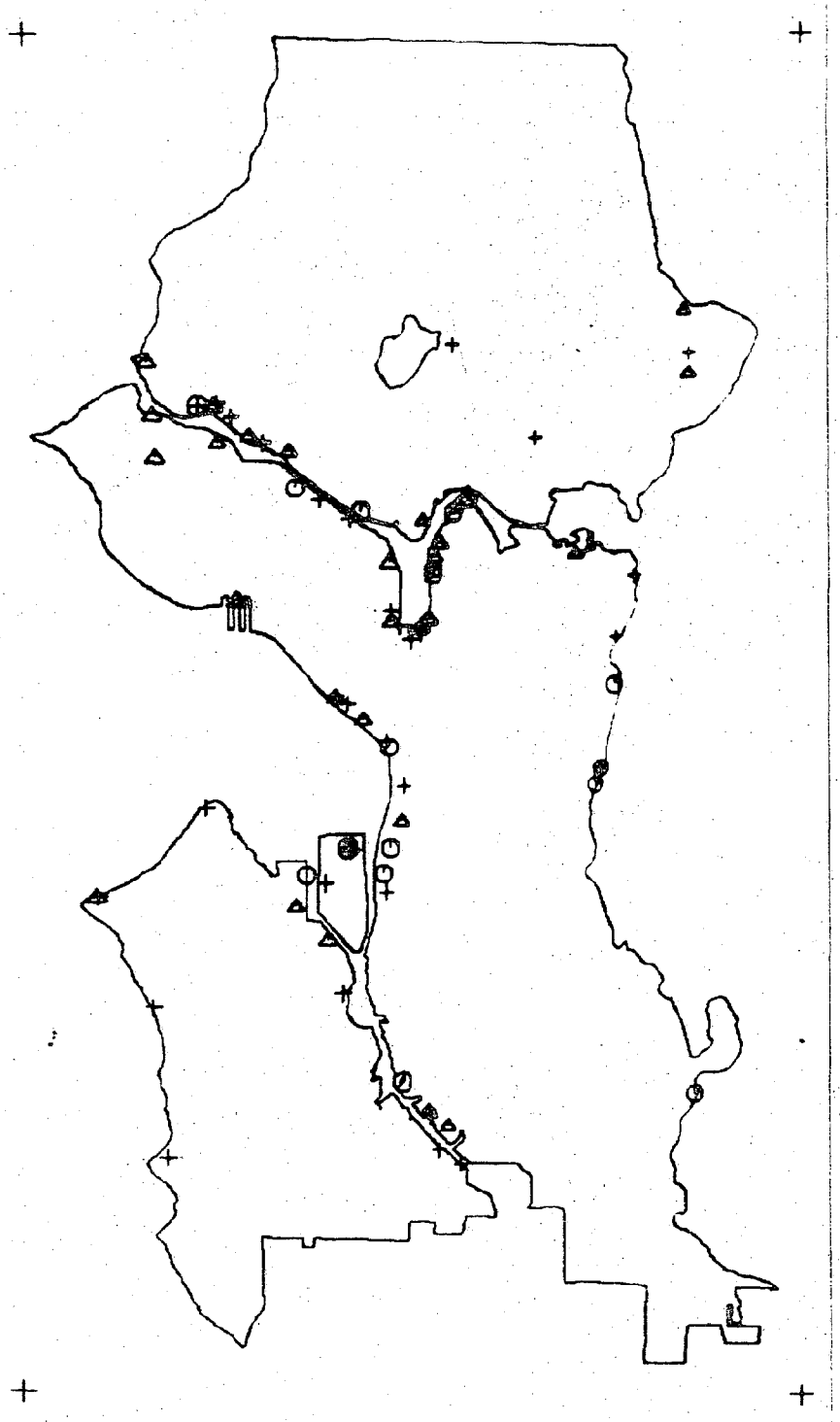
△ - BOTH



SHORELINE PERMITS 1971 - 1976

1974 PERMITS

0 - OVER WATER
\+ - ON LAND
△ - BOTH



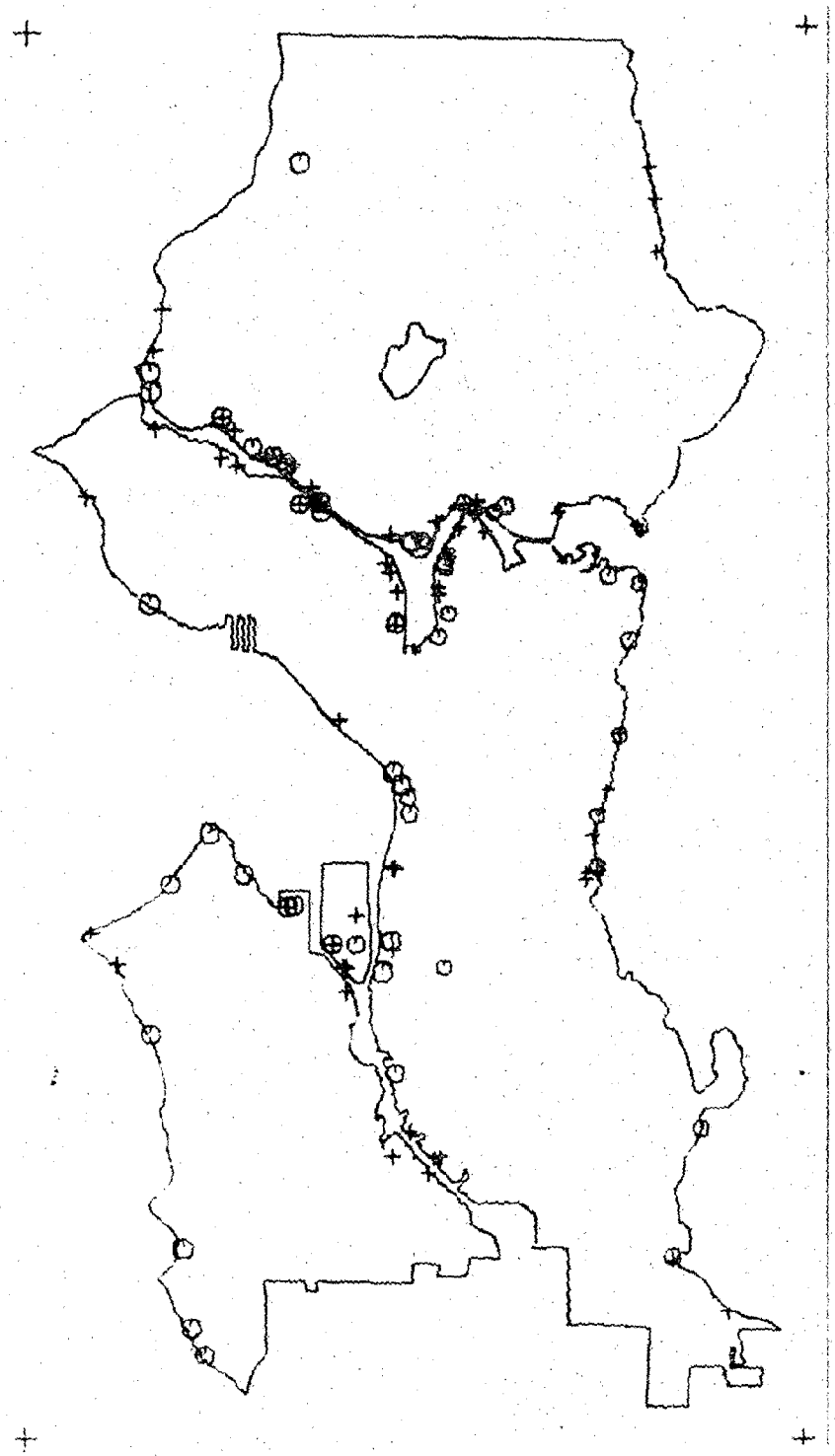
SHORELINE PERMITS 1971 - 1976

1976 PERMITS

0 - OVER WATER

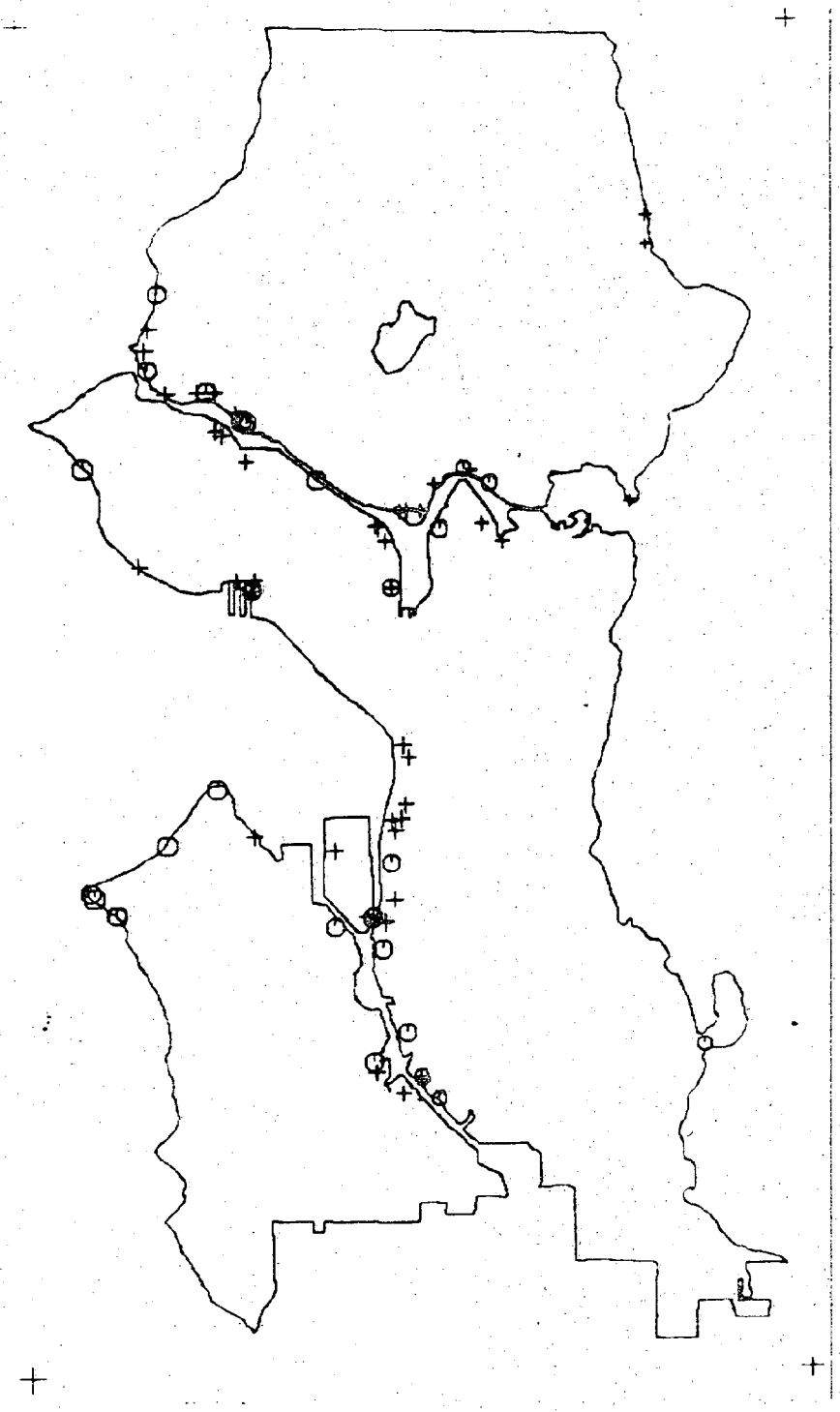
\+ - ON LAND

△ - BOTH



SHORELINE PERMITS 1971 - 1976

1971 AND 1972 PERMITS
+ - WATER DEPENDENT
0 - NON-WATER DEPENDENT

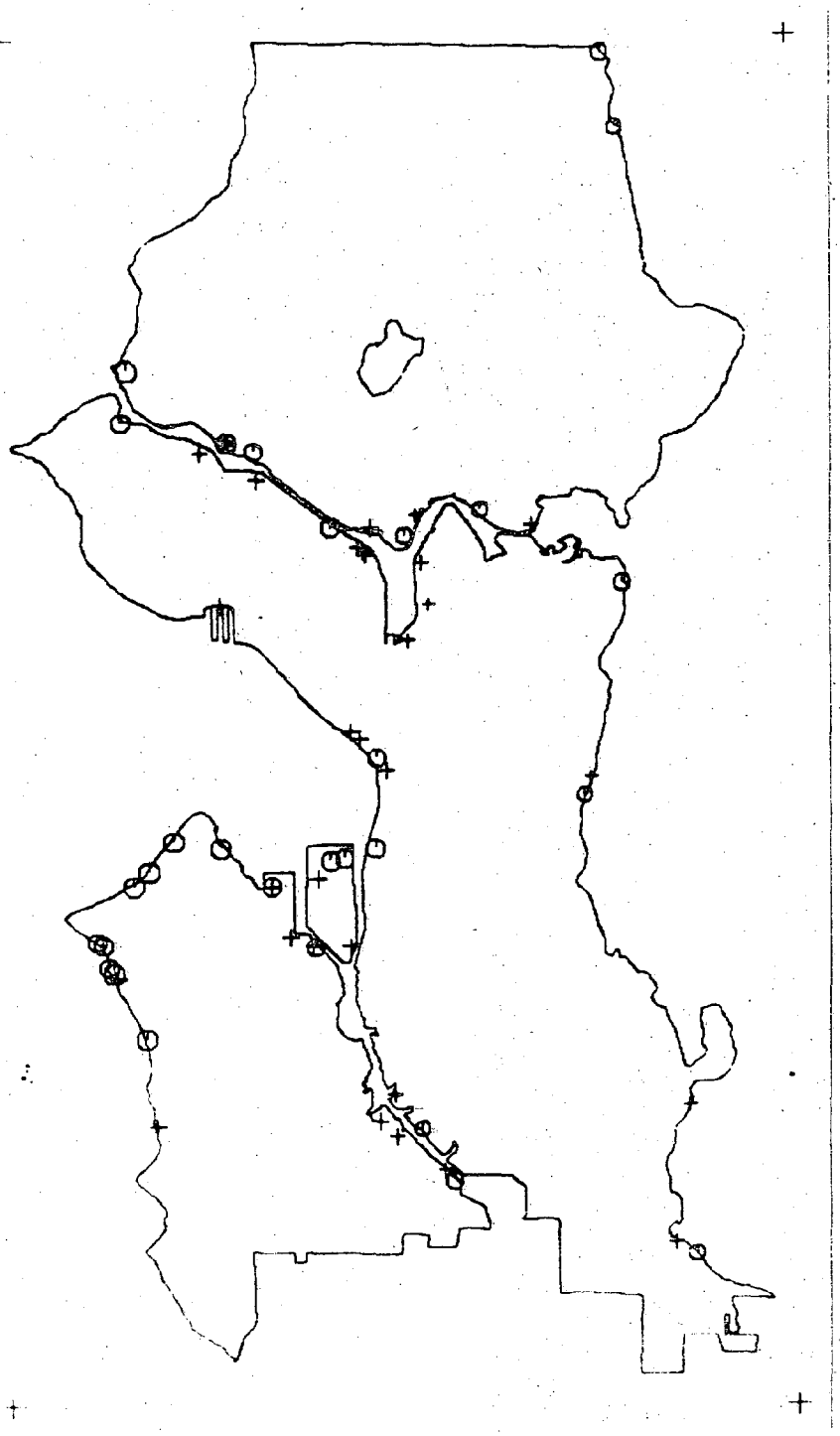


SHORELINE PERMITS 1971 - 1976

1973 PERMITS

\+ - WATER DEPENDENT

0 - NON-WATER DEPENDENT

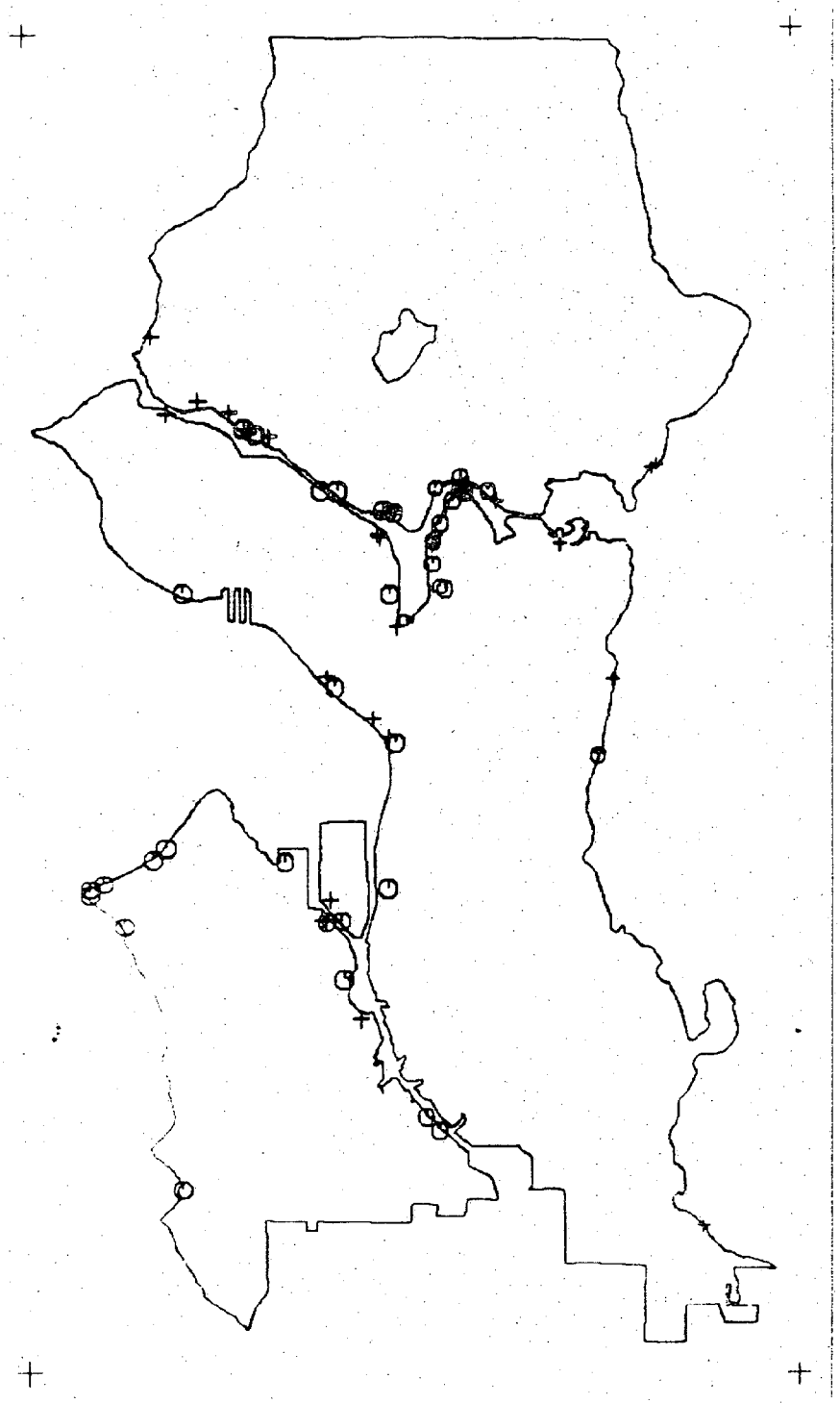


SHORELINE PERMITS 1971 - 1976

1974 PERMITS

+ - WATER DEPENDENT

0 - NON-WATER DEPENDENT

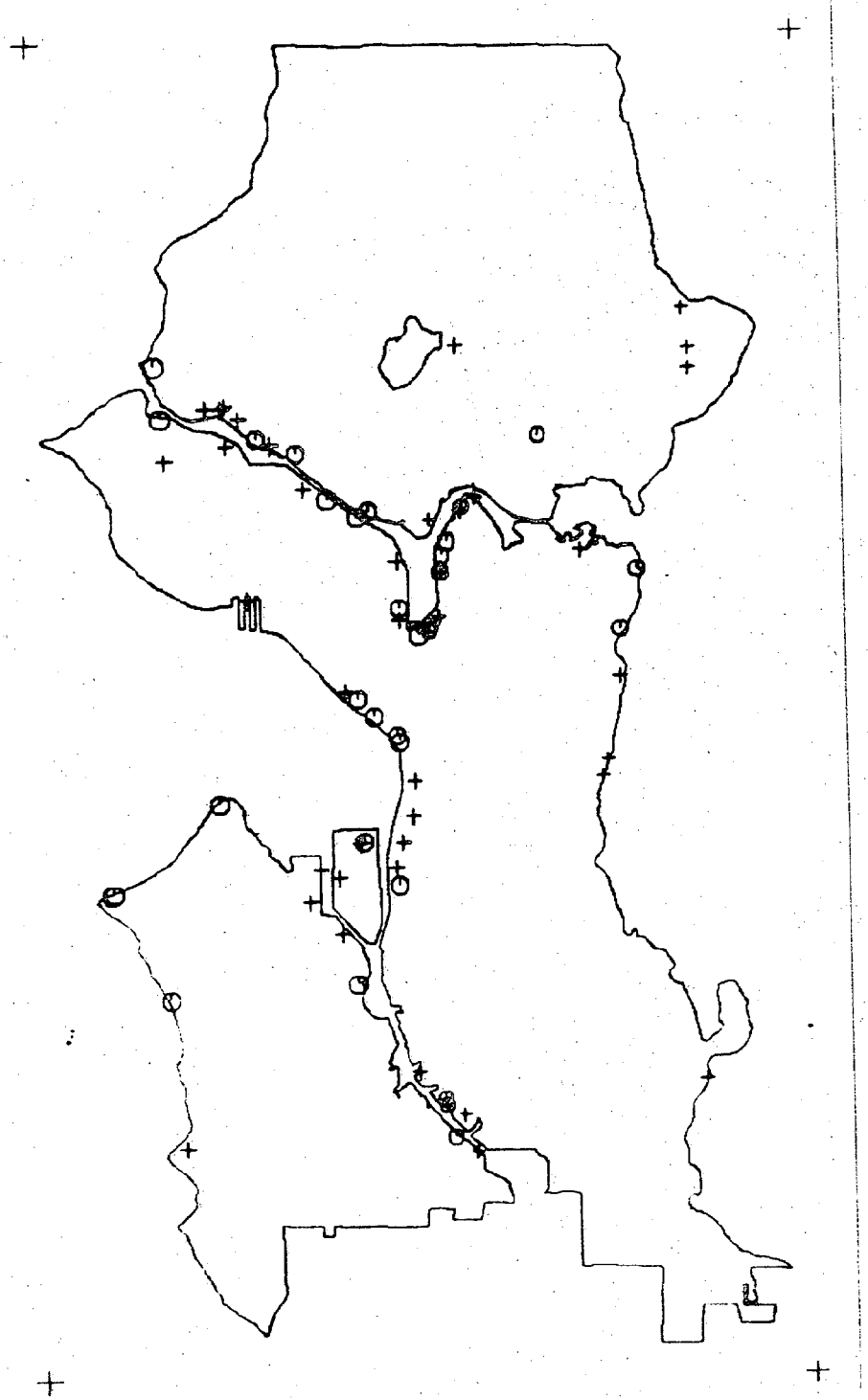


SHORELINE PERMITS 1971 - 1976

1975 PERMITS

+ - WATER DEPENDENT

0 - NON-WATER DEPENDENT



SHORELINE PERMITS 1971 - 1976

1976 PERMITS:

\+ - WATER DEPENDENT

0 - NON-WATER DEPENDENT

SHORELINE STRUCTURES DESIGN

AND

CONSTRUCTION STANDARDS COMPENDIUM

City of Seattle

Department of Community Development

Environmental Management Division

The preparation of this report was funded in part by a grant from the Office of Coastal Zone Management through the Washington State Department of Ecology.

June 1977

Acknowledgements

All the material contained in the Shoreline Structures Design and Construction Standards Compendium is from existing sources noted in the Bibliography. The Army Corps of Engineers have produced a great deal of research in the field of coastal engineering. One Corps publication, Help Yourself, contains very useful illustrations which were used extensively in the Shoreline Structure section. Credit for this work is given on the Shoreline Structure Outline by source number.

TABLE OF CONTENTS

Introduction

The Compendium has been developed in four related sections as a convenient reference tool to provide information standards and guidelines for the construction and maintenance of shoreline structures. It will require revision as new standards are developed and as new construction techniques evolve.

The Bibliography has been coded to allow cross reference in the Compendium tables and the classification section, between standards and protective structures, and between regulatory agencies and standard-setting organizations in the field. The capital letters identify the source of the publication and the number indicates its position within the source listing. For example, B-3 is the reference titled Groins - An Annotated Bibliography, whose source is the Army Corps of Engineers. Letters A-J are reserved for federal agencies, K-R for state agencies, S-V for local agencies, while the letter W is reserved for private standard-setting organizations.

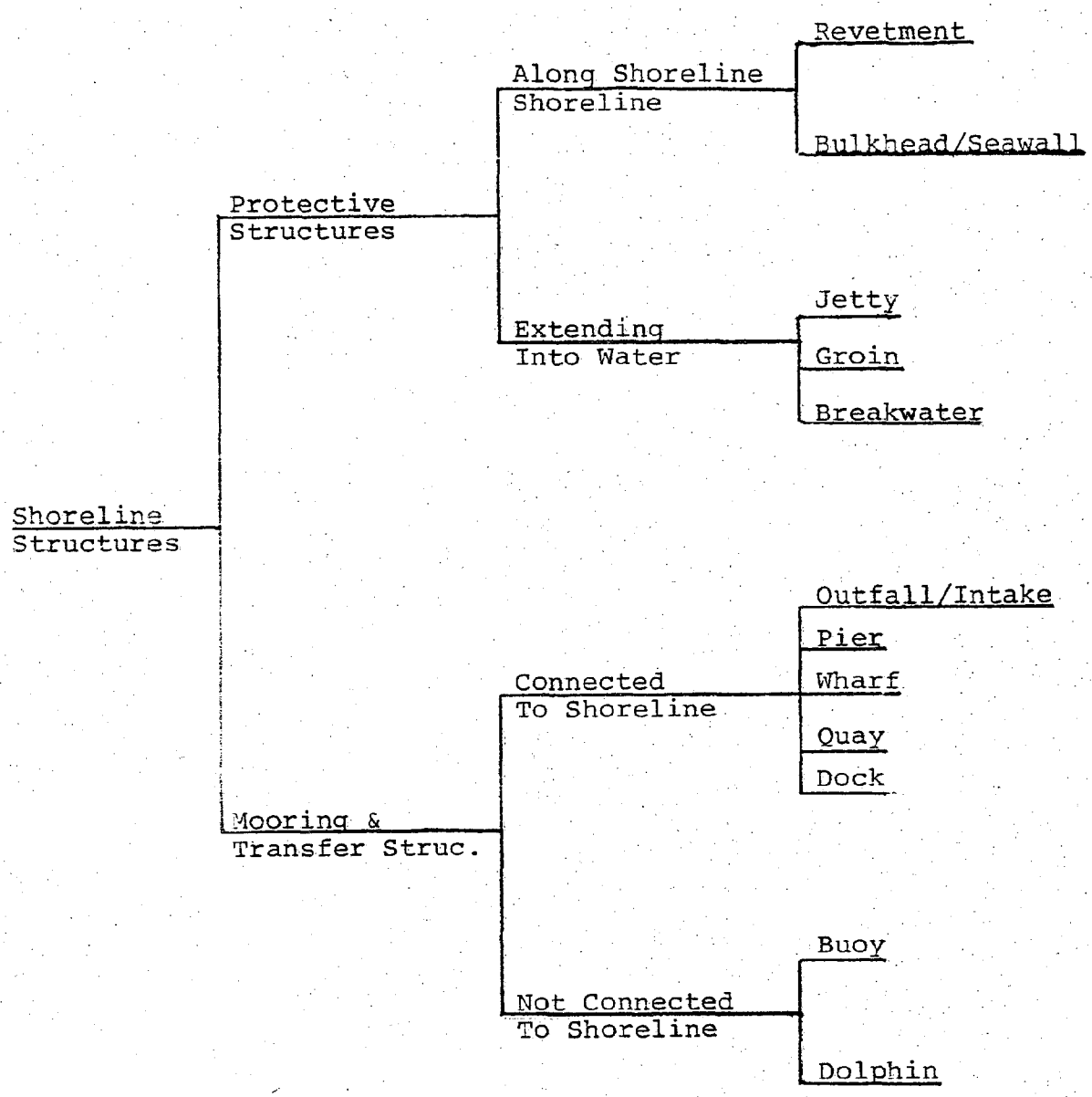
The Glossary has been developed for classification of structures and to define terms used in the Shoreline Structure section. Each defined term is referenced to its source in the Bibliography. In some cases, more than one definition is provided for a given term where overlapping but slightly different meanings provide clarification. The Glossary has been limited to those terms which directly pertain to shoreline structures; glossaries for the general field of hydraulics or coastal engineering are much more extensive.

The Shoreline Structures section provides illustrations of common protective and mooring structures. The selection of protective structures must take into account the environmental characteristics of any specific location. Environmentally sensitive areas such as beaches, estuaries, bluffs, flood plains, and areas of soil instability should be avoided, not only because they play a significant part of the ecological system, but also because the cost or original construction plus the cost of upkeep is far more expensive than on more stable sites.

In most cases, construction in high energy zones requiring massive structural defenses against wind and wave action interferes with the geohydraulic process and results in unsightly and expensive construction which may be destroyed long before its cost can be justified.

In addition to presenting standard solutions to shoreline protection problems, an attempt has been made to encourage the selection of environmentally compatible solutions. Site selection should take into account the existence of active erosion and accretion processes along the Puget Sound shoreline. Although most of the Seattle shoreline has been bulkheaded, inspection shows that continuing and increasingly expensive repairs and replacements are required for most sites. In areas like Magnolia, both the structures and their defensive bulkheads have had to be abandoned. The key to successful construction on waterfront sites is the selection of shoreline structures which will be working with these forces rather than against them.

SHORELINE STRUCTURE CLASSIFICATION



A simple classification of shoreline structures has been devised based on the definitions in the glossary. Structures with similar functions or similar position in relation to the shoreline have been grouped together.

It should be recognized that many shoreline uses utilize a combination of structures. For example, a marina is composed of docks, dolphins, a breakwater and possibly a type of revetment on shore. The classification should be viewed as the organization of basic components used in construction for shoreline activities.

Compendium Table A

Shoreline Structures and Sources of Standards

	Coded Sources from Bibliography
I. Protective Structures	
Along Shoreline	
Revetment	B-1, -2, -7, -9, -10, -13; E-1; K-1; M-3; S-1, -2; W-6
Bulkhead/Seawall	A-1; B-1, -2, -5, -6, -10, -12 -13; D-1; C-1; E-1; K-1; M-1, -2; N-1; S-1, -2; W-2, -4, -5, -6, -8
Extending into Water	
Jetty	B-1, -2, -10, -13; K-1; M-3; S-1; W-6
Groin	B-1, -2, -3, -6, -10, -13; M-3; S-1; W-5, -6
Breakwater	B-1, -2, -8, -10, -13; E-2; K-1; M-3; S-1; W-6, -9
II. Mooring and Transfer Structures	
Connected to Shore	
Outfalls/Intake	M-3; S-1; W-1, -6
Pier	A-1; B-5, -6, -12, -13; C-1; D-1; M-3; S-1; W-5, -6, -7, -9, -10, -11, -13
Wharf	A-1; D-1; S-2; W-6, -11, -13
Quay	A-1; D-1; S-1; W-6, -13
Dock	A-1, B-5, -6; C-1; D-1; M-3; N-1; S-1; W-4, -5, -6, -7, -9, -10, -11, -13
Not connected to Shore	
Buoy	B-12, S-1; W-6
Dolphins	B-5, -6, -12; C-1; M-3; S-1; W-4, -5, -6, -7, -9, -10, -12

Compendium Table B

Agencies or Standard Setting Organizations/Shoreline Structures

	Revetment	Bulkhead/Seawall	Jetty	Groin	Breakwater	Outfall/Intake	Pier	Wharf	Quay	Dock	Buoy	Dolphin
Federal												
Coast Guard		X					X	X	X	X		
Army Corps	X	X	X	X	X		X			X	X	X
Fish & Wildlife	X						X			X		X
Dept. of Navy		X					X	X	X	X		
NOAA	X				X							
State												
Cal. P.W.	X	X	X		X							
Washington Fisheries		X										
Game	X	X	X	X	X	X	X			X		X
Social and Health Serv.		X								X		
Local												
City of Seattle	X	X	X	X	X	X	X	X	X	X	X	X
Private*												
A.P.W.A.						X						
A.S.C.E.		X								X		X
A.I.T.C.		X		X			X			X		X
A.S.T.M.	X	X	X	X	X	X	X	X	X	X	X	X
A.W.P.A.							X			X		X
A.W.P.I.		X										
N.A.E. & B.M.		X			X		X			X		X
N.F.P.A.							X	X		X		
P.C.A.												X
U.B.C.							X	X	X	X		

*See Bibliography for full name of agencies and organizations.

SHORELINE STRUCTURES

Outline and Illustration Reference

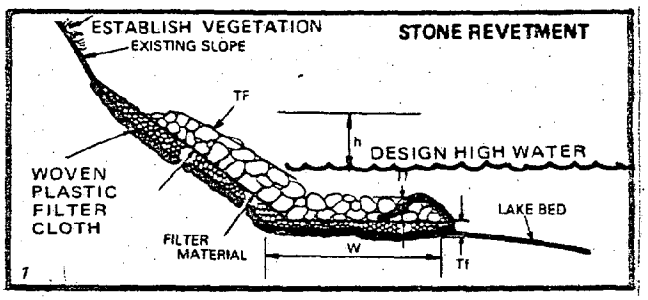
Type of Structure	Structures Illustrated	Illus. Number	Source Number
I. Shoreline Protective Structures			
A Revetments	Stone	1	B-13
	Gabion	2	B-13
	Grout filled bag	3	B-13
B Seawalls	Wood sheetpile	4	B-13
	Steel sheetpile	5	B-13
	Precast Concrete Slab	6	B-13
C Beach Accretion Devices	Offshore Breakwaters	7	B-13
	Impermeable Groins	8	B-13
D Construction Alternatives			
a) Revetments	Gabion Revetment	9	B-13
	Stone Revetment	10	B-13
	Stone/Marsh Plant Revetment	11	
	Grout Filled Bag Revetment	12	B-13
b) Beach Accretion Devices	Offshore Breakwaters	13	B-13
	Impermeable Groins	14	B-13
c) Seawalls	Heavy-duty Timber Crib	15	B-13
	Heavy-duty Timber & Mesh Crib	16	B-13
	Steel or Timber Bulkheads	17	B-13
d) Tires	Floating Tire Breakwater	18	E-2
e) Relocation	Houses	19	B-13
E Construction & Maintenance Guidelines, Rules 1 - 6			
F Improper Solutions	Debris	20	B-13
	Single Stone Layer Revetment	21	B-13
	Floating Log Bulkhead	22	B-13
	Sloping Concrete Bulkhead	23	B-13
	Sandbag Revetment (fresh water)	24	B-13
	Concrete Blocks	25	B-13
II. Boat Mooring Structures			
A Buoys	Mooring Buoy in Tidal Waters	26	B-12
B Marinas	Dimensional Criteria	27	B-5
	Fixed Pier	28	B-5
	Floating Pier-Water Ballast	29	B-5
	Floating Pier-Foam	30	B-5

Shoreline Protective Structures

REVETMENTS

STONE

When erosion is occurring on a natural shoreline, stone revetment is the preferred method of shore protection. It is economical and suitable for all types of erosion problems when stone is available in sufficient size and quality. The key design considerations are the dimensions, foundation treatment, and stone size. Construction is not complicated and no special equipment, other than a crane and trucks are needed.



Description	Design depth of water 50' offshore (ft.) 3 – 4	5 – 6	7 – 8
Dimensions			
Thickness (ft)	2	4	5
Average Wt of Stone(#)	200 – 500	750 – 2000	2000 – 5000
Height of Structure (ft)	4	6	8
Toe Protection Width (ft)	2	4	5
Filter material	Woven Cloth		
List of Materials (per ft)			
Stone (tons)	1.89	4.94	7.36
Filter (sq ft)	13	19	22

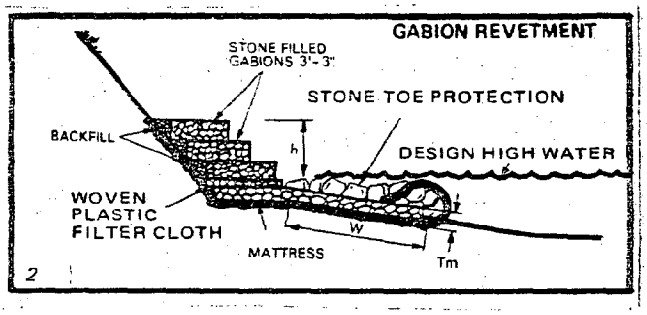
Notes: 1) Slope should be compacted and graded to 1:2 or flatter. 2) Place a gravel, small rock, filter blanket, and/or woven filter cloth on the prepared slope. 3) Place rock carefully with a crane, rock should have a three-point bearing. 4) Insure rock sizes are well mixed. Larger and smaller rock should not be visibly segregated.

Maintenance Requirements

This structure is subject to displacement. The effectiveness of the structure will be impaired by thinning of the protective layer or settling of the structure. Restoration of the rock slope protection to the designed top elevation, equivalent thickness and reduction of voids in the facing should be accomplished when needed. The list of materials and general costs information is given in the following tabulation.

GABION

A gabion is a steel wire mesh basket available commercially. Revetments can be constructed from stone filled gabions by groups of individuals without special construction equipment. Gabion structures can be built to any height required. A step design is suggested to reduce wave runup. The manufacturer's instructions should be followed closely. The structure should rest on an 18" thick gabion mattress to protect against scour. This type of construction is applicable to all shore-protection problems.



Description	Design depth of water 50' offshore (ft.) 3–4	5–6	7–8
Dimensions			
Height (ft.)	5	7	9
Apron length (ft.)	2	5	7
Filter material	Woven Cloth		
Materials (per ft.)			
Gabions(#)	1	3	4
Gabions–Stone filled (yd^3)	0.2	0.7	0.9
Gabion type mattress (yd^3)	0.2	0.4	0.7

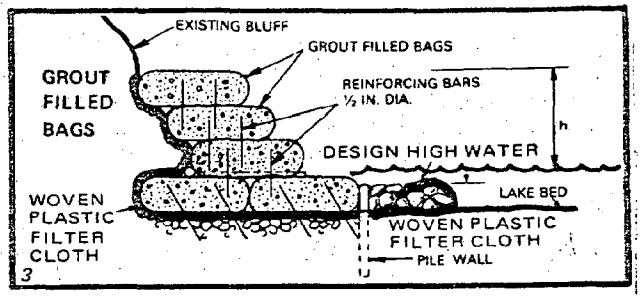
Notes: 1) Gabions can be filled with any stone material larger than the mesh. 2) Gabion structures maintain their strength even if the foundation settles somewhat. 3) You should stagger the joints between baskets the same way you stagger the joints between courses in a brick wall to make a stronger structure. 4) You would be wise to anchor the seaward end of the mattress with large stone or anchor screws. 5) Your mattress should extend out as far from the toe as one and one-half times the design depth.

Maintenance

The life of gabion protection depends on the durability of the wire. Replace broken wires with galvanized or plastic coated wire. The baskets occasionally are moved during severe storms, but can often be replaced after the storm. Such movement indicates foundation failure or scour at the toe. Repair all storm damage as quickly as possible.

GROUT FILLED

Large grout filled nylon bags (20' x 5' x 1.6") may be used to protect eroding shorelines. This type of structure is adaptable to all types of slopes. Bags should be placed parallel to the shore with reinforcing bars installed both vertically and horizontally as shown in the section below. This type of structure may be applicable where access is limited and rock is not readily available. No special material is needed other than the bags and construction is not complicated. A grout pump is required to fill the bags. Prices in the table below were computed with the assumption that ready-mix grout will be used but a concrete mixer could be substituted at the site.



Description	Design depth of water 50' offshore (ft.) 3 – 4	5 – 6	7 – 8
Dimensions			
Height of Structure (ft)	6.4	8.0	11.2
(Bags)	(5)	(6)	(8)
List of Materials (per ft.)			
Grout (Yds. 3)	1.5	1.8	2.4
Reinforcing bars (lbs.)	10	12	16
Filter Cloth (Sq. Ft.)	18	21	26

Maintenance Requirements

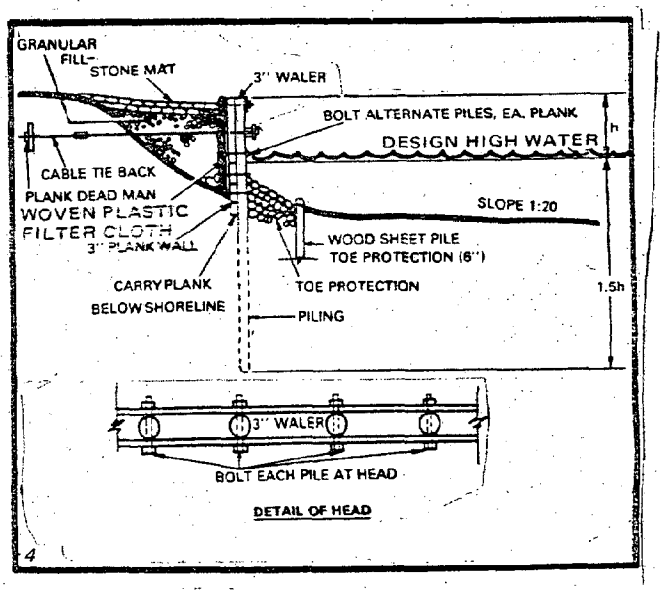
Remedial work on this type of structure is not easily accomplished. Special attention should be given to toe protection. Uneven settlement or undermining might cause fracture or collapse. If excessive scour causes toe stone to settle, more material should be added. This type of structure is readily adaptable to add-on construction. Additional structure height can be easily accomplished if necessary.

SEAWALLS

WOOD SHEET PILE

Timber walls are constructed of plank sheeting with round piles. They consist of two rows of 3-inch plank sheeting and a row of round piling with heavy horizontal walls between the planks and the piling. They must be tied back to anchor piling. The most common cause of failure of sea walls is undermining of material from the bottom of the toe of the structure, resulting in inadequate penetration of piling. The pressure of the soil and water on the back side can then tip the structure. The tie-backs provide additional strength to resist this force. Timber bulkheads also require positive toe protection.

The piling and sheeting are driven with the aid of a jet from a small pump. The use of this design is controlled by sub-surface foundation conditions. It is suitable for sand or sand and gravel shores where the sand deposit is 12-15 feet below the bottom. Wooden structures must be securely fastened together with bolts.

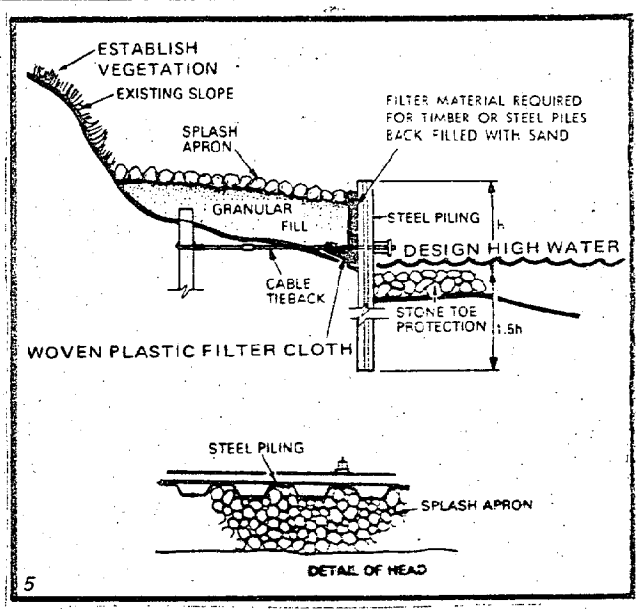


Description	Design depth of water 50' offshore (ft.) 3 – 4	5 – 6	7 – 8
Dimensions			
Height (ft)	5	8	10
Diameter of Piles (in)	6	8	10
Pile length (ft)	13	20	25
Wall plank thickness(in)	3	3	3
Toe protection wt (lbs)	70	140	200
List of Materials (per ft)			
Piling	5.3	8.0	9.3
Water	1	1	1
Wall Plank (s.f.)	6	9	11
Filter Blanket (s.f.)	9	12	16
Toe Stone (c.y.)	.33	.7	.95
Fill Material (c.y.)	.9	2.0	3.0

STEEL SHEET PILE

A steel bulkhead serves to armor the bank. The fact must be designed to absorb all wave energy. Severe scour occurs at the bulkhead line. The sheeting depends upon penetration and tie backs for its stability. The structural design of sheet piling is highly specialized and not subject to standard plans. For this reason the service of a qualified engineer is essential. Key design considerations are foundation conditions, penetration of the piling, height and alignment, and scour protection. Sufficient access must be available for pile driving equipment.

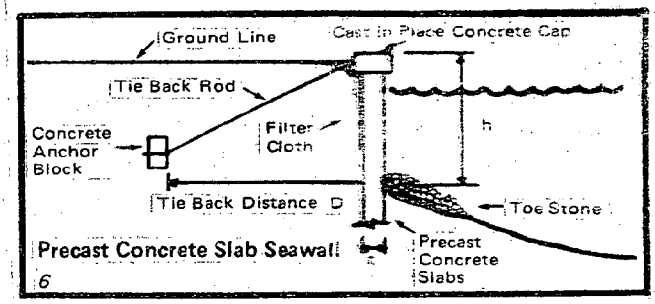
Piles should be carefully located as shown on the drawings and driven in a plumb position, each pile interlocked with adjoining piles for its entire length, so as to form a continuous diaphragm throughout the length of each run of wall. The contractor should drive all piles as true to lines as practicable and should provide suitable temporary walls or guide structures to insure that the piles are driven in correct alignment.



Description	Design depth of water 50' offshore (ft.) 3 – 4	5 – 6	7 – 8
Dimensions			
Height (h)	5	8	10
Piling length	13	20	25
Toe protection apron length	2 X 2	4 X 4	5 X 5
List of Materials (per ft.)			
Steel Piling (s.f.)	13	20	25
Waler (ft)	1	1	1
Fill material (yds)	.9	2.0	3.0
Toe Protection (yds)	.75	.60	.95

PRECAST CONCRETE SLAB

Hardened shore protection with a vertical seaward face may be installed in a relatively short time by using precase concrete slabs jetted into place or driven with a vibratory or impact hammer. A concrete cap is usually cast on top of the slabs to serve both as a structural tie and to improve the finished appearance. Tie-backs are usually needed to prevent the wall from tipping seaward. Also, adequate penetration of the piles or slabs into the sea bottom is necessary to prevent the toe from sliding seaward. If wave action occurs against the vertical face, scour erosion at the toe of the wall may be expected. The wave energy breaking against the vertical face is deflected both upward and downward. The downward component of the deflected wave scours the sea bottom at the toe of the wall. Hardened toe protection may be required to prevent toe failure.



Description	Design depth of water at seawall For protected waters only (for exposed locations consult professional design engineers.) 1' to 1.5'	3'	4'
Dimensions Height, h	4.5' to 5.5'	6.5'	7' to 8'
Slab piling length	10' to 12'	14'	16' to 18'
Slab thickness t	5½"	7"	8"
Cap size	10" x 16"	12" x 8"	16" x 20"
*Tie back rod diameter	1"	1-1/8"	1-1/4"
Tie back distance D	12' to 14'	16'	20'
Distance between anchor rods	10'	12'	12'
Anchor block size	12"x18"x3'8"	12"x18"x5.	12"x24"x5'

*Tie back rods should be heavily coated or wrapped to resist erosion.

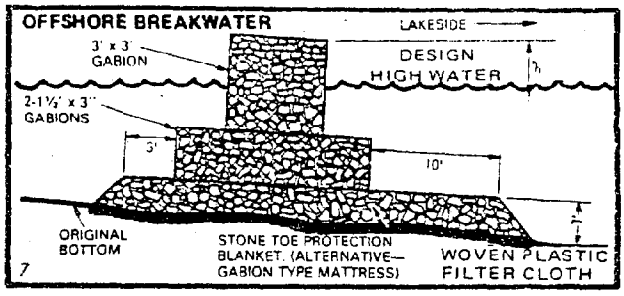
BEACH ACCRETION DEVICES

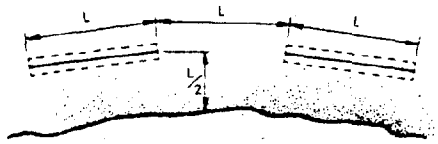
OFFSHORE BREAKWATERS

Offshore breakwaters are a method of shore protection for flat or moderate offshore slopes. The design wave is based on water depth 50 feet seaward of the structure.

Offshore breakwaters can be constructed of any material capable of withstanding the wave energies impinging on them, including stone, gabions, steel, wood, and concrete shapes. A toe protection blanket is essential. Offshore breakwaters may be low structures to allow passage of wave energy or they can be high structures to completely block waves. They should be built in shallow water nearshore for reasons of economy. They can be continuous for long distances or segmented with passages between them to allow exchange of water.

Caution. Offshore breakwaters interfere with shore processes; their use demands extreme caution to preclude major downdrift erosion. Consider then only in areas of substantial sand movement. Make them low so they will be overtopped by waves during storms. Offshore breakwaters are difficult and expensive to maintain.



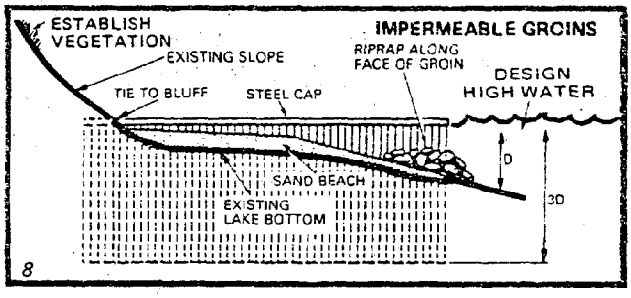


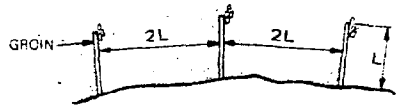
	Design depth of water 50' offshore (ft.)		
Dimensions	3–4	5–6	7–8
Height (ft.)	1.5	2.0	
Apron length (ft.)	10.0	10.0	Not
List of Materials			Recom-
Gabions–Stone filled (yd^3)	0.7	0.7	mended
Stone toe protection (yd^3)	0.6	0.6	

IMPERMEABLE GROINS

Protection of the shoreline by groins assumes sand is available and moving along the shoreline. Groins can have hthe undesirable effect of damaging downdrift shores. The layout of groins is very important. Groins should be kept low, only one foot above the expected high water, and shore, terminating at the 3 foot depth. Groins must be protected from flanking by tying them well into the bank. The maximum length of groins should not exceed 100 feet. If possible groins should be artifically nourished by placing sand on the updrift side of each groin.

Caution. Groins are shore protection structures that interefere with shore processes and entrap beach materials. Their use demands extreme caution to preclude major downdrift erosion. Consider them only in areas of substantial sand movement. Make them low so they will be overtopped by waves during storms. Groins should be constructed in stages, starting at the extreme downdrift end of the area to be protected. Study the effects of the single groin carefully before completing the layout of the groin field.





	Design depth of water 50' offshore (ft.)		
Dimensions	3–4	5–6	7–8
Steel Piling (length)(ft.)	115	65	
Steel Piling (wetted length)(ft.)	100	50	Not
Depth (ft.)	15	15	Recom-
Groin Spacing (ft.)	200	100	mended
List of Materials (per groin)			
Sheet Piling (tons)	27	16	
Timber Walers (tons)	3	2	
Stone Filter Blanket (tons)	90	90	
Stone Rip rap (tons)	140	140	

CONSTRUCTION ALTERNATIVES *REVETMENTS*

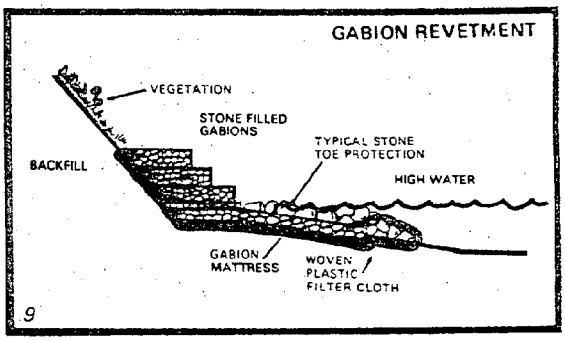
GABION REVETMENT

ADVANTAGES

No special construction equipment required, rated best do-it-yourself type of protection. Flexible, easily repaired after storm damage. Low first cost, if do-it-yourself project.

DISADVANTAGES

Subject to rusting and deterioration unless wire baskets are plastic coated. Limits use and access to beach. Moderate maintenance costs. Reduces productivity of intertidal area.



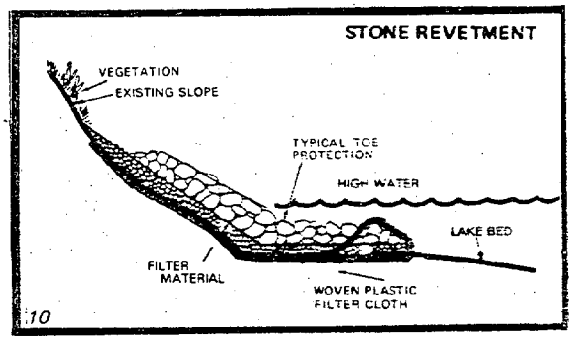
STONE REVETMENT

ADVANTAGES

Most effect structure for absorbing wave energy. Flexible — not weakened by slight movements. Natural rough surface reduces wave runup. Lends itself to stage construction. Easily repaired — low maintenance cost. The preferred method of protection when rock is readily available at a low cost.

DISADVANTAGES

Heavy equipment required for construction. Limits use and access to beach. Reduces productivity of the intertidal area. Moderately, high first cost. Difficult to construct where access is limited.



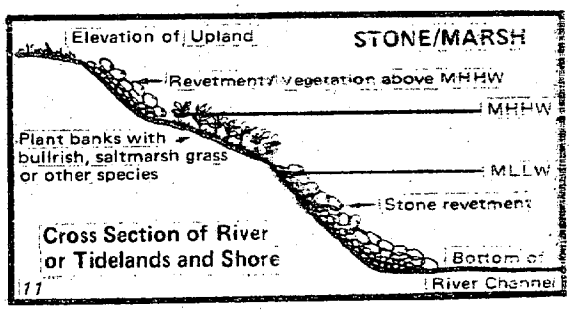
STONE/MARSH VEGETATION

ADVANTAGES

Same as stone revetment. Provides productive habitat in intertidal area. Preferred method of protection in low energy zones.

DISADVANTAGES

Vegetation must be planted on 3:1 slope or flatter. Combination can only be used in low energy zone.



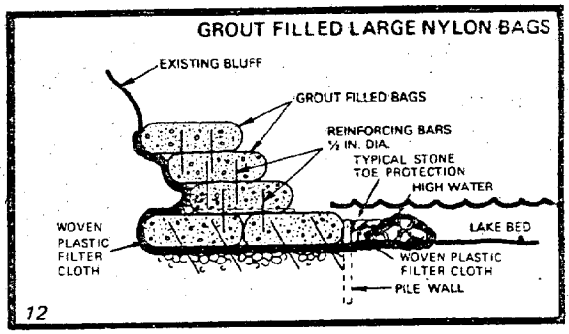
GROUT FILLED REVETMENT

ADVANTAGES

Moderate first cost. Adaptable to stage construction.

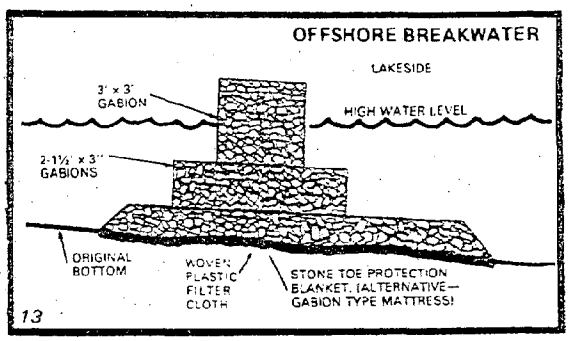
DISADVANTAGES

More subject to catastrophic failure if the toe is undermined. Reduces productivity of the intertidal area.



BEACH ACCRETION DEVICES

OFFSHORE BREAKWATERS



ADVANTAGES

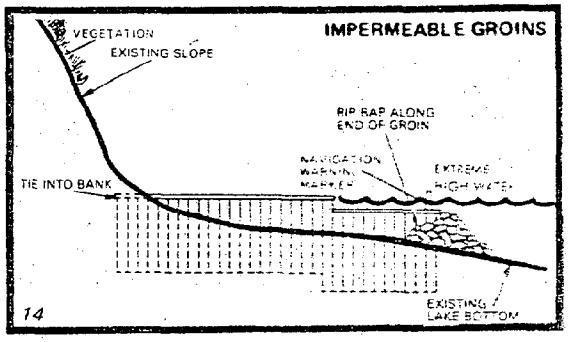
Resulting beach protects upland areas and provides recreational benefit.

Moderate first cost and low maintenance cost.

DISADVANTAGES

Extremely complex coastal engineering design problem. Qualified coastal engineering services are essential. Groins rarely function structly as intended. Areas downdrift will probably experience erosion. Unsuitable in areas of low littoral drift. (Sand movement) Subject to flanking, must be securely tied into bluff.

IMPERMEABLE GROINS



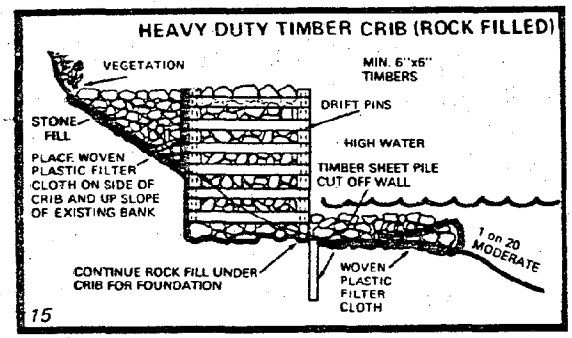
ADVANTAGES

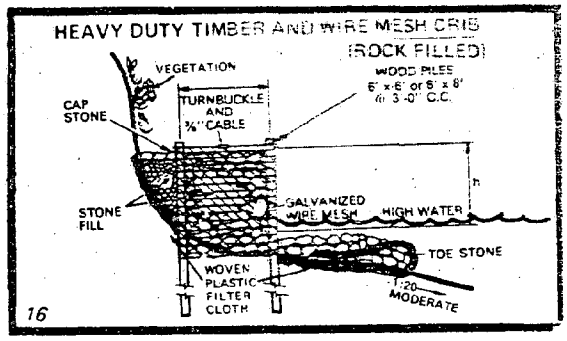
Beneficial effect can extend over a considerable length of shoreline. Maintains or enhances recreational value of a beach. The structure is not subject to flanking – it can be built in separate reaches. Gabions can be constructed on shore and transported to site by ordinary earth moving equipment. Tends to build a natural beach between the breakwater and the shore.

DISADVANTAGES

May modify beachline and cause erosion in downdraft areas. Structure is subject to foundation and scout failures, floating plant and heavy equipment may be required for construction. Gabions may be damaged by floating ice or logs. Extremely difficult to repair.

SEAWALLS





ADVANTAGES

Lends itself to protecting short reaches Can be constructed of materials that are readily available. Structure is easily repaired.

DISADVANTAGES

Structural integrity depends upon adequate toe protection. Vertical walls induce severe scour at their base. Limits use and access to beach. Reduces producitivity of the intertidal area.

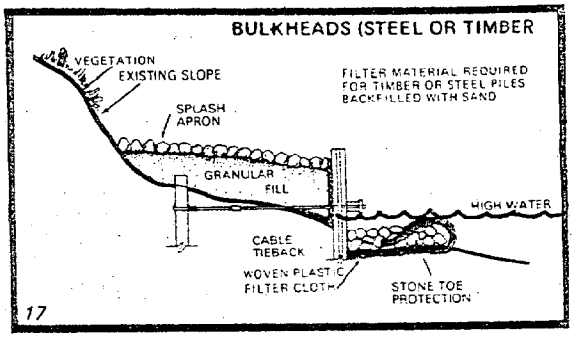
STEEL OR TIMBER BULKHEADS

ADVANTAGES

Provides substantial protection. Maintains shoreline in fixed position. Low maintenance cost. Materials are readily available.

DISADVANTAGES

Structural integrity depends upon adequate toe protection. Vertical walls induce severe scour at their base. High first cost. Pile driving requires special skill and heavy construction equipment. Complex engineering deisgn problem. Limits access and use of beach. Reduces productivity of the intertidal area.



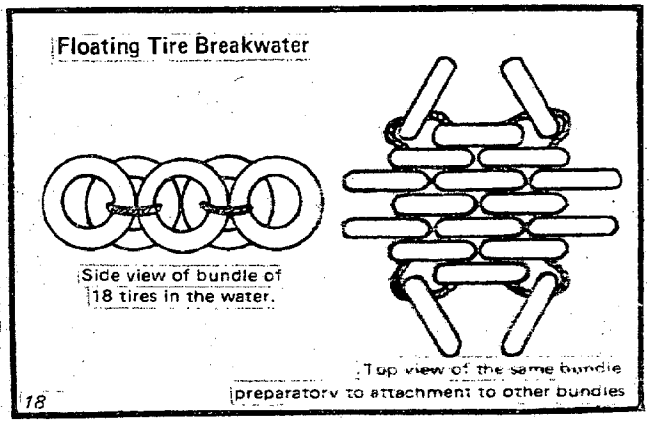
FLOATING TIRE BREAKWATER

ADVANTAGES

Very low construction cost, easy to build. May be used where surface-to-bottom breakwaters are not feasible. Simple mooring arrangement, easy maintenance. Provide wave suppression without impeding todal and current flow. Minimum safety hazard to colliding boats. Provide floating habitat for fish.

DISADVANTAGES

No long term performance data available. Short lifespan. Effective only for small waves Low profile above water.



HOUSING RELOCATION

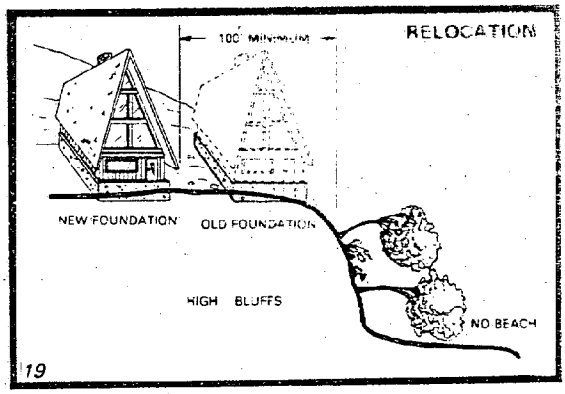
Relocation is an alternative that can not be overemphasized. Erosion is a natural geologic process that is extremely difficult to stop. The alternatives to build shore protection or to relocate must be weighed against the consequence of failure. Depending on the type of structure you might consider, it may cost the same to relocate as it would to build shore protection. Should a protective structure fail, then your investment in the structure is lost and your home or cottage is still in danger.

ADVANTAGES

It is permanent, in the long run it is the best method of protection. Adaptable to short reaches of shoreline. Can be accomplished by the individual through contract with a house mover.

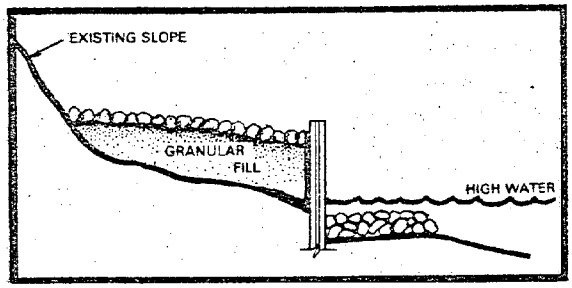
DISADVANTAGES

Special skills and equipment required. Area must be available for relocation of the house. Does not stop erosion.



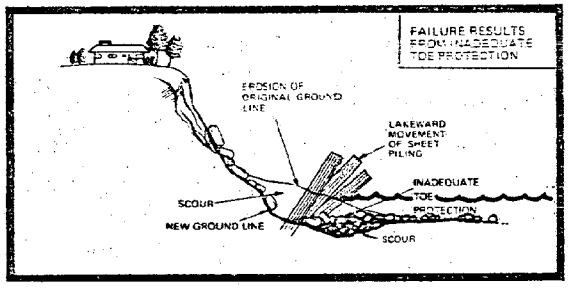
CONSTRUCTION AND MAINTENANCE GUIDELINES

RULE 1
PROVIDE ADEQUATE PROTECTION FOR THE TOE OF THE STRUCTUE SO THAT IT WILL NOT BE UNDERMINED.



CHECK FOR SIGNS OF FAILURE

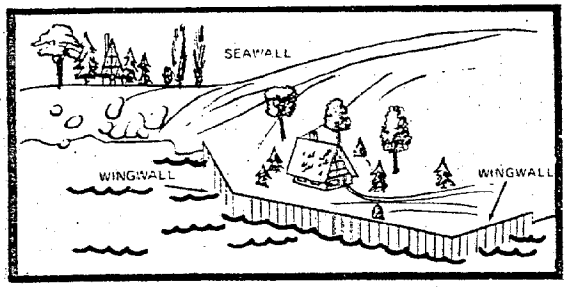
Most failures of shore protection works result from "toe failure", or erosion under the lowest part of the structure. Failure of the bulkhead can be prevented with adequate toe protection. Toe protection must be substantial enough to prevent the original ground under it from washing through the toe protection blanket, and extend far enough seaward of the structure to prevent underminind. Check for signs of failure such as movement of the wall, erosion behind or at the toe, or at the end of the structure.



MAINTENANCE OR REPAIR PROCEDURE

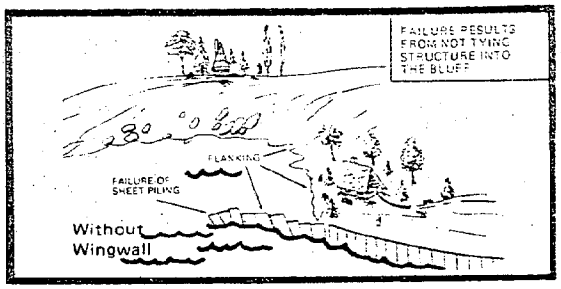
Re-establish support by underpinning, tie backs, systems of anchor piling, walers and tie rods. Place larger stone or rock-filled mattress at toe or structure to prevent scour. Backfill where necessary.

RULE 2
SECURE BOTH ENDS OF THE SHORE PROTECTION WORKS AGAINST FLANKING.



CHECK FOR SIGNS OF FAILURE

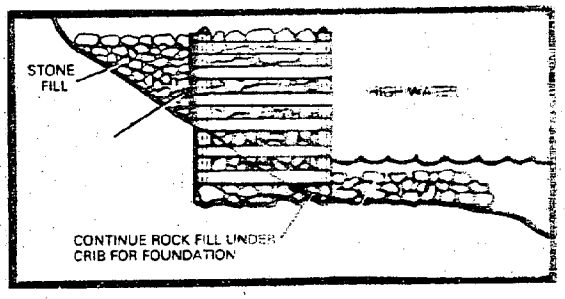
Erosion will continue adjacent to your works. If an existing structure has been flanked, such as the one shown below, correct it by placing additional material at the ends and tying your works directly into the bluff. Check for signs of failure such as movement of the ends and erosion at the end of the structure. The illustration below shows the result of not constructing wingwalls and tying the ends of the structure into the bluff.



MAINTENANCE OR REPAIR PROCEDURE

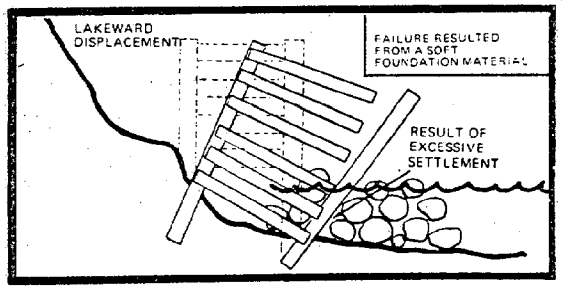
Place additional material at the ends and tie structure directly back into the bluff.

RULE 3
CHECK FOUNDATION CONDITIONS.



CHECK FOR SIGNS OF FAILURE

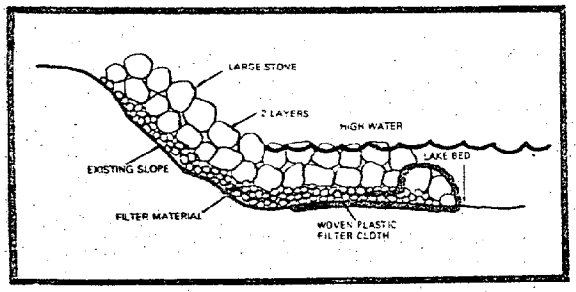
Soft foundation material may result in excessive settlement of the structure. Soft underlayers may allow all or part of structure to slide. Check for settlement, and excessive displacement. Hydrostatic pressure due to groundwater seepage may cause movement of some types of impermeable walls.



MAINTENANCE OR REPAIR PROCEDURE

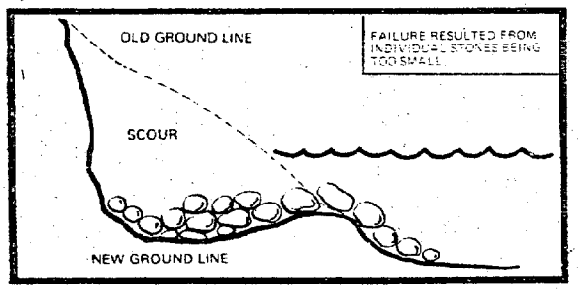
Re-establish support by construction underpinning, foundation protection and backfilling. If the structure was impermeable such as a steel wall add or reopen weep holes.

RULE 4
USE MATERIAL THAT IS HEAVY AND DENSE ENOUGH THAT WAVES WILL NOT MOVE INDIVIDUAL PIECES OF THE PROTECTION



CHECK FOR SIGNS OF FAILURE.

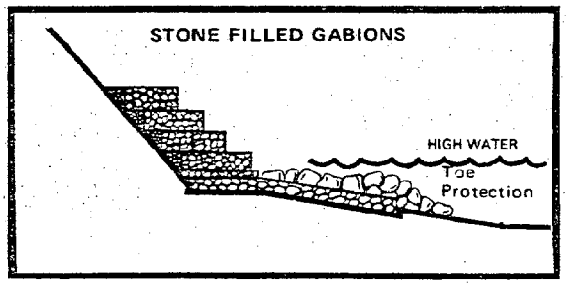
A cause of common failure is to use undersized material; waves have tremendous power and can move a lot of material in a short time. Small stones or pieces of concrete, will be moved around and carried away by small waves. Larger waves will do it even faster. The bank revetment below was constructed of undersized stone that was carried down the slope by large waves. Excessive settlement, increase in voids, loss of filter material, erosion behind, or at the end of the structure can result due to the use of small stone layers. Filter material may be required between underlying ground and the protective material.



MAINTENANCE OR REPAIR PROCEDURE

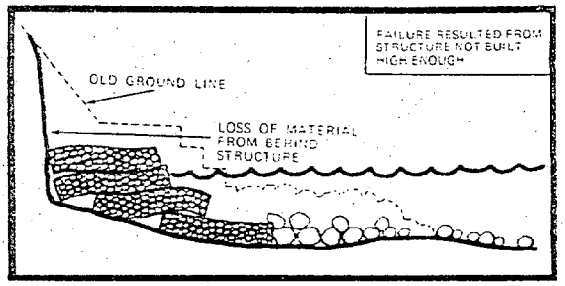
Place additional stone at toe, restore to original elevation, section, and thickness, reduce excessive void ratio, back fill behind structure, extensive upgrading in size of material may be required.

RULE 5
BUILD REVETMENT HIGH ENOUGH THAT WAVES CANNOT OVERTOP IT (SPRAY OVERTOPPING IS ALL RIGHT, BUT NOT WAVES).



CHECK FOR SIGNS OF FAILURE

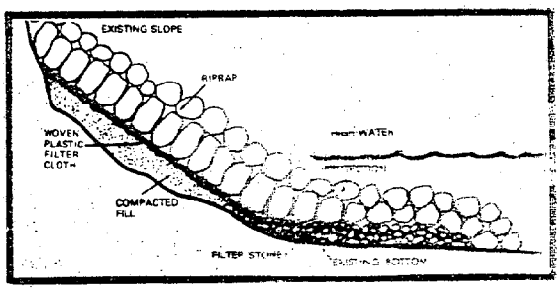
Many failures have happened because the structure was not built high enough and erosion could then continue behind the structure as if were not there. Check for broken wire, excessive movement, and erosion behind or at ends of structure.



MAINTENANCE OR REPAIR PROCEDURE

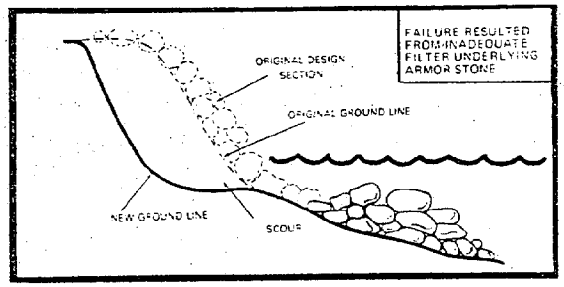
Restore to higher elevation, back fill behind structure, add filter cloth, and splash apron.

RULE 6
MAKE SURE THAT VOIDS BETWEEN INDIVIDUAL PIECES OF PROTECTION MATERIAL ARE SMALL ENOUGH THAT UNDERLYING MATERIAL IS NOT WASHED OUT BY WAVES



CHECK FOR SIGNS OF FAILURE

A filter material such as woven plastic filter cloth must be placed on a highly erodible embankment to prevent the fine material from washing through the voids in the structure. The protection material must be thick enough to make a long passage for dissipation of wave energy prior to reaching the underlying materials. In the case below woven plastic filter cloth was not included. As a result fine bluff material was washed out by waves.

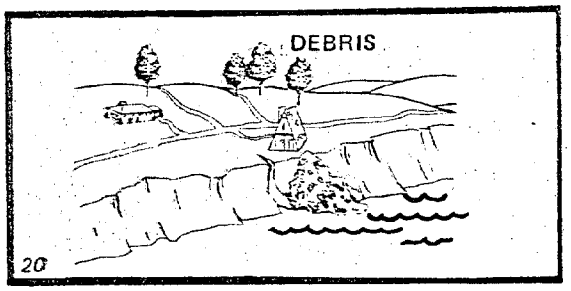


MAINTENANCE OR REPAIR PROCEDURE

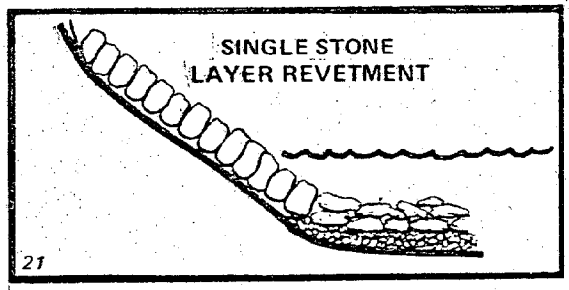
Rebuild to original elevation, use at least two layers of stone, use a stone filter or woven plastic filter cloth, fill behind structure.

IMPROPER SOLUTIONS

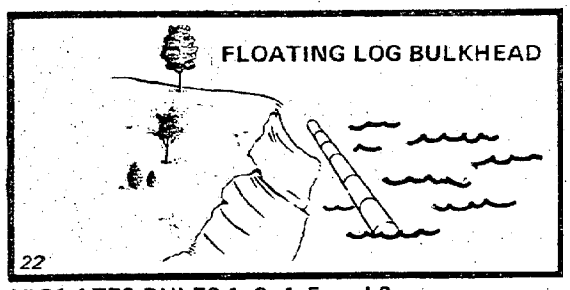
Each of these improper solutions violates two or more construction guidelines. Can you tell which construction guidelines each of these examples violates and how the structures will fail? Answers are provided under each illustration.



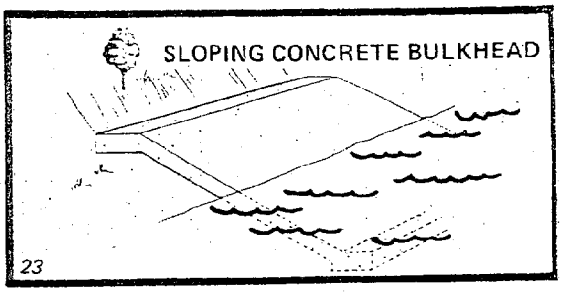
VIOLATES RULES 1, 2, 3, and 6



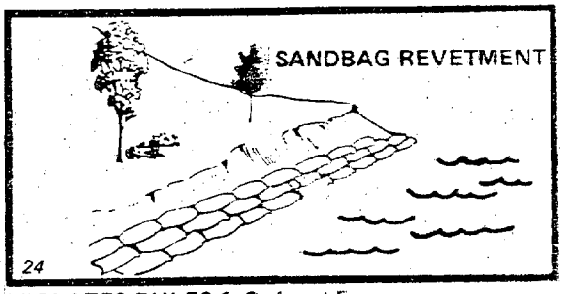
VIOLATES RULES 1, 4 and 6



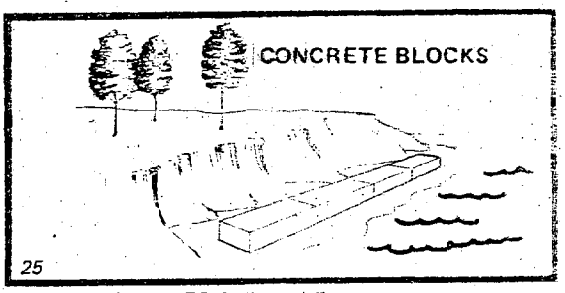
VIOLATES RULES 1, 2, 4, 5, and 6



VIOLATES RULES 1 and 2



VIOLATES RULES 1, 2, 4 and 5



VIOLATES RULES 1, 2, and 5

Boat Mooring Structures

BUOYS

The general public is authorized to install mooring buoys for private use in tidal waters within the geographical boundaries of the Seattle District, Corps of Engineers by a general permit (No. 071-OYB—1-003686). The installation of buoys is subject to conditions contained in the permit including:

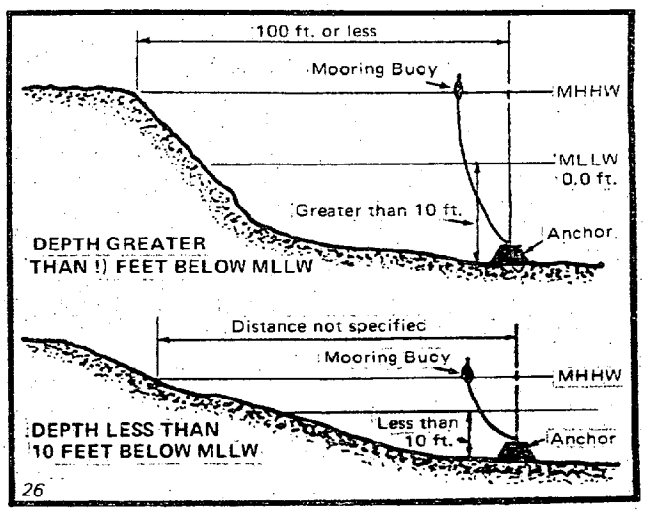
A buoy cannot interfere with navigation or orderly harvest of commercial food fish or shellfish resources.

A buoy cannot restrict the movement of vessels using existing facilities or engaged in commercial fishing at key net fishing locations.

Work in nevigable waters should minimize water quality degradation and any other adverse impact of the work on fish, wildlife and natural environmental values.

Anchor lines shall be weighted or made with nonfloating material.

MOORING BUOYS IN TIDAL WATERS



NOTE:
MLLW – Mean Lower Low Water
MHHW – Mean Higher High Water

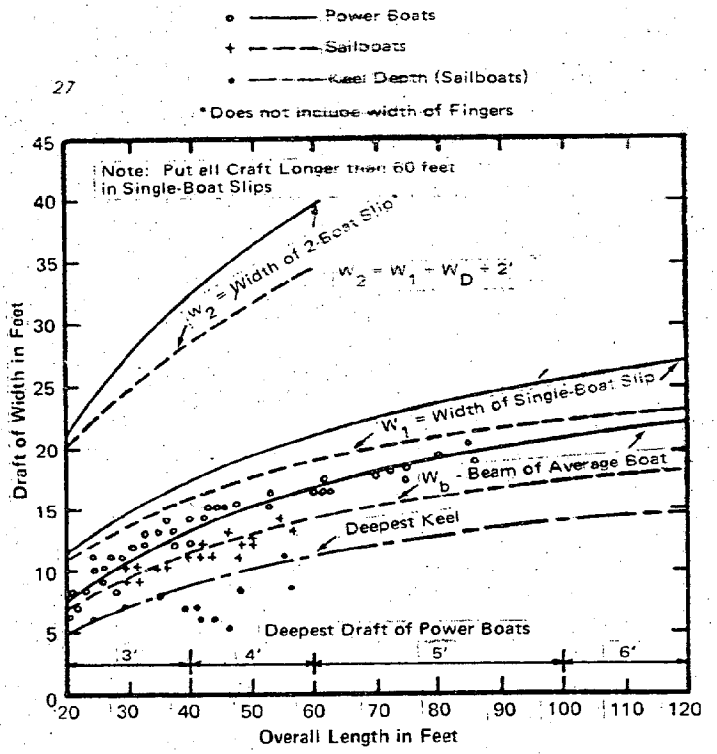
MARINAS

Slip Dimensions

The most common slip arrangement is a series of piers or headwalks extending perpendicular to the bulkhead to a pierhead line, with finger piers extending at right angles from the headwalk on either side. For power craft, widths of fairways between finger ends are usually 1.75 to 2 times the length of the longest slips served, while for sailboats with width is 2 to 2.5 times the slip length. A graph from the National Association of Engine and Boat Manufacturers current catalog data shows average beam width and maximum depths of keels for various lengths of craft. The graph also shows suggested average widths for right-angle slips where the actual dimensions of craft to be berthed are not known. Where basin configuration or curtailment of water space dictates a need for skewed slips, the slip spacing must be calculated, allowing about 1.5 feet of clearance on each side between hull and finger for boats up to 35 feet in length and 2 feet of clearance for longer craft. With the increase of houseboats and multihulled craft, it may be advisable to provide a number of extra-wide slips, depending on past experience record and projected needs of the area.

Widths of headwalks and finger piers vary from one region to another. The average headwalk width is about 8 feet, with a range of about 5 to 16 feet. The wider headwalks usually have some width for bearing-pile risers, locker boxes, firefighting equipment, and utility lines. The narrower piers often have all obstructions moved to knees at the junctions of finger piers. Extra-wide headwalks are usually in fixed-pier installations because of the higher cost of floating construction. Long, fixed headwalks can also serve as roadways for service vehicles.

Boarding fingers for single-boat slips are usually about 3 feet wide, normally the minimum allowed for floating



DIMENSIONAL CRITERIA FOR BERTHED CRAFT

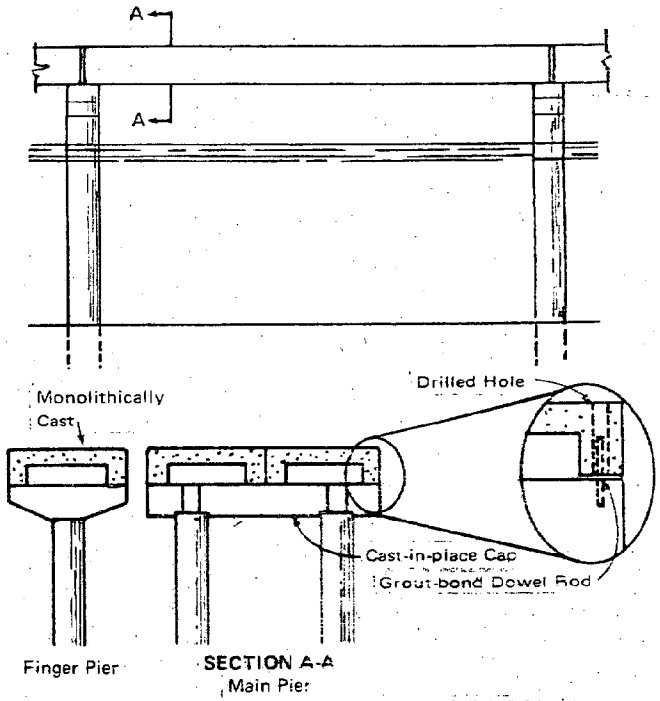
construction because of the instability of narrower floats. For this reason, floating fingers longer than 35 feet are usually 4 feet wide. In doublt-boat slip construction, a finger width of 4 feet is common for all slip lengths. A compromise system of alternating fuli width and narrow fingers (about 12 inches) is used in some areas.

FIXED-PIER STRUCTURES

Structural design criteria for fixed-timber headwalks and fingers are presented in source No. W9 All timber used for construction should be treated to avoid damage by dry rot and living organisms. This source and the American Society of Civil Engineers (1969) present data on timber treatment. The American Wood Preserver's Association (1971), Standard C-1, describes the treatment processes, materials used, and results of preservative treatment for wood products by various preservatives applied by the pressure process. AWPA Standard C-18 extends the coverage of Standard C-1 to include the specific requirements for pressure-treated piles and timbers used in marine construction. These standards are updated periodically to include the latest techniques and materials; hence, only the current editions should be used. Because of possible failure due to undetected weakness in the wood, all deck planking should of nominal 2-inch thickness and not less than 6 inches in width. Galvanized nails and hardware should be used. Deck nailing should penetrate the supporting timbers at least 3 inches so the nails will not pull up under repeated flexure caused by passing traffic. Creosoted piles that project above deck level should be protected with batterns or some protective sheathing.

Metal framework berthing structures are generally too costly to fabricate commercially available basic components, but several systems have been developed that use factory-built components for easy field installation. Most are of tubular and pressed-steel construction with either stamped metal or timber plank decks. Bottom conditions in the berthing basin must be checked to determine if the anticipated loading will cause settlement or if the depths in the basin are too great for the system. Most prefabricated systems are for small individual docks along a lakefront or riverfront and are not normally suitable for large installations.

In areas where timber is scarce or costly, reinforced concrete construction is frequently used for fixed-level berthing systems. The structural design criteria are similar to timber construction except that connections and fastening devices are different and the dead load to be supported is greater. However, lightweight concretes are sometimes used in stringers and decking to reduce the dead load (see Figure 28). If enough concrete cover on the reinforcing steel is not provided, cracking and spalling from rust swells may result. As for bulkhead construction, all concrete in a saltwater environment should have 3 inches of concrete covering all steel reinforcement. This amount of cover may be infufficient if care is not exercised in placing and vibrating the concrete. With a properly designed mix and careful placement, a good dense concrete can be obtained to outlast almost any type of construction.



PROPOSED USE OF PRESTRESSED DECK SLABS FOR FIXED PIER CONSTRUCTION

28

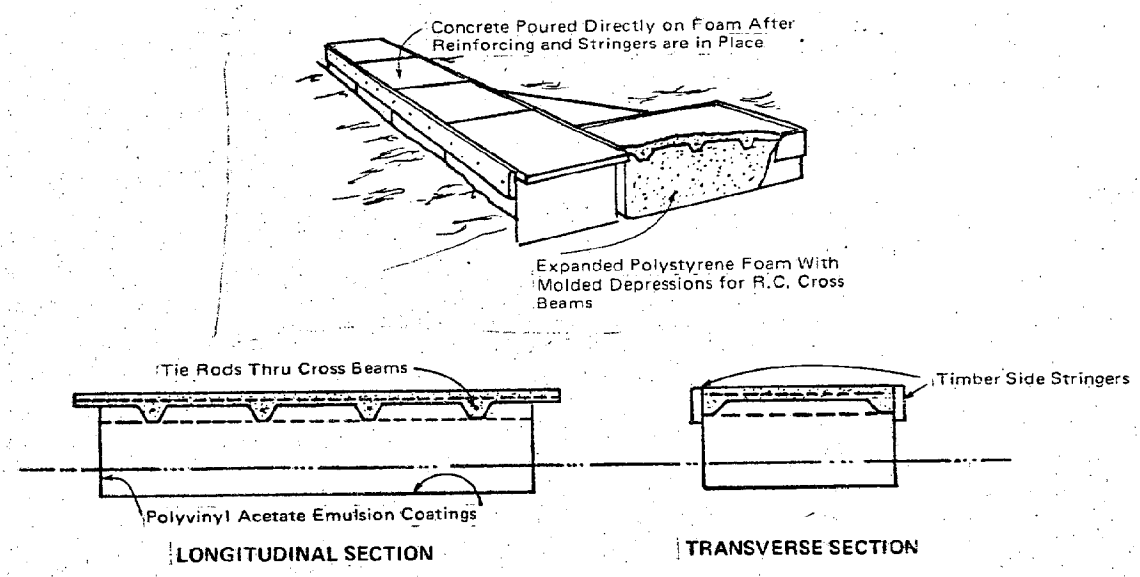
Floating Pier Structures

Where water levels do not fluctuate more than 2 feet, the berthing docks and slips are almost universally of fixed construction. If the normal range is between 2 and 5 feet, the use of a floating system is optional. Where water levels fluctuate more than 5 feet, a floating system is mandatory. The cost of a floating system is usually greater than a fixed system, but the difficulty in keeping boats properly tied and the inconvenience of boarding or leaving boats during extreme low water often justify the choice of a floating system.

A successful floating dock system has the best possible combination of flotation units and structural system. Numerous floats have been used, and most are described in Source No. W9, and American Society of Civil Engineers (1969). The most successful are the foams such as extruded polystyrene (Styrofoam), expanded-pellet polystyrene, and foamed polyurethane. Although foam floats have been used extensively without any surface protection, they attract marine growth and living organism. Some external protection is applied to all foam floats, especially in seawater. This protection may be a spray coat of polyvinyl-acetate emulsion or dense polyurethane, a fiberglass and resin application, a plaster coating, or concrete encasement of the foam.

Polyurethane foam is more costly than polystyrene foam, but is sometimes preferred because it cal easily be "foamed" into a mold without expensive processing. Also, it is naturally hydrocarbon-resistant. Two types are available, but only one is nonabsorbent — the monocellular variety, which should always be specified. Like polystyrene, it should have protective covering for marina use.

Care must be used in selecting coatings to ensure compatibility with the base foam. Polyester resins cannot be used with polystyrene, but will bond well with polyurethane. Polyvinyl-acetate emulsion and dense polyurethane may be applied directly to polystyrene foam which makes a fairly tough coating. Epoxy glues should be



29 FOAM FLOAT WITH CONCRETE DECK

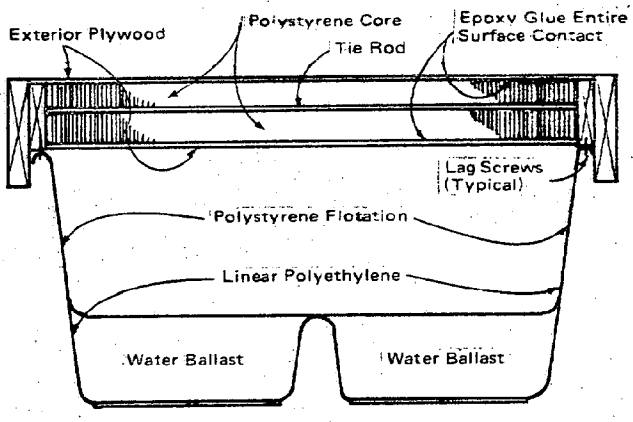
used to bond separate boards of polystyrene foam; epoxy-bonded protective coatings may be used with either foam. If the additional protection of a fiberglass and resin application is desired over polystyrene, an epoxy coating compatible with the resin must be first applied.

Most of the hollow shell floats arynow being replaced with foam-filled shells. Few shell-type floats are being manufactured without a foam core or some kind. Problems with leakage, internal condensation of moisture, and vandalism (mainly bullet punctures) are the reasons for this change. Fiberglass shells are still the most common of the thin shell types, but foam fillers are often provided. Tubular metal floats for freshwater use are now nearly all foam-filled. They are particularly serviceable in areas where ice formation and heavy floating debris aryproblems. Monolithic concrete shell-and-deck units and now almost universally cast around foam cores.

One type of floating constructiothat appears very promising is the fiberglas or plastic-coated shell with a molded foam core over which a reinforced concrete deck is poured (Figure 29). The edge beam and the crossbeam and tie rod system in this construction make the units exceptionally strong, if the concrete is properly mixed and placed. Although topheavy, there is no danger for a headwalk with finger piers of this construction to turn over. The extra weight and stiffness of the concrete deck add an element of inertia under pedestrian traffic that makes it approximately equal to the monolithic concrete shell-and-deck float in stability. However, the extra weight of concrete or part-concrete floating units places a severe stress on the unit connecting stringers and on the finger headwalk connections under moderate wave or surge conditions. For this reason, heavy floating systems should be installed only in well protected basins.

Lightweight floating docks tend to be "bouncy" and, for this reason are often rejected in favor of the heavier types. One thin shelled float deliberately leaves a pocket of unfilled space below the foam core. After launching, these pockets fill with water through small holes punched in the bottom of the shells. The trapped water moves with the float, adding measurably to its inertia without increasing the load on the supporting foam. The result is less bounciness with no increase in the deadweight of the floating components before launching.

30 WATER-BALLASTED FLOATING DOCK



Glossary of Terms Relating to Shoreline Structures

NOTE: Each definition has been referenced to the source in the Bibliography.

Backshore - The part of the shore covered by water during exceptional storms only; the zone of the shore lying between the foreshore and coastline and acted upon by waves only during severe storms. (W-3)

Backwash - The seaward return of the water following the uprush of the waves. (W-3)

Bank - The continuous margin along a river or stream where all upland vegetation ceases. The elevation of land which confines waters of a stream to their natural channel in their normal course of flow. (W-3)

Beach - The belt or zone along the shore usually with a gentle slope toward the water, occupied by unconsolidated material, moving sand or shore drift. The zone from the waterline to the line of permanent vegetation. (W-3)

Beach Accretion - The gradual building up of a beach by wave action. (W-3)

Berm - The nearly horizontal formation along the beach caused by the deposit of material under the influence of waves. (W-3)

Bitt - A double post fitting to which mooring lines from vessels are attached. (D-1)

Bollard - A single post fitting to which mooring lines from vessels are attached. (D-1)

Boom - A structure, usually floating, of timber or logs chained end to end, used to keep floating material away from an intake, dam or other structure. (W-3)

Breakwater - An offshore barrier, sometimes connected with the shore at one or both ends, to break the force of waves and which affords shelter to shipping and marine structures. It may be a natural formation, or constructed of large loose rock, piling or concrete blocks. (W-3)

- A structure protecting a shore area, harbor anchorage or basin from waves. (B-4, B-5)

Bulkhead - A structure of wood, stone or concrete erected along the shores of water bodies to arrest wave action or along steep embankments to control erosion. (W-3)

Bulkhead - Boundary structures that separate land from water by a vertical retaining wall. The vertical timber piles are connected to an anchor system by steel tie rods. (B-6)

- A structure or partition to retain or prevent sliding of the land. A secondary purpose is to protect the upland against damage from wave action. (B-4, B-5) See Seawalls.

Bulkhead Wall - A retaining wall of timber, stone, concrete, steel or other material built along or parallel to navigable waters. (W-11)

Buoy - A float, especially a floating object moored to the bottom, to mark a channel, anchor, shoal, rock. (W-3)

Camel - Floats placed between a vessel and pier, or between vessels, designed to distribute wind and current forces acting on the vessel. (D-1)

Channel - (1) The deep portion of a river or waterway where the main current flows; (2) The part of a body of water deep enough to be used for navigation through an area otherwise too shallow for navigation. (W-3)

Cleat - A mooring fitting having two diverging horizontal arms to which mooring lines from vessels are attached. (D-1)

Conduit - A general term for an artificial or natural duct, either open or closed, for conveying water or other fluids. (W-3)

Crest - (1) The summit or highest point of a wave; (2) The highest elevation reached by flood waters flowing in a channel. (W-3)

Crib - An open-frame structure loaded with earth or stone ballast to act as a baffle in bank protection (K-1)

- A structure composed of frames of timber laid horizontally upon one another, or of timbers built up as in the walls of a log cabin. (W-3)

Crib, submerged - A water works intake built of masonry, timber or metal and resting on the bed of a waterway, with its top below normal water level, to protect the exposed ends of intake pipes. (W-3)

Culvert - A closed conduit for the free passage of surface drainage water under a highway, railroad, canal or other embankment. (W-3)

Current - That portion of a stream of water which is moving with a velocity much greater than the average or in which the progress of the water is principally concentrated. (W-3)

Current, littoral - A current that moves along the shore in a direction parallel to the shoreline. (W-3)

Current, rip - A strong surface current of short duration flowing outward from the shore. It usually appears as a visible band of agitated water and is the return movement of water piled up on the shore by incoming waves and wind. Frequently called rip tide. (W-3)

Current, tidal - A current brought about or caused by the tidal forces; the periodic horizontal movement of water accompanying the rise and fall of the tide due to the tide-producing forces. (W-3)

Datum, sea level - A determination of mean sea level that has been adopted as a standard datum for heights. (W-3)

Dock - A natural open or artificial enclosed basin in which vessels may remain afloat when moored to a wharf or pier. (W-11)

- A fixed or floating decked structure against which a boat may be berthed either temporarily or indefinitely. (B-5) See Pier.

- The piers for the reception of vessels. (W-3)

Dock, self docking - A floating dock constructed in sections so that any section can be unbolted and lifted up on the remainder for repair and maintenance. (W-3)

Dolphin - A group of piles driven close together in water and tied together so that the group is capable of withstanding lateral forces from vessels and other floating objects. (W-3)

- A cluster of battered pilings joined at the top. (B-5) NOTE: The term "battered" refers to the placing of pilings at a slight angle from the perpendicular.

- A cluster of piles. (B-4)

Drift, shore - Material, usually sand or small pebbles, carried along the shoreline by shore or littoral currents or waves. (W-3)

Erosion, beach - The retrogression of the shoreline of large lakes and coastal waters caused by wave action, shore currents, or natural causes other than subsidence. (W-3)

Facing - The outer layer of slope revetment. (K-1)

Fender - A device or framed system placed against the edge of a pier or clock to take the impact from berthing or berthed vessel. (D-1)

Fill - The volume of material to be added. (W-3)

Foreshore - The sloping part of a beach between the high water and low water marks. (W-3)

Gabion - A connected system of wicker or metal cages filled with brush or rocks and used for slope protection of stabilization. (B-5)

Groin - A bank or shore protection structure in the form of a barrier oblique to primary motion of water, designed to control movement of bed material. (K-1)

- A breakwater or structure constructed across a beach to control or interrupt the movement of sediment along the shore. (S-1)

- A shore protective structure (usually perpendicular to shore) to trap sedimentary material or to retard erosion of the shore. (B-3)

-(British, Groyne) - A shore protection structure built (usually perpendicular to the shoreline) to trap littoral drift or retard erosion of the shore. (B-4)

- Fingerlike barrier structures built perpendicular to the shoreline for extending and maintaining a protective beach. (B-6)

- Long, low fingerlike structures that jut out from the shore. (E-4)

Groin, Attracting - A groin which attracts the current towards itself and fixes the deep channel close to itself. (W-3)

Groin, Permeable - A groin with openings large enough to permit passage of appreciable quantities of littoral drift. (B-4)

Groin, Repelling - A groin which pushes the current away from it. (W-3)

Grout - A fluid mixture of cement and water or of cement, sand and water. (W-3)

Harbor, Jetty - A harbor created or formed by construction of jetties. (W-3)

Headwall - A wall of stone, metal, concrete or wood at the end of a culvert or drain to serve one or all of the following purposes: protect fill from scour or undermining, increase hydraulic efficiency of conduit, divert direction of flow, or to serve as a retaining wall. (W-3)

Inlet - The upstream end of any structure through which water may flow; an entrance. (W-3)

Intake - The place where water enters a conduit or other structure. (W-3)

Jetty - An artificial barrier used to change the natural littoral drift to protect inlet entrances from clogging by excess sediment or to improve a harbor area. (S-1)

Jetty - (1) On open seacoasts, a structure extending into a body of water and designed to prevent shoaling of a channel by littoral materials and to direct and confine the stream of tidal flow. Jetties are built at the mouth of a river or tidal inlet to help deepen and stabilize a channel; (2) (British usage) Jetty is synonymous with "wharf" or "pier." (B-4, B-5)

Line, Bulkhead - A line in a river or harbor defining the channelward limit of structures. (W-3)

Mesh - Woven wire or other filaments used alone as revetment, or as a retainer or container of masses of gravel or cobble. (K-1)

Outfall - Discharge or point of discharge of a culvert or other closed conduit. (K-1)

- The point, location or structure where sewage or drainage discharges from a sewer, drain or other conduit. (W-3)

Outlet - Downstream opening or discharge end of a pipe, culvert, sewer or canal. (W-3)

Overflow - Any device or structure over or through which any excess water or sewage beyond the capacity of the conduit or container is allowed to flow or waste. (W-3)

Parapet - A low wall built along the edge of a structure as on a seawall or quay. (B-4)

Pier - A structure extending into the water for use as a landing place or promenade or to protect or form a harbor. (S-1)

- A structure of greater length than width, and projecting from shore into navigable waters so that vessels may be moored alongside for loading and unloading or for storage. (W-11)

Substructure - A portion of a pier or wharf below and including deck. (W-11)

a) Pile and deck type: deck supported on piles.
b) Block and bridge type: deck supported by blocks of masonry, concrete with bridges or arches constructed on and between the blocks.
c) Solid fill type: deck supported by solid fill or earth and confined by bulkhead.

Superstructure - That portion of a pier or wharf above the deck. (W-11)

- A structure, usually of open construction, extending out into the water from the shore, to serve as a landing place, a recreational facility, etc. rather than to afford coastal protection. In the Great Lakes, a term sometimes improperly applied to jetties. (B-4) See Wharf.

Pier, Fender - Any construction adjacent to a wharf, pier, slipwall or other structure to prevent contact and damage to vessel or structure. (W-3)

Pier, Finger - A minor extension from a primary pier. (S-1)

- A comparatively smaller pier structure attached (usually perpendicular) to the headwall of a multi-slip pier; usually provided to facilitate access to the berthed craft. (B-5)

Pile - A long, heavy timber or section of concrete or metal to be driven or jetted into the earth or seabed to serve as a support or protection. (B-4)

- A long, slender stake or structural element of timber, concrete, or steel which is driven, jetted, or otherwise embedded on end into the ground for the purpose of supporting a load, or of compacting the soil. (W-3)

Pile, Anchor - Piles driven on the land side of a bulkhead or pier to which the bulkhead or pier is anchored or tied by rods, cables, chains or other devices. (W-3)

Piling, Sheet - Interlocking members of wood, steel, concrete subject to lateral pressure, driven individually to form an obstruction to percolation, to prevent movement of material, for cofferdams, seawalls, stabilization of foundations, etc. (W-3)

- A pile with a generally slender flat cross-section to be driven into the ground or seabed and meshed or interlocked with like members to form a diaphragm, wall, or bulkhead. (B-5)

Quay - (pronounced KEY) - A stretch of paved bank, or a solid artificial landing place parallel to the navigable waterway, for use in loading and unloading vessels. (B-4)
NOTE: Quays are frequently used for recreational purposes also.

Revetment - A facing of stone, concrete built to protect a scarp, embankment or shore structure against erosion by wave action or currents. (B-4, B-5)

- A light armor facing of blocks, rocks, or other hard material on the natural sloping shore. They can consist of precast concrete, stones, nylon bags filled with cement grout or gabions. (E-1)

Rip-rap - A foundation or sustaining wall of stones placed in the water or on an embankment to prevent erosion. (S-1)

- A layer facing or protective mound of stones randomly placed to prevent erosion, scour, or sloughing of a structure or embankment. (B-4, B-5)

- Broken stone or boulders placed compactly or irregularly on dams, levees, dikes, etc. for protection of earth surfaces against the action of waves or currents; brush or pole mattresses, or brush and stone, or other similar materials used for protection. (W-3)

Rubble - Loose, angular and water-worn stones along a beach. (W-3)

Rubble Mound - A mound of random-shaped stones protected with a cover layer of selected stones or specially shaped concrete armor units. (B-5)

Scour - Removal of underwater materials by waves and currents, especially at the base or toe of a shore structure. (B-4)

Scour, Suction - Scour at the toe of banks caused by the impact and suction of translation waves created by movement of boats or by tidal action. (W-3)

Seawalls - Protective retaining structures that occupy an advanced position along a shoreline or barrier to wave attack. Seawalls are not clearly distinguishable from bulkheads. (B-6)

1) A vertical face of either precast concrete slabs, or steel or wood sheet piles driven into the sea bottom to secure the toe. The top is secured by anchor rods connecting the wall to anchors placed back a safe distance landward.
2) A massive freestanding gravity structure with curved, vertical or inclined faces designed to withstand the full force of the oncoming waves. (E-4)

Seepage - The slow movement of water through small cracks, pores, interstices, etc. in the surface of unsaturated material into or out of a body of surface or subsurface water. (W-3)

Shore - The corridor of ground bordering any body of water which is alternately exposed, or covered by the tides and/or waves. A shore of unconsolidated material is usually called a beach. (W-3)

Slip - The space between piers which is entered and occupied by ships. (W-3)

- A berthing space between two finger piers. (B-5)

Slope - The inclination or gradient from the horizontal of a line or surface. The degree of inclination is usually expressed as a ratio, such as 2:1, indicating two units of horizontal distance to one unit of rise. (W-3)

Stone - Large natural masses of stone are generally called rocks; small or quarried masses are called stones; and the finer kinds, gravel or sand. (W-3)

Structure - Something constructed or built, as a building or pier. (W-3)

Training Wall - A wall or jetty to direct current flow. (B-4)

Wall, Cutoff - A thin wall or footing extending downward, under, or around the head wall to provide resistance to seepage. (W-3)

Wall, Revetment - A wall constructed along the toe of an embankment to protect the slope against erosion. (W-3)

Wall, Wing - (1) A lateral wall constructed in connection with a spillway or outlet to confine and direct the flow or to retain and prevent erosion; (2) An extension of an abutment wall to retain the adjacent earth. (W-3)

Water, high - The maximum height reached by each rising tide. (W-3)

Water, mean high - The mean height of tidal high waters at a particular point over a period of time to such length that increasing its length does not appreciably change this mean. For tidal waters, the cycle of change covers a period of 19 years, and mean high water is defined as the average of the high waters over a 19-year period. (W-3)

Water, low, mean low - Defined as the opposite in the extreme to water, high and water, mean high. (W-3)

Water, navigable - Any stream, lake, arm of the sea, or other natural body of water which is actually navigable in fact and which by itself or by its connections with other waters, for a period of time to be of commercial value, is of sufficient capacity to float watercraft for the purposes of commerce, trade, transportation or pleasure; or any waters which have been declared navigable by the Congress of the United States. (W-3)

Waterway - (1) Any body of water, other than the open sea, which is or can be used by boats as a means of travel. (2) Any natural or artificial channel or depression in the surface of the earth which provides a course for water flowing either continuously or intermittently. (W-3)

Weep - An opening formed during construction in retaining walls, aprons, canal linings, foundations to permit drainage of water collecting behind and beneath such structures to reduce hydrostatic head. (W-3)

- Hole in wall, invert, apron, lining or any other solid structure to relieve pressure of groundwater. (K-1)

Wharf - A structure having a platform built along and parallel to navigable waters so that vessels may be moored alongside for loading and unloading, or for storage. "Pier" and "wharf" are interchangeable (W-11)

- For vessels to receive and discharge cargo, passengers, stores and fuel. (W-3)

Works, head - A general term applied to all the structures, devices, etc, located at the head or diversion point of a conduit or canal. The term is practically synonymous with diversion works; an intake heading. (W-3)

Works, intake - Structures at the location where water is taken from a source of supply into a conduit for transportation to other locations. (W-3)

Federal Government

Code

Coast Guard, Engineering Division, Seattle District, Federal Office Building, 915 2nd Avenue, Seattle, WA 98104

A-1 Civil Engineering Handbook, CG 251

The manual contains design criteria for the following structures: piers, wharves, cargo handling facilities (bins, bunkers, cranes), seawalls, bulkheads, quay walls, seaplane facilities, ferry terminals and small boat piers. Updated 1977, 1000 + pages.

Coast Guard, Deepwater Ports Project, Office of Marine Environment and Systems, Washington, D. C. 20590

A-2 Proposed Environmental Review Criteria for Deepwater Ports.

The Deepwater Port Act of 1974 requires the Secretary of Transportation to establish review criteria which are outlined in this publication. 1975, 14 pages.

Army Corps of Engineers, Federal Center South, 4735 E. Marginal Way, Seattle, WA 98124

Loan copies of the following sources are available through the District Library. Free copies may be obtained by writing the Coastal Engineering Research Center (C.E.R.C.), Kingman Building, Fort Belvoir, Virginia 22060.

B-1 Shore Protection Manual, Volumes I, II and III

The Manual contains guidelines and techniques for functional and structural design for shore protection works. Volume I describes the physical environment in the coastal zone including an introduction into coastal engineering, the mechanics of wave motion, water and wave predictions and the littoral process. Volume II contains design parameters for coastal engineering problems. Volume III contains four appendixes including a glossary. 1973, 1,170 pages.

B-2 Shore Protection Planning and Design (C.E.R.C.), Technical Report No. 4

The engineering aspects of coastal process and design of offshore and shore protecting structures. This report has been largely replaced by the Shore Protection Manual. 1966.

B-3 Groins - An Annotated Bibliography, C.E.R.C., Misc. Paper No. 1-72.

463 information articles with author index, title index, and source description are contained in the bibliography. 1972, 250 pages.

Federal Government (continued)

Code Army Corps of Engineers

B-4 Glossary of Coastal Engineering Terms, C.E.R.C., Misc. Paper No. 2-72.

This glossary is contained in the Shore Protection Manual described above. 1972, 55 pages with illustrations and photographs.

B-5 Small Craft Harbors: Design, Construction and Operation, C.E.R.C., Special Report No. 2.

The report was prepared to assist engineers and operators in the design and construction of small craft harbors. It contains analytical data on marinas, docks, and design standards. 1974, 375 pages with illustrations and photographs.

B-6 Design Methods of Treated Timber Structures for Shore, Beach and Marina Construction, C.E.R.C.

The report contains designs for timber bulkheads, seawalls, groins, finger piers, and wave barriers for marinas. 1976, 39 pages with illustrations.

B-7 Survey of Coastal Development Types, C.E.R.C., Misc. Report No. 76-7.

Presented are a review of 25 selected revetment types, a procedure for revetment design which includes identification of controlling site conditions, comparative cost analyses method and an example problem. 1976.

Waterways Experiment Station, P.O. Box 631, Vicksburg, Miss. 39180

B-8 Hydraulic Characteristics of Mobile Breakwaters Composed of Tires or Spheres, Technical Report H-68-2, 1968.

B-9 Development of Design Criteria and Acceptance Specifications for Plastic Filter Cloths, Technical Report S-72-7, 1972.

B-10 Shore Protection Guidelines, National Shoreline Study.

The report contains a general discussion of beach protection from the forces of the sea and manmade effects on the shore. 1971, 59 pages with 37 photographs and illustrations.

B-11 Bibliography on Tidal Hydraulics, Committee on Tidal Hydraulics, Report No. 2, Supplement 7.

The bibliography contains 670 references, all of which are available on loan, within the continental United States, from the Library Branch, Waterways Experiment Station, Corps of Engineers, P.O. Box 631, Vicksburg, Mississippi 39180.

Federal Government (continued)

Code

Army Corps of Engineers (continued)

-11 The annotated document is divided into the following sections: Theoretical, Sedimentation, Salinity, Contamination, Regulation and Improvement, Laboratory Experiments, Surveys and Instruments, Basic Physical Data. 1975, 236 pages.

B-12 Permit Procedures, Seattle District

This booklet explains permit procedures for applicants with sample drawings for mooring buoys, bulkhead/fill, pier and dredging. 1972, 22 pages.

B-13 Help Yourself, North Central Division, 546 South Clark Street, Chicago, Ill. 60604.

"Help Yourself" is a public information pamphlet which presents Great Lake shoreline simplified problems and solutions. It contains standard designs, sample specifications, construction and maintenance guidelines.

Fish and Wildlife Service, 2625 Parkmount Lane S.W., Olympia, WA, 98502

C-1 Guidelines on Proposals Affecting Fish and Wildlife, Federal Register, Monday Dec. 1, 1975. Part IV.

Guidelines contain policy on docks, ports, piers, marinas, seawalls, and criteria for permit review.

Department of Navy, Bureau of Yards and Docks

D-1 Design Manual - Waterfront Operational Facilities, DM-25

DM 25, one of a series of 40 manuals, contains design criteria for government piers, wharves, cargo handling facilities, seawalls, bulkheads, quaywalls and other waterfront operational facilities. (See Coast Guard Civil Engineering Handbook.) Glossary. 1971, 130 pages with illustrations.

National Oceanographic and Atmospheric Administration - Sea-grant (NOAA)
Florida University, Marine Advisory Program, G022 McCarty Hall, Gainesville, Florida 32611.

E-1 Seawall and Revetment Effectiveness, Cost and Construction

Waterfront owners reference guide to the types of shore protection structures that are commonly available and the relative costs of each. 1975, 70 pages with illustrations.

Federal Government

Code

National Oceanographic and Atmospheric Administration (continued)

University of Rhode Island, Marine Advisory Service
Narragansett, Rhode Island 02882

E-2 How to Build a Floating Scrap Tire Breakwater

The pamphlet gives details of tire construction, advantages and disadvantages. 1975, 15 pages with illustrations and photographs.

State Government

Code

California Department of Public Works, Division of Highways, Box 1499, Sacremento, California 95807

K-1 Bank & Shore Protection in California Highway Practice

The manual, produced by the Bank Protection Committee, reviews design principles and construction procedures for streams, rivers, lakes, tidal basins, desert wash locations and open coast conditions. Glossary. 1970, 423 pages with 443 illustrations and photographs.

Georgia Department of Natural Resources, 270 Washington Street S.W., Atlanta, Georgia 30334

L-1 Handbook: Building in the Coastal Environment

The handbook provides on-site guidelines for making development compatible with coastal resources in the planning design, construction and buying/selling phases. 1975, 115 pages with illustrations.

Washington State Department of Fisheries, General Administration Blvd., Olympia, Washington 98504

M-1 Criteria for the Design of Bulkheads, Landfills and Marinas

Criteria by geographical area has been established for permit review of construction in all tidal waters. 1971, 12 pages with illustrations.

M-2 Bulkhead Criteria for Surf Smelt Spawning Beaches

Specific criteria for surf smelt has been established to supplement the general criteria above. 1974, 8 pages with illustrations.

M-3 Standard Provisions Policy for Hydraulics Project Approval

The Directors of Fisheries and Game have adopted a policy that the referenced general and technical provisions will be made part of Hydraulics Project Approvals whenever

Code

Washington State Departments of Fisheries & Game (continued)

3 these provisions are applicable. The policy is applied to work involving conduit crossing, removal of logs and/or log jams, channel realignment, gravel removal in spawning areas, culvert installation in fish passage areas, bank protection, bridge construction, concrete piers, pile driving, landfill marina construction, storm drainage and sewage outfall pond construction in anadronous waters, dam removal and flood control diking. 1971, 37 pages with 5 illustrations.

Washington State Department of Social and Health Services, MS LD-11, Olympia, Washington 98504

N-1 Environmental Health Guidelines for Marina Development and Operation

These Guidelines assist agencies in reviewing and developers in preparing plans for new marina facilities. The guidelines cover marina location, water supply, restroom facilities, sewage disposal, sewage pump-out facilities, solid waste collection, bulkheads and landfills, electric wiring and equipment. 1974, 6 pages.

City of Seattle

ode

Department of Community Development, 306 Cherry Street, Seattle Washington 98104

S-1 Seattle Shoreline Master Program

The Master Program restricts the placement of structures along the shoreline and places general conditions upon the design of shoreline structures where they are permitted.

S-2 Seattle Marine Shore-Resource Analysis

Basic guidelines in the placement of shoreline structures in respect to the geo-hydraulic shore process. 1977, 41 pages with illustrations.

Code

American Public Works Association

-1 *Standard Specifications for Municipal Public Works Construction

Standard specifications for street layout, sanitary sewers, storm drains, water distribution systems are provided. 1976, 590 pages with 75 standard plans.

American Society of Civil Engineers (ASCE)

W-2 Anchored Bulkheads, Transactions of the AXCE, Vol. 119, 1954, pp 1243-1324.

W-3 Nomenclature for Hydraulics, Manuals & Reports on Engineering Practice, No. 43.

An extensive glossary of terms associated with hydraulics. 1962, 498 pages.

W-4 Small-Craft Harbors, Manuals and Reports on Engineering Practice, No. 50, 1969.

American Institute of Timber Construction

W-5 *Timber Construction Manual, 2nd Edition, Wiley, New York, 1966.

American Society for Testing Materials (ASTM), 1916 Race Street, Philadelphia, PA 19103

W-6 *Applicable ASTM Standards, 1971.

American Wood Preserver's Association, AWPA, Suite 628, 1625 Eye Street, N.W., Washington, D.C. 20006

W-7 Standards of the AWPA C-1 & C-18, 1971.

American Wood-Preserver's Institute (AWPI)

W-8 Bulkheads: Design and Construction, AWPI
Technical Guidelines for Pressure Treated Wood, Parts I, II and III, Washington, D. C. 1970.

National Association of Engine & Boat Manufacturers, Inc. Greenwich, Conn.

W-9 Marinas - Recommendations for Design, Construction and Maintenance, 1961.

*Loan copies are available at the Municipal Reference Library, Municipal Building, 600 Fifth Avenue, Seattle, WA 98104.

Private Organizations (continued)

Code

National Association of Engine & Boat Manufacturers, Inc. (continued)

W-10 Marine Operations & Service, 1967

National Fire Protection Association, 60 Batterymarch St., Boston, Mass.

W-11 Piers and Wharves

Standards for the constructionand protection of existing piers of combustible materials when automatic sprinklers can not be installed. 1975.

Portland Cement Association, Chicago, Illinois

W-12 Small Boat Launching Ramps

Information on properties of concrete when used for boat launching ramps from the Water Resources Bureau. 1965.

International Conference of Building Officials, Vol. 1, 1970

W-13 *Uniform Building Code Standards, Standards include some marine structures such as wharves and docks. Vol. 1, 1970.

Miscellaneous

W-14 Subject Guide to Government Reference Books

Sally Wynkoop, Libraries Unlimited. A general orientation guide to the most important reference books published by the Government Printing Office, 1972, 276 pages.

*Loan copies are available at the Municipal Reference Library, Municipal Building, 600 Fifth Avenue, S-attle, WA 98104.

SAMPLE SPECIFICATIONS - (B-13)

Here are some sample government specifications covering the work illustrated in this compendium.

SITE WORK

This work consists of performing all excavation and backfilling. All work shall be conducted in a manner to prevent damage to the structures which are to remain and to maintain or improve the aesthetics and ecology of the site.

STONE PROTECTION

The work required consists of furnishing and placing stone as indicated on the drawings and herein. Surplus material other than stone shall be placed against the toe stone, as directed. All stone required shall be produced from quarries approved by the owner.

FOUNDATION PREPARATION

Areas on which cover stones and toe stones are to be placed shall be trimmed and dressed as needed to provide stable bedding and so that the stones may be placed within the allowable tolerances from the neat lines. Where cover stone areas are below the required depth, they shall be brought to grade by filling with core stone. To the extent practicable, the larger sizes of core stone shall be placed in the upper surface of the core stone.

LIMITING DIMENSIONS

Cover stone and toe stone shall be in pieces generally compact in shape and as nearly cubical as possible with the least dimension of any stone being not less than one-third its greatest dimension.

Stone shall consist of a well-graded mixture of sizes that will form a compact mass in place. The mixture shall be well graded within the limits of maximum and minimum as specified on the drawings. Where space is available and the required work does not permit the inclusion of the larger sizes of stone, these sizes shall be omitted from the mixture.

PLACEMENT

Stone shall be placed by equipment suitable for handling material of the sizes required. The cover stone shall be placed a minimum of two layers thick. Stones shall be placed by means of a bracket or strip. End dumping will not be permitted. Stone shall not be dropped from a height greater than three feet.

GRADES

Cover stone and toe stone shall be placed to the grades (neat lines) shown on the drawings within a tolerance of 0.5 foot above grade and 0.5 foot below grade, measured perpendicular to the neat lines. The intention is that the stone protection shall be built to at least the neat lines, the outer surfaces shall be reasonably even and present a uniform appearance and that extreme ranges in tolerance will not be allowed in surfaces of adjacent stones.

PILING; STEEL SHEET

Shop drawings shall be submitted to the owner for his approval. The Contractor shall furnish two certified copies of all mill reports covering the chemical and physical properties of the steel used in the work.

Steel for sheet piling shall conform to the requirements of ASTM Standard A 328.

Piles, including special fabricated sections, shall be of the types indicated on the drawings and shall be of a design such that when in place they will be continuously interlocked throughout their entire length. All piles shall be provided with standard handling holes located approximately four inches below the top of the pile. Each steel pile shall be free from any kinks and shall not possess camber, twist, or warp of a degree which will, in any manner, prevent easy and ready driving of a pile. The interlock of each pile shall be straight throughout its entire length and shall be of such shape and dimensions as will permit free and easy threading.

PILING TIMBER

Wood piles shall conform to Federal Specification MM-P-371, Type I, Class B, rough-peeled subject to further limitation in this Section of the specifications. The pile shall be treated in accordance with Federal Specification TT-W-571 with cresote by the pressure process. The wood piles shall be treated to refusal with a minimum cresote content of ten pounds per cubic foot. The Contractor shall make provisions for treating in the field, all cuts, holes and abrasions in the cresoted piles. Abrasions and cuts in the piles shall be given two brush coats of the cresote followed by a heavy coat of tar paint. The lengths of piles shall be as called for on the drawings. To provide for "heading" and cutting off square after driving, piles shall be driven within one foot of the depths specified.

PLACING AND DRIVING PILING

Driving equipment shall be a size and type required to drive piling to the required penetration without serious damage to the pile. Piledriving leads shall be marked so as to facilitate counting of the blows. A protecting pile cap of approved design shall be employed in driving, when required, to prevent damage to the tops of the piles. Spliced piles shall not be used. All piles shall be driven to the penetration called for where practicable to do so without damage to the piles.

QUALITY CONTROL

The contractor shall establish and maintain a quality control system for all operations performed under this contract to assure compliance with contract requirements and maintain records of his quality control for all operations performed.

Element 5 - WORKSHOPS AND TRAINING SESSIONS

Introduction

New legislation requires that many people learn about it: those who administer it, those who must apply for permits, as in the case of the SMP, and those who are not directly affected but who may have concerns about the effects of the new regulations.

As the Shoreline Master Program took shape and was used as a guide for permits, it became clear that special training was needed for the intake of shorelines permit applications in the Building Department. For other departments which have, like the Parks Department, responsibilities for maintaining shorelines, or the Engineering Department which has utilities on or close to shorelines, special knowledge of a different kind is essential.

The project was in three parts, a series of training sessions for Building Department personnel, a one-day work shop for other departments, and a "speaker's kit" consisting of text and slides, for community groups.

The three types of information which were produced and the target audiences were:

a.	Training for permit intake	Building Department personnel
b.	Training workshop for other City personnel	Building, Engineering, and Parks Department
c.	Speaker's Kit	General public

The training for permit intake consisted of a series of necessarily short sessions during the workday, detailing specific intake procedures for a variety of cases. An outline of the material presented for each session is appended. The sessions were held in July and August, 1976, and were scheduled for early morning when other Building Department personnel could handle the duties of the trainees.

To meet the management needs of the Parks and Engineering Departments, a workshop presenting Wolf Bauer's material was arranged in June, 1977. It was attended by approximately 30 selected personnel from the Engineering, Parks, and Community Development Departments. The session ran more than five hours and covered in detail the specific management problems of the marine shorelines of Seattle. Copies of the report prepared by Mr. Bauer as another element of this grant were sent to participants for reference in their work.

Also based on Mr. Bauer's material is the Speaker's Kit providing a brief text for use with slides illustrating various shoreline problems and situations characteristic of Seattle. The slides are not included but are described and correlated with the appropriate text.

The text of the Speaker's Kit is attached. The slides are available on a loan basis.

SHORELINES WORKSHOPS

Outline

Session I - Explaining the permit process
- -Applicability of Shoreline Management Act
- -Shoreline permit requirement
- -Relation to other permit requirements
- -Relation to State Environmental Policy Act (SEPA)
- -Required forms and instructions
- -Filing the application
- -Timing
- -Public involvement

Session II - Accepting applications
- -The applicant manual
- -Preapplication conferences
- -Checking applications
  - What information?
  - How much?
  - What quality?
- -Notice
- -Fees
- -Special circumstances
  - Shoreline conditional uses
  - Shoreline variances
- -Revisions

Session III - Exemptions
- -Locating the Shoreline District
- -Identification of exempt developments
- -Requirement of consistency with Seattle Shoreline Master Program
- -Exemption process
- -Shoreline variance for exempt development

Session IV - Interpreting the SSMP
- -Use categories (water dependency)
- -Shoreline environments- purpose- permitted uses/activities
- -Bulk regulations
- -Relation to underlying zoning
- -General prohibitions or criteria

Session V - Special problems
- -Floating homes
- -Signs
- -Single family residences
- -Piers and bulkheads
- -Maintenance and repair activities

Session VI - Open

YOUR SHORELINES AND YOU

GRAPHICS

Introduction

This presentation is about Seattle's beaches, what is happening to them and why it is important to you. We're gradually losing our public beaches; and many private owners are experiencing problems with bulkheads and seawalls. Yet we could save and even improve and enlarge our public beaches by proper management.

Slides showing problem areas on beaches:
Lincoln Park
Golden Gardens
Magnolia and West Point
Carkeek Park

The Shoreline Management Act and the Seattle Master Program do not really control the shorelines; they provide a permit system for change of use but do not prevent mismanagement.

You may ask, "Why should I be concerned? I don't own any Seattle waterfront." But you do. If you live in Seattle, you own a share of the 24.7 miles of public waterfront in parks as well as a share of the more than 11 miles of port areas that you also own and support but can't use or even see. Of course you also own shares of County and State waterfront in other places, in common with other taxpayers of the County and State.

Slide of map showing public ownership on shorelines

When you own something, you have to take care of it. Taking care of what we own when it is shorelines is a complicated problem. We have a lot to learn about shorelines, especially when large bodies of water are involved. We should be concerned that if our waterfront ownership is to keep its value it must be taken care of so that we don't — literally — lose it.

GRAPHICS

Why be concerned about shorelines? Because the shoreline is:

-The visible meeting of our familiar land/air ecological system and the completely different ecological system of the undersea world; — Shot of Shoreline

-The beginning of one special kind of recreation area, reaching from here to the rest of the world; — Sailboat

-The total of another area, covered by water part of the time, dry land part of the time—the special habitat of the intertidal zone; — Low-tide shot

-A source of food—particularly proteins—the most highly productive area of earth; — Fish in market.

-An important transportation mode, for many generations the most significant, so that special laws have for centuries provided for the special public rights we know of as the rights of navigation, the public trust, and"the freedom of the seas." — Freighter

-An ecologically and physically fragile resource area, easily damaged or destroyed, extremely difficult to restore;

-An almost fatally attractive living area—providing view and desirable location; — Housing at north end of Fort Lawton

-An attractive area for industrial uses. — Harbor Island

Why be concerned about shorelines?

Because only 14% of the total city saltwater shoreline is "natural." — Shot of map highlighting "natural" shoreline.

86% has been bulkheaded or sea-walled or riprapped for industrial use, and isn't attractive even if we could get close to it, which, for the most part, we can't. Public access to the publicly owned tidelands and water is an important goal of the Shorelines Program, but is limited in parts of Seattle. — Shots of sheet piling riprap on R.R.

GRAPHICS

Why be concerned about shorelines? Because we are losing what beaches we have.

Shot showing erosion

Why? Because man-made structures built in ignorance are destroying the attractiveness and usability of our shorelines.

Ugly shot

What's the problem?

We've looked at shorelines and the area on both sides as if it was a kind of cake we could divide up into a lot of square pieces. The idea was, you fill in the water to make land, and then you make money selling off the new land in neat lots. Lots of people have, and still do.

Shot of plat into water (South end of Magnolia)

Legal requirements for platting have been written and administered as if there were no shoreline, as if you could move it around whenever and wherever you wanted to, without recognizing the dynamic effects of water.

This is the source of many problems, and very expensive problems to boot. Because waterfront land is so desirable it is very expensive and it gets cut up into very small pieces so that private individuals who can afford to buy land on shorelines want to use every inch, to the water's edge, and maybe push the water back, just a little by building very close to the natural shoreline or a little over and then trying to protect the house or terrace or the pool with bulkheads and the beach with groins.

Shot of plat with narrow lots

But, as we now know, this works only in the short run, and building a fort against the sea is a losing game in the long run.

Physically, the sea works as a geohydraulic system. The word "geohydraulic" comes from "geo," meaning earth, and hydraulic meaning water. The area where the water and land meet is where water and land interact on each other in predictable ways; thus we use the term geohydraulic for the interaction and the effects.

Shot of high tide, Shot of low tide, same location

We are looking at a dual system—land and water, and water is the opposite of land in many ways. We must recognize that water can not be treated in the same way that we treat land. On tidal waters, the shoreline changes continually; on lakes seasonally.

GRAPHICS

But much more than a simple location change of a line is involved. On a natural beach, tidal action, wind and current carry sand and gravel from place to place along the beach, building up here, removing there, building in one season, cutting away in another season. Wind may pick up sand carried by water and return it to where it started. However, the beach has two important characteristics:

(a) A constant need for new material, and
(b) An optimum shape, the result of wind and currents, which is shown in the diagram.

Shot of Bauer diagram

What we think of as "the beach" is the foreshore, and is only one part of the total shoreline system that all has to work together if the shoreline is to be relatively stable. Another part is the feeder bluff which provides beach nourishment in the form of gravel, sand and clay. Along the shore from bluff to the beach it feeds is the drift sector. In Seattle most of these bluffs are cut off from the beaches they once nourished.

Shot of Bauer diagram

The berm is probably the most sensitive part of the entire shoreline system, because it is what maintains a stable beach. The berm is nature's natural erosion control system. If you pave it with concrete, cut it away, build over it, or cut it off from the feeder bluffs, or otherwise take away its shape and porous gravel character, you will eventually lose the very qualities you wanted in that location, and lots of your money is lost, literally washed out to sea. Sometimes all it takes is a single winter storm; sometimes it's a matter of years. Eventually the sea wins. You may not realize that all our beaches are slowly eroding over a period of years.

Shot of Bauer diagram of drift sector

Aerial

Thus, you can see that a land approach to the shoreline that does not respect the total drift sector system has been an expensive mistake. We can't go back to the beginning, but we should begin to get our management in tune with the geohydraulics of the shore, legally and administratively, and realize that the shoreline is too valuable a resource to let it be abused.

GRAPHICS

Let's look at a few of the obvious and non-scientific differences between the land/air we live in and the water/land system of the shoreline. Air never really stops but gets thinner as you get farther out into space. Land continues under the sea. The sea has definite boundaries; it stops at the top of the wave and as it reaches the land underneath or the shoreline.

Most of the flora and the creatures of the sea have completely different life support systems that permit them to live successfully in the water and prevent them from living outside the water. We and our fellow creatures are the opposite.

Air is so light that we are scarcely aware of it. Water is so heavy that it drags at our feet as we wade, yet forces our bodies to float if we are immersed. For some creatures, water is the analog of air -- it flows through them as air through us -- but with at least one difference that the water is often supplying food.

Though both air and water flow in similar ways, their behavior results in vastly different results to land forms and man-made structures on the shorelines. There's where we've failed to recognize the crucial differences that the shoreline is the meeting place, the interface of two systems, each working on and modifying the other at that ever shifting line we call the shoreline.

GRAPHICS

The Master Program as a Management Tool

The State Shoreline Management Act delegates shoreline management to local government but only provides one tool. That tool, the shoreline permit system, is based on a master program, which is very much like the zoning code. The City, that is DCD, literally can do nothing about the shoreline until someone applies for a shoreline permit. Therefore, we can not expect really creative shoreline management from the Shoreline Master Program because the mandate isn't there.

Shot of application brochure

Many other agencies also have duties or powers to use to regulate the use of water and shores; for navigation, for structures built in, on or over water, for leasing and use of submerged state tidelands, for water quality, for discharge of materials into water, for Port activities. There is some overlap, and there are some gaps. Just as possession is nine points of the law, ownership or control of access are important powers affecting management of a resource.

Shot of Coast Guard regulations
Corps regulations
EPA
Building Department

What do we do when we technicians begin to see that we are losing the resource we are expected to manage? What do we do when we don't own it? Or when there is no way to provide for much needed restoration before it is too late? In Seattle, two public agencies, the Port and the Park Board, have active management powers, but only for the shorelines in parks and Port development. The only other large shoreline owner is a private company, the Burlington Northern. In these areas, there is a direct responsiility and the power to manage the shoreline productively and not destructively.

Yet none of them have treated the shoreline as a dual system of land and water working as a system, but only as land with an encroaching water area to be pushed off or defended against.

We shouldn't write off our urban beaches. They are a prime resource and could be a far greater resource, a great recreation area, for the 80 to 90% of us who do not own boats, or who like to go to the beach anyhow.

They provide an immediately available recreation and scenic resource that is an integral part of the city, a people attractant that very few other cities have. We could be the North American Rio! But, first we need to save the beaches.

Shot of erosion of bulkheads
(Lincoln Park, north end
Discovery Park west of
Lawtonwood)

SEATTLE MARINE SHORE-RESOURCE ANALYSIS

PRELIMINARY OVERVIEW

Wolf Bauer
for the
CITY OF SEATTLE
DEPARTMENT OF COMMUNITY DEVELOPMENT

1977

This report was funded in part by a Section 306 Coastal Zone Management grant through the Washington State Department of Ecology.

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WOLF BAUER P.E.
CONSULTING ENGINEER

5622 Seaview Avenue N.W.
Seattle, Washington 98107 U.S.A.
Telephone (206) 783-2119

May 26, 1977

CITY OF SEATTLE
DEPARTMENT OF COMMUNITY DEVELOPMENT
306 Cherry Street
Seattle 98104

Att: Rosemary Horwood
Senior Planner

Letter of Submittal

RE: MARINE SHORE-RESOURCE ANALYSIS
Preliminary Overview
Public Beach Status &
Enhancement Potentials

Gentlemen:

The attached report and appended text is in response to your request for a preliminary analysis of the marine shore resources and public beaches in terms of their use limitations and potentials.

Lack of time precluded a more comprehensive evaluation of the total shoreline. It is hoped, however, that this overview, as well as the earlier 5-hour photo-documentation presented to city staff members on May 13th, will serve your purpose to become better aquainted with this important city resource in terms of future management policies and programs.

Respectfully yours,

Wolf Bauer P.E.
Shore-Resource Consultant

WB:H

SEATTLE MARINE SHORE-RESOURCE ANALYSIS

PRELIMINARY OVERVIEW

Wolf Bauer P.E.
Shore-Resource Consultant

INTRODUCTION

This shore resource overview is written in the form of a position paper that focuses, at this point of the study, primarily on the status, limitations, and potentials of public recreational beaches within Seattle's coastline.

One can hardly speak of any naturally operating "Drift Sector" systems along this coastal reach of Puget Sound between Everett and Tacoma, sectors within which one or more receding "Feeder Bluffs" supplies beach building and maintenance materials longshore to accretion drift terminals. Prior to the extensive railroad and other private and public shore revetting and bulkheading, such Drift Sectors once operated along all of the City shoreline bluffs, building hooked spits and barrier berms against Piper Creek, into Smith Cove, and along Duwamish estuarine marshes, as well as the more robust points and Class I beaches at Brace and

Williams Points, around the tip of Alki Peninsula, at West Point, and Meadow Point at Golden Gardens.

The marine shores within the municipal boundaries of the City of Seattle comprise about 25½ miles, not including the East and West Waterways at the mouth of the Duwamish River. Of this reach of Puget Sound coastline, less than 14% remains as moderately intruded and natural beach waterfront, while about 86% is altered and impacted by bulkheading, riprapping, structures, and defense works in various stages of disrepair. In terms of my beach shore classification system (adopted by the City under the Shoreline Management Act for inventory purposes), only about 2½% of the shores are Class I dry berm beaches with backshore above highest tide, while 2% are Class II marginal, and 13½% are Class III wet erosional beaches with no walkable highest-tide foreshore. (See Beach Classification diagrams and definitions in appended text.)

The glacial till materials making up the bluff moraines along the Seattle shoreline are high in sands, silts, and clays, and thus relatively low in gravel. This situation has brought about a basic shortage of stable accretion shoreforms such as points, spits, hooks, and barrier berms, all containing high-priority Class I recreational beaches. While the 2,000 miles of Washington's inland and strait shores contain only about 5% of such natural accretion beaches, it is particularly

unfortunate that nature short-changed the coast of greatest population density with those gravels that produce the porous storm-berms and accretion shoreforms containing dry beaches with backshore environments. (See text on accretion shoreform and Class I beach resource values.)

This situation has been further aggravated by uniformed and ill-considered upper foreshore bulkheading and filling over some of these original storm-protective berms, thus down-grading former Class II and Class I to erosional Class III beaches that now have to be "maintained" with increasing costs, and their artificially created backshore fills and pavings "defended" against erosion. Much of present beach erosion also has its origin in the extensive private bulk-heading and groining updrift from such public beaches, cut-ting off and slowing down the former supply of sand and gravel. A city that prides itself on its extensive water-ways and so-called recreational marine beaches has squandered what little dry backshore beaches it had as its geologic heritage, and reduced the original 20% to 2½%. Only 1/8th of this high priority resource now remains, assigning only 1/16th of an inch of Class I beach to each backup Seattle citizen.

POTENTIAL FOR PUBLIC BEACH REHABILITATION OR ENHANCEMENT

CARKEEK PARK Only a tiny Class I dry berm beach remains as part of the upper foreshore of Pipers Creek delta. This fluvial cone would normally act as an impact baffle for both south and north-drifting beach material from nearby "feeder bluffs." Construction of the railroad "Chinese Wall" bulkhead has largely deactivated these bluffs in terms of beach supply sand and gravel, as has bedload sediment from a meander-restricted Pipers Creek. Thus we have a material-starved and shrinking beach which at high tide cannot take care of more than fifty people without over-crowding.

Beach scale should be related to park scale, especially in view of the unique and high priority combination of beach and stream channel that is so attractive to visitors, and particularly to children. No recreational environment has a higher "use" value than that of a meandering small beach creek that no amount of "messing with" can disturb and affect, or that needs maintenance or other protection. Such a rare child - creek beach habitat combination operates in happy compatibility at Picnic Point, Meadowdale, and Seahurst Park.

Because of the delta foreshore platform, there is here at Carkeek an outstanding opportunity to develop an adequately sized Class I beach and natural shorescape. The creek resource can be ideally adapted to conform in geohydraulic balance with the marine shore system. While this report is not concerned with beach design recommendations, it might nevertheless be noted that probably no money expended for this purpose at Carkeep Park could possibly produce greater public benefits — an investment that can be staged as a pay-as-you-go beach enhancement program.

MEADOW POINT
GOLDEN GARDENS PARK

Meadow Point, despite its past history of commercial utilization, remains, nevertheless, the only natural looking accretion-type shoreform within Seattle's coastline. Thus a few hundred yards of berm beach in over twenty-five miles of shores is all that may be called representative of such recreational beaches, with their driftwood backshores and dune-grass environments.

The geohydraulic berm-maintenance system operating at Meadow Point is partially supplemented by a geopneumatic system creating a mini-dune habitat in the southern accretion sector of the Point. Small perennial and seasonal springs from the Sunset Hill aquifer also supply the Point at both north and south ends.

A number of problems are affecting this most precious shore resource of Seattle, not the least of which are those arising from an apparent lack of understanding as to the importance of the resources and the nature of the systems that produce them here. For example, dumping massive riprap and rubble piles onto the southern accretion pocket represents not only an insult to the esthetics of a lovely crescent sweep of sandy beach, but, what is worse, such dumping can not and will not prevent erosion here, if that is its purpose. Filling and bulldozing a pond and cattail marsh that has existed at the northeast corner for many years makes the result of fresh water input from the hillside seem equally short sighted and heavy-handed.

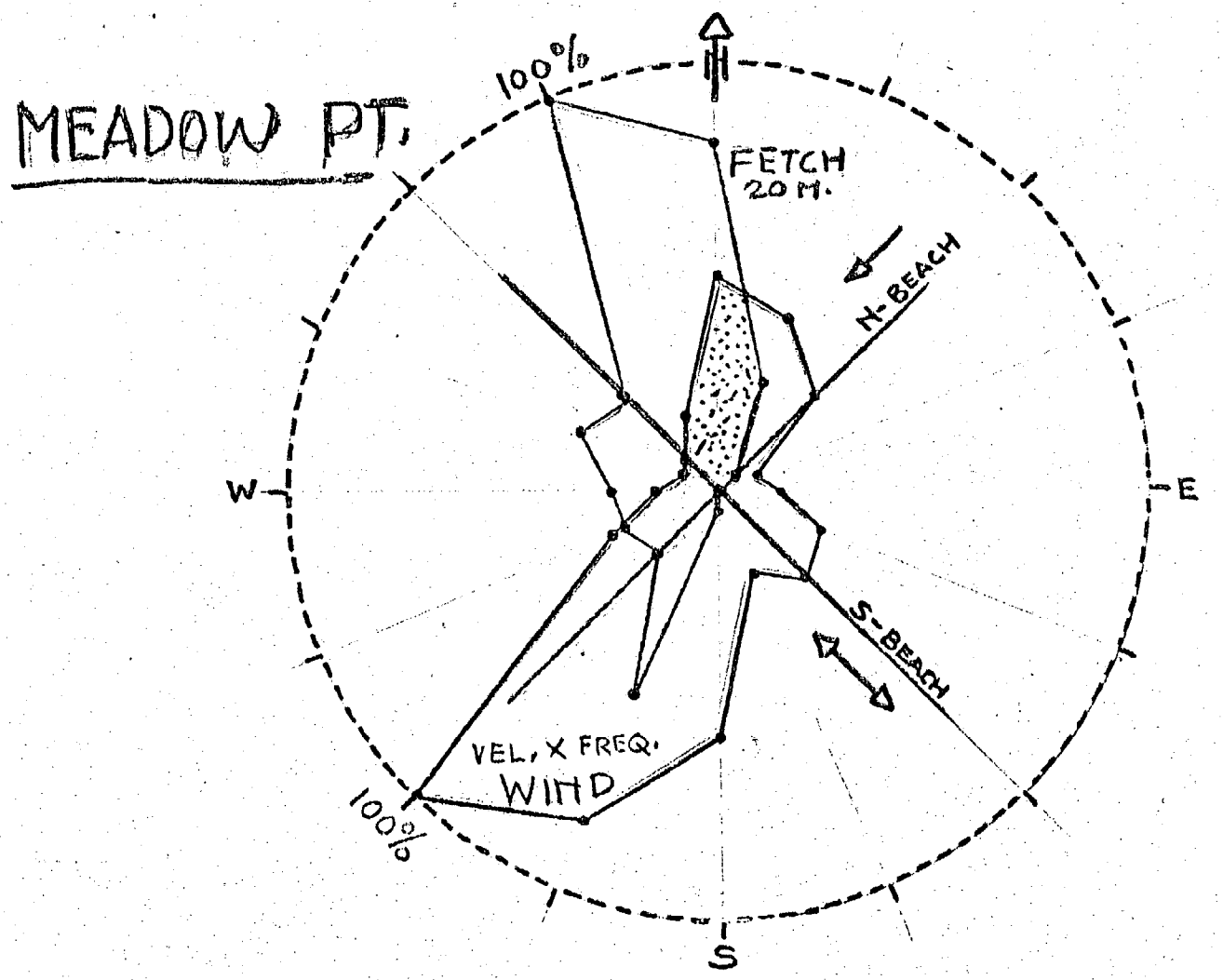
Parks should be designed around their resources, not over them, and even the red-winged blackbirds that once returned to this habitat each year were part of the public heritage.

For example, the dune system seems to operate more or less without control or direction, but its function could well be part of the beach park design. There are, furthermore, some basic geohydraulic problems associated with the beach system itself. As can be seen from the drift-rose diagram, and as noted by observations over the past twenty-five years, the net drift along the north beach is southwesterly to the south beach, even though there is periodic return transport of sand to the north pocket (and partially by wind transport).

FIG. 1

DRIFT - ROSE

(Less Refraction Effect)



WOLF BAUER

Northerly storms tend to erode the north bank near the pond, as well as the tight and non-porous fill material underlying the dunegrass backshore of the point's apex. This unnatural condition prevents wave swash from building a porous gravel berm that can act as a flexible storm buffer for the dunegrass habitat. Since the point does not receive beach maintenance materials by longshore drift from either the north or south, following the appearance of railroad and street bulkheads, this shoreform is slowly losing ground, as the finer fractions of sediments reach the near and off-shore without volumetric make-up along the beach.

Without going into site specifics, Meadow Point, like Carkeek Park beach, is also in a starvation phase. In view of its great popularity, and because it represents a one-of-a-kind endangered specie in Seattle's shore zone, this beach and environment should also be enhanced and redesigned to reach its inherent potential as a functional, esthetic, and recreational resource. Among basic needs here could be enhancement and control of the rare dune system; upper foreshore and backshore rehabilitation to a properly functioning natural storm-berm system around the erosional apex of the point; a possible extension and realignment of the north beach northward perhaps a hundred yards to prevent further backshore recession, and to provide additional dry beach environment to this limited city park; and perhaps evaluating the various opportunities that the local ground water flows provide for rehabilitating and enlarging the nearly buried freshwater pond, and a possible tie-in with a future marsh-pond in the present storm-surge basin on the central Scotch Broom meadow.

DISCOVERY PARK NORTH BEACH

The erosional Class III beach just west of lower Salmon Bay and Lawton Woods represents a short reach of typical Puget Sound sea-bluff environment. Here bluff recession is active with considerable sluffing and sliding along areas of impervious clay-silt beds and water seepage slippage planes. The bluffs are typically low in gravel, and there is thus little beach drift sediment covering the wave-cut foreshore shelf above high tide. Two imposing glacial erractics, and some large boulders in the mid and lower foreshore attest to bluff recession progress, while lending wilderness character to this beach environment. In view of its park status, no structures or paving should be sited near the top rims in order to forestall temptation to defend such arbitrary areas with useless bluff-toe revetting along this reach, defense works that have already degraded the private sector to the east. The riprap fill-boundary of the Metro site at the west end of this reach could be utilized as an anchoring groin for the establishment of a short Class I pocket beach at this location for high-tide recreational beach use and access.

DISCOVERY PARK SOUTH BEACH

Only a generalized statement can be made in this condensed overview, as to the many alternative approaches to shore resource development and management in this city sector. Although the major bluff beach environment is intact and untouched, the beach system itself has suffered considerable change in terms of reduced upper

foreshore drift-belt loading and drift passage between Smith Cove and West Point Light. Especially is this true southeast of the Light where the ill-considered foreshore installation of a riprapped sewage lagoon has obliterated what was once an outstanding Class I berm beach. Not only has a rare heritage resource been buried here under shorescape-despoiling rubble, but this structure continues to exert negative effects in contributing to an increasing erosion phase around West Point Light, while its southeast pocket acts as a driftlog trap that will continue to mess up and cover what little dry beach remains in this park.

If this foreshore seawall enclosure is to remain (for whatever park or Metro use), then it would be advisable to realign the northermost bluff beach so that a robust gravel berm can be curbed from the outer south corner of the Metro seawall southeasterly to the end of the present Class II beach where it meets the protruding bluff buttress that makes up the base complex of the overlying cliff. This would create a much-needed major dry berm beach (with dune grass planting and beach-park picnic facilities) for Discovery Park. It would not only be stable at this orientation, but would cease to act as a driftlog eddy trap.

The Magnolia Bluff reach between Discovery Park and Smith Cove represents a variously intruded Class III erosion shore, mostly bulkheaded. A narrower foreshore and nearshore shelf creates here a higher wave-energy zone. Variable bluff compo-

sition and water table effects have resulted in spotty instability of this bluff. Haphazard defense works, past and present, have left here a sorry mess of storm litter near untenable dwellings, or their former sites. There are, however, yet some beach park possibilities between Magnolia Park and the Coast Guard property at Smith Cove.

MYRTLE EDWARDS PARK There exists here both a need, as well as an exciting challenge in terms of creating a natural and scenic Puget Sound driftwood and dune-grass beach facing out into Elliott Bay. Such a basic addition to this bare park area would be of particular significance not only as an adjunct to the shore habitat displays at the nearby aquarium, but just inthe uniqueness of its existence in the downtown area of a busy harbor.

Despite some shortcomings of the nearshore bathymetry for stable dry beach development, namely the relatively steep nearshore profile, the possible use of subtidal sills, and the fact that one or two embayment-beaches can be oriented to the local wave refraftion patterns, make such a development practical, and at a modest investment cost.

ALKI BEACH

The 11,000 ft. long reach of shoreline between Duwamish Head and Alki Point light is made up of a number of distinct beach shores. Beginning at the small bulkheaded vista park at the Head, a rubble-covered and bulkheaded Class III beach extends southwesterly along Alki Avenue for 6000 ft. (54.6%), followed by 1,500 ft. of Class L bathing beach (13.6%), 2,500 ft. of bulkheaded Class III park beach (22.7%), and ending with 1,000 ft. of housing bulkhead and Coast Guard riprap beach at the lighthouse (1.1%). Thus Alki bathing beach represents only 1% of Seattle's marine shoreline covered in this analysis.

The relatively broad intertidal foreshore shelf widens graually from Alki Point to Duwamish Head. Orientation to both wind waves and boat traffic wakes is such as to produce relatively balanced longshore drifting of sand, there being no gravel available to build a stable storm-berm backshore. Under these geohydraulic conditions it would be feasible to create a major above-tide recreational beach attached in the north to the vista park at Duwamish Head. Unlike the profile situation at the Lincoln Park south beach, where the paved high-level shore walk can be replaced with a lower level beach berm, the Alki Avenue roadway is fixed to its present bulkhead and retaining wall. This will necessitate a future walkable backshore berm to be below the street level. Here, however, a porous gravel berm will create a backshore that then serves

as a storm-tide buffer to the concrete bulkhead, obviating the riprap rubble now despoiling this segment of public shoreline. (Some of this rock could be utilized for groin core construction since the convex shoreline near Duwamish Head will require more than one beach anchor out to the MHHW tideline.) The final goal and result of creating a new driftwood-dunegrass backshore environment will be that of providing typical Puget Sound beach experience as a counter to the artificiality of rubble and concrete now dominating the West Seattle seascape.

LOWMAN PARK The present concrete and masonry bulkhead projects into a flat upper foreshore that is devoid of a protective sand and gravel drift-berm. This situation is a result of bulkheaded feeder bluffs and banks on each side. The bulkhead is thus subject to undercutting, and the structure is exposed to drift-log battering during high-tide periods.

This Class III wet beach is part of a broad foreshore shelf upon which an accretion-type point might be built over the upper foreshore. Such a point shoreform with both northwest and southwest-facing shores could be designed with a hidden backbone of porous cobble. Depending on the length of shoreline to be enhanced, short side-groins with flat, unobtrusive slopes may be needed to retain a stable backshore that can serve as both storm buffer and recreational dry beach to this

mini park. Some private properties on each side of the park would have to be included in the overall beach design, as would also the stormwater outfall extension.

LINCOLN PARK NORTH SHORE

Little remains of the Class I beaches that must formerly have made up the tip of Williams Point. Only about 300 ft. of the immediate north beach retains a gravel storm berm with narrow backshore of driftwood and dune-grass partially impacted by a low concrete retaining wall. Northerly storm waves refract with minimum drift angle upon this berm beach, while the southerly storms allow only low-energy refracted waves to operate a slow northeasterly drift, hence its generally stable condition, and Class I status.

The bulkheaded point in front of Evans Pool, like the Lowman Park bulkhead, juts well into the upper foreshore and is thus programmed for erosion and driftlog attack. The former porous and flexible storm berm has been replaced with an unyielding, non-porous structure and paving that is incompatible with a geohydraulic system that has operated here for thousands of years. A number of alternative beach rehabilitation approaches are also possible here, but they depend on an overall program of south beach restoration.

Asid from the short reach of Class I beach that shows a typically steep accretion shore profile in the upper foreshore drift belt, the remaining north shore grades from Class II to

Class III intruded beaches. The northernmost end of this crescent bay beach is eroding because it receives little drift gravel from the bulkheaded shores on either side, and because its backshore is made up of the tight and non-porous pathway fill that allows full storm wave swash to pull the material seaward. The drift-rose diagram shows a northeast net drift effect, which makes this north-end beach (non-bulkheaded segment) a good candidate for realignment and enhancement to a stable accretion beach.

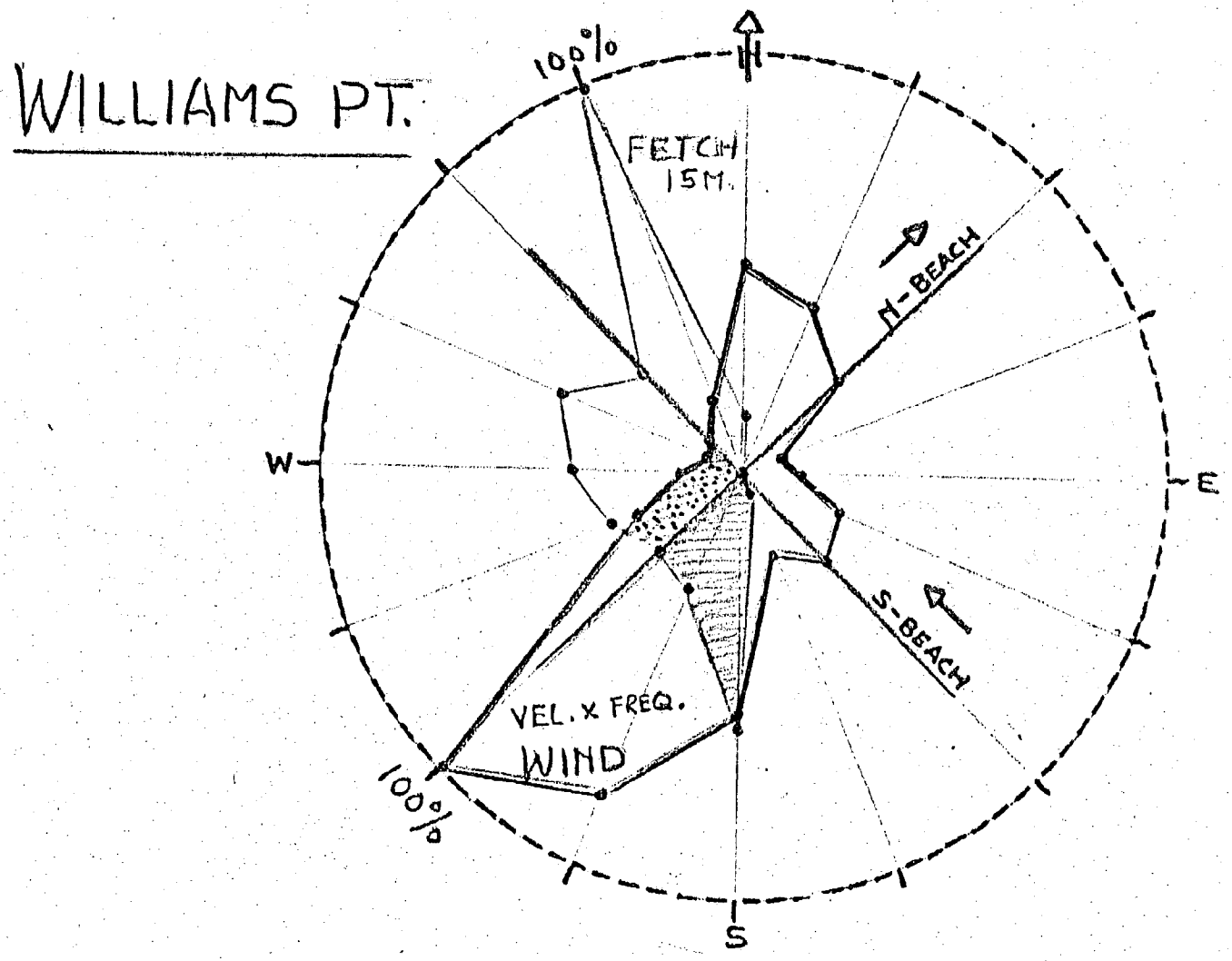
LINCOLN PARK SOUTH BEACH

Bulkhead intrusion into the gravel-starved foreshore of this reach has exposed this poorly sited and designed structure to considerable deterioration from both driftlog battering and toe undercutting. The combination of concrete bulkhead and asphalt paving sited over this wet Class III erosion beach represents a shocking and dismal example of beach park design — a visual blight that even the lovely Madrona flubb-fringe can not overcome.

As illustrated by the Williams Point drift-rose diagram, the south beach net drift-effect is northwesterly. The change in shore orientation of this curving bay-beach, however, produces a nodal or drift reversing point near the southeast end of the park, one in which wave refraction from south winds tends to move sand into the accretion pocket next to the ferry dock.

FIG. 2

DRIFT - ROSE
(Less Refraction Effect)



WOLF BAUER

These geohydraulic conditions are thus favorable for creating a fairly stable Class I dry beach in that portion of the park.

It is not the purpose of this preliminary overview to recommend specific correction or enhancement policies, or design-specifics, but rather to evaluate the beach and beach-process status in terms of an overall rehabilitation program, and to point out local potentials and limitations for these projects. At Lincoln Park there is an early need to resolve the bulkhead erosion situation. Here, however, bigger is not better, especially when it should be a matter of correcting the basic mistakes of the past, rather than prolonging and enlarging them by even more costly "defense works." In the final analysis, all the expensive bulkheading and its costly annual maintenance only protect a 3" layer of asphalt that has no business substituting for a backshore beach.

Both technical and economic feasibility await only a recognition of the fact that one of the largest shoreside gravel pits on Puget Sound is located just a few miles away on Maury Island. It may be a time for understanding that "bermheads" could, in many instances, replace bulkheads, and that we might begin to correct some of the inequity of a situation where an unpopulated area possesses gravel so much needed by the starved beaches populous on the east side of Puget Sound.

SEOLA BEACH Several hundred yards of natural bluff shore remain just north of the southern city boundary. Most of this shore is Class II beach with marginal sand and gravel drift-berm along the toe of the Madrona-tree-covered bluff. A little over a hundred yards of the north end of this unintruded natural beach can be classified as Class I bluff-offset berm beach. Here a tree-covered berm creates a narrow backshore environment, one that could be developed into a shady and unique beach park shorescape.

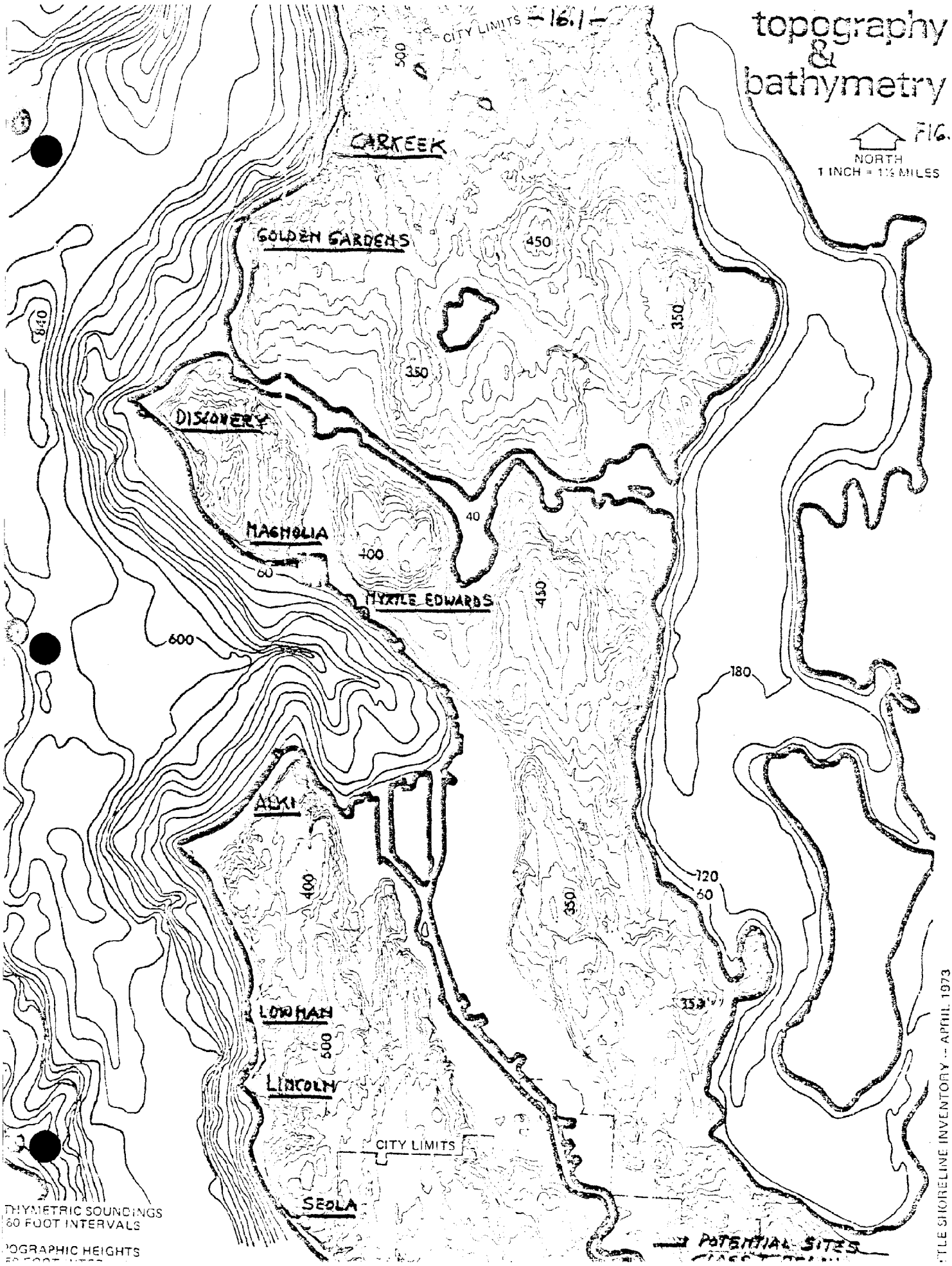
CONCLUDING STATEMENT

The foregoing public-beach overview represents a preliminary analysis of the geohydraulic shore status, and the many potentials for beach enhancement along Seattle's critically intruded marine shoreline. It is meant to serve as an initial eye opener to the inherent shortcomings in those shore-proces environments which create and maintain Class I accretion beaches.

This overview report and new approach to a very old problem is intended to serve as a catalyst for the rehabilitation and enlargement of one of this city's greatest public resources.

topography & bathymetry

FIG. 3



THYMETRIC SOUNDINGS
60 FOOT INTERVALS

OGRAPHIC HEIGHTS

TLE SHORELINE INVENTORY -- APRIL 1973

APPENDED TEXT

A P P E N D I X

BEACH COMPONENTS, CLASSIFICATION, AND SYSTEMS *

Wolf Bauer

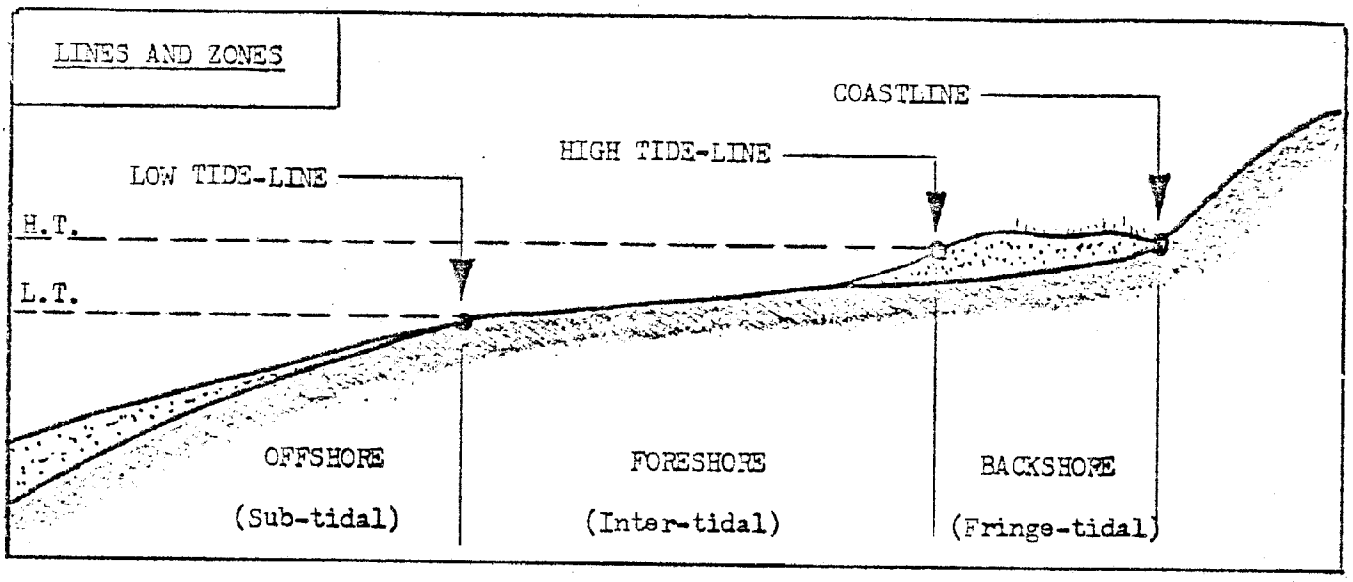
Of the four basic types of shores, namely rocky, beach, marshy, and estuarine, the beach type is the most prevelant in this area. The zones and components of beaches are illustrated in Figure 1A. Beaches may be classified into three major classes according to the existence or absence of a backshore above mean higher-high water. They can be further differentiated as to whether they are natural (unimpaired), or intruded (impaired). This classification is shown in Figure 4A. Unlike ocean beaches which are primarily sand that is easily eroded during storms, Puget Sound and inland strait beaches are composed of sand and gravel derived principally from the erosion of glacial moraine bluffs making up the shorelands. Here it is exactly the presence of gravel that usually provides the proper material porosity for berm building during storm conditions, and thus accounts for above-tide driftwood beaches with vegetated dune-grass backshores. (See Figure 3A illustrating the swash-current cycle that is responsible for over 80% of all geo-hydraulic beach action along our shores.)

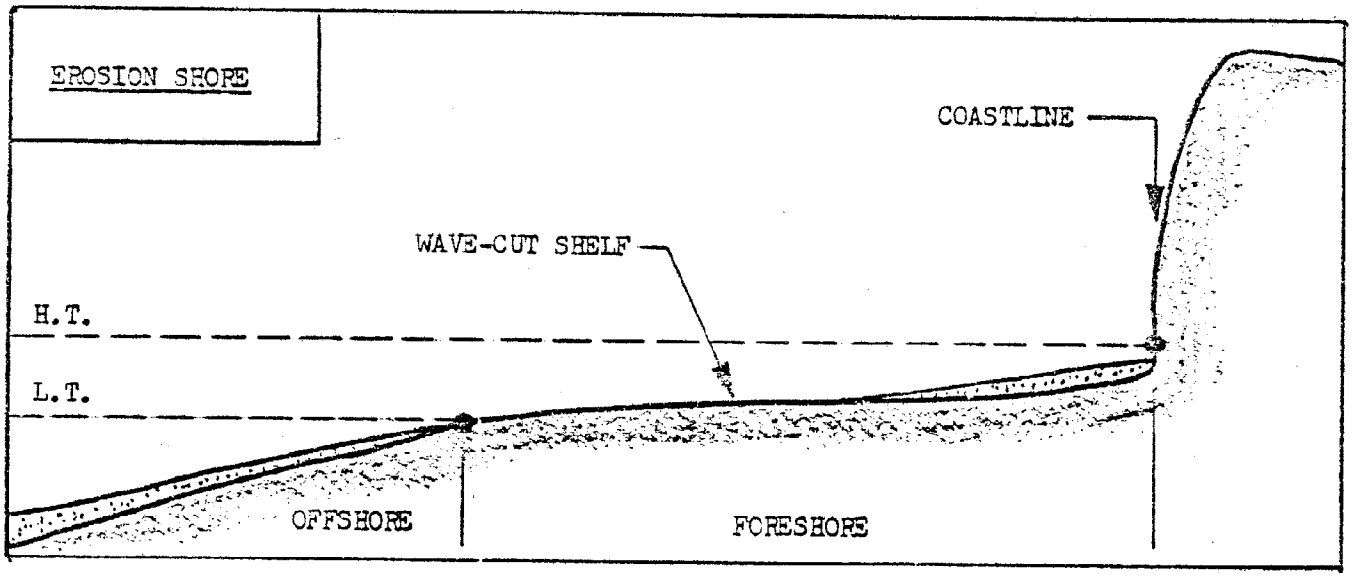
CLASS I BEACHES are accretional or rollback dry beaches, the backshore of which is only wetted under extreme tide and wave conditions. These beaches are usually the accretion terminals of their Drift-Sectors, and as such are components of points, spits, tombolos, as well as the various bluff-offset, and bay or marsh-barrier shoreforms. (See Figure 7A, Accretion-beach Environments)

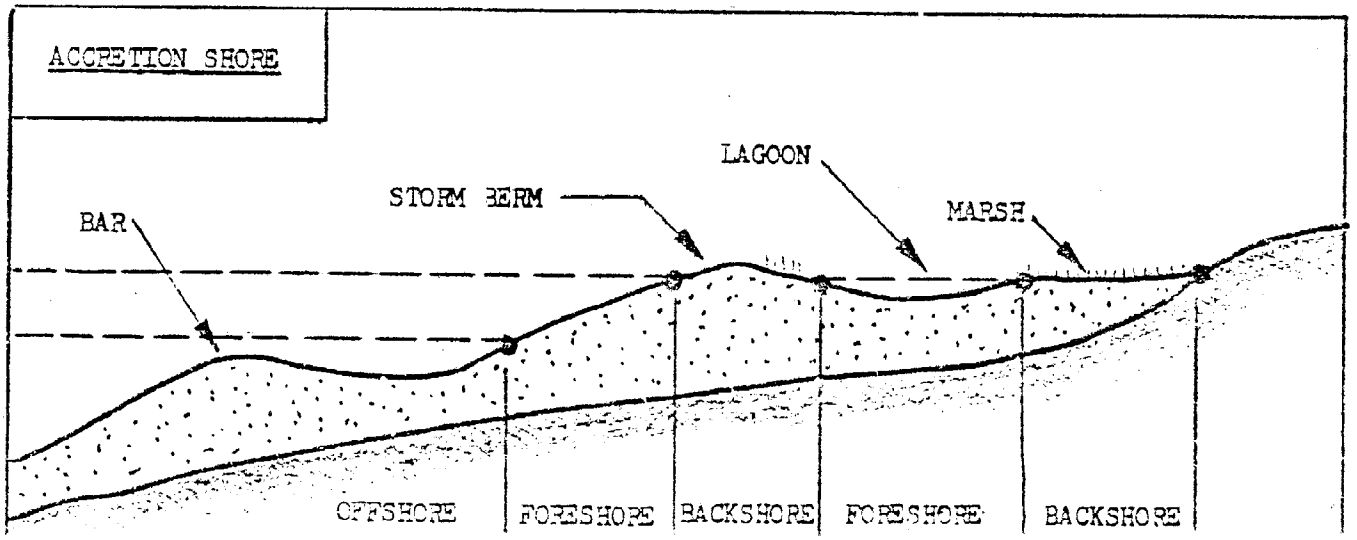
* Text and illustrations are excerpts from a future "Shore-Resource Manual", and are furnished as a prepublication courtesy by the author.

FIG. 1A

THE PHYSICAL SHORE SYSTEM







CORRIDOR DEFINITION: THAT EARTH - WATER DIFFUSION ZONE WHICH STRADDLES THE EXTREME SURGE LIMITS OF RIVERINE, LACUSTRINE, ESTUARINE, AND MARINE WATERS, INCLUDING THOSE ADJACENT TERRESTIAL AND AQUATIC FRINGES THAT CAN DIRECTLY AFFECT, OR THAT ARE AFFECTED BY, THE PREVAILING GEOHYDRAULIC AND GEOPNEUMATIC SYSTEMS.

THE SHORE-PROCESS CORRIDOR

FIG. 2A

ZONAL HORIZONS

VERTICAL ZONES	RIVERINE ENVIRONMENT	ESTUARINE ENVIRONMENT	MARINE ENVIRONMENT
CORRIDOR	TERRESTIAL FRINGE	VALLEY FRINGE	BAY FRINGE	COAST FRINGE
	SURGE ZONE	FLOODPLAIN / BACKSHORE: FLOODWAY FRINGE	FLOODPLAIN / BACKSHORE: SURGEPLAIN	STORM-TIDEPLAIN BACKSHORE
			UPPER MARSH	
		FLOODPLAIN / FORESHORE: FLOODWAY (1% + ½ MPH)	FLOODPLAIN / FORESHORE: LOWER MARSH	FORESHORE
			TIDAL FLAT TIDAL CHANNELS	
	AQUATIC FRINGE	MAIN CHANNEL THALWEG	MAIN DISTRIBUTARIES BAY OFFSHORE	NEARSHORE TO DEPTH BELOW MLLW < ½ MAX. WAVELENGTH

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MARINE - SHORE ZONES AND BOUNDARIES

FIG. 3A

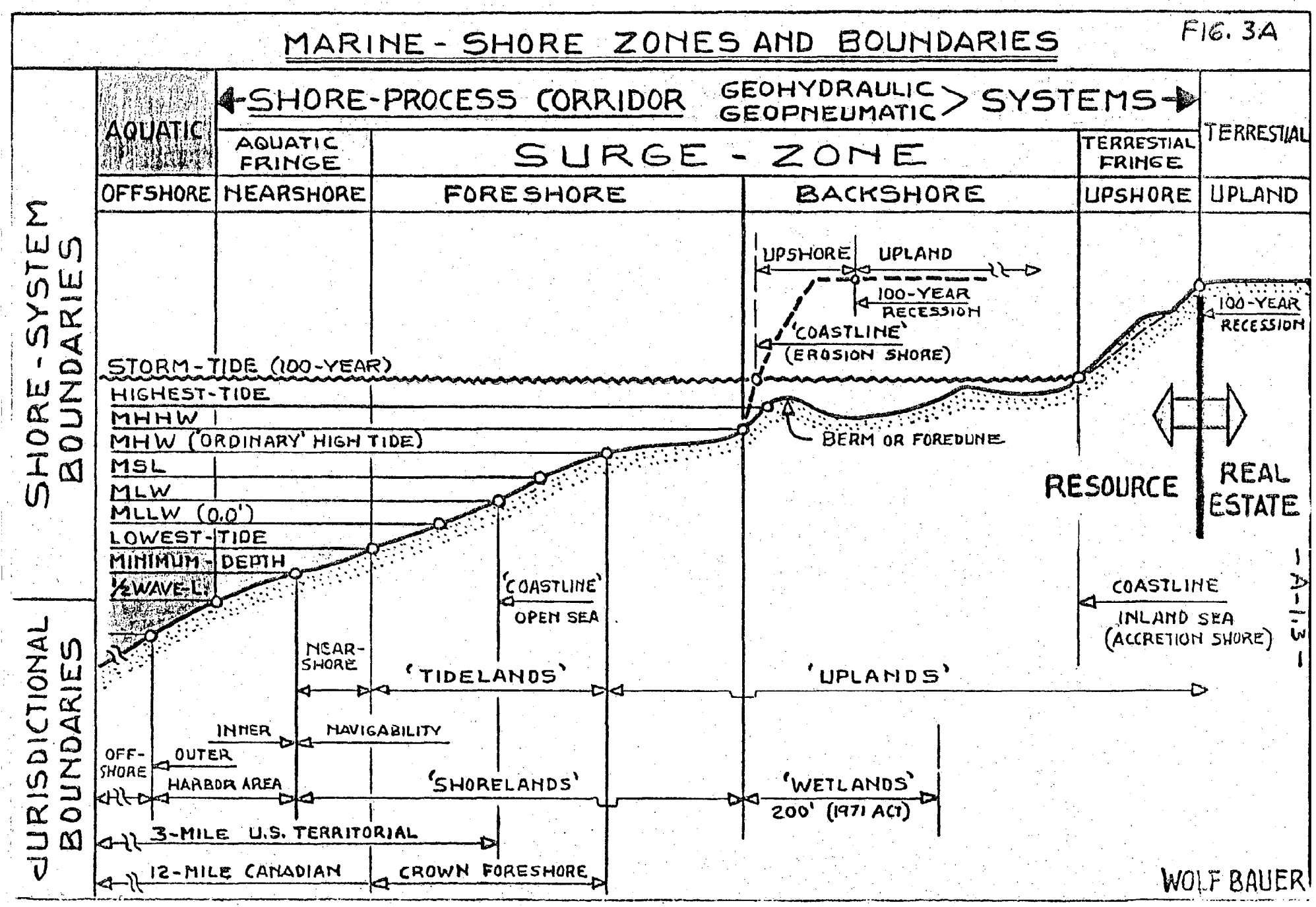

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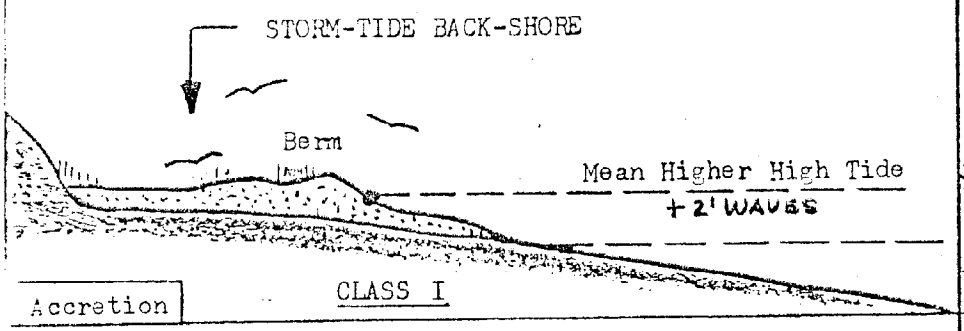
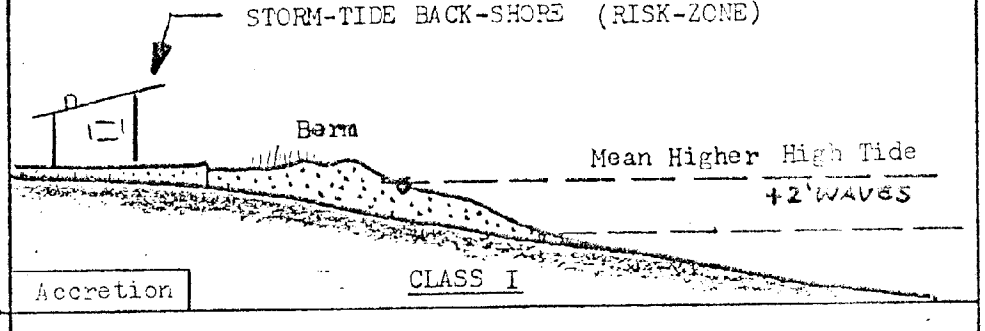
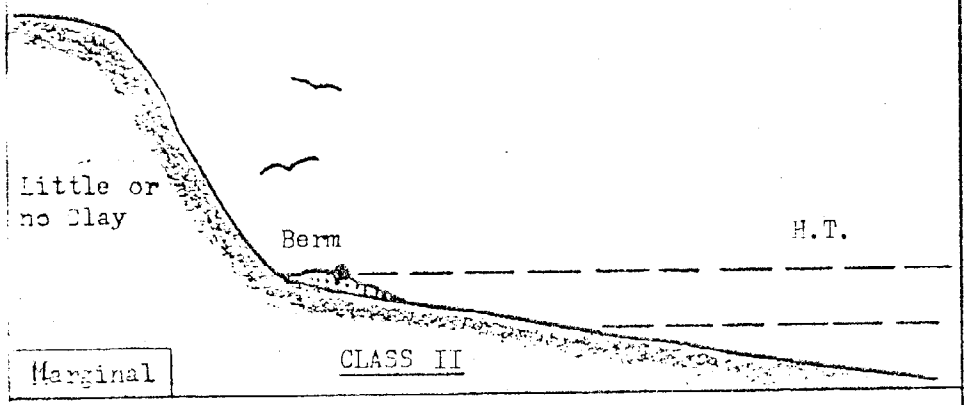
FIG. 4A

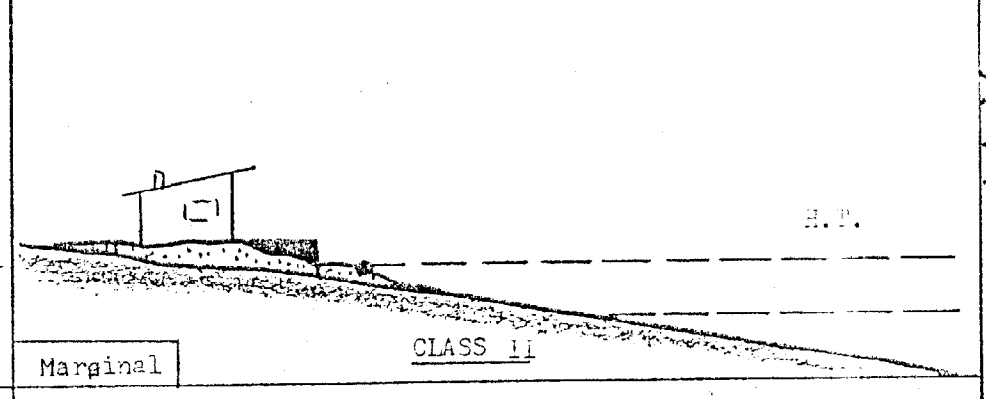
GEO-HYDRAULIC BEACH SHORE CLASSIFICATION

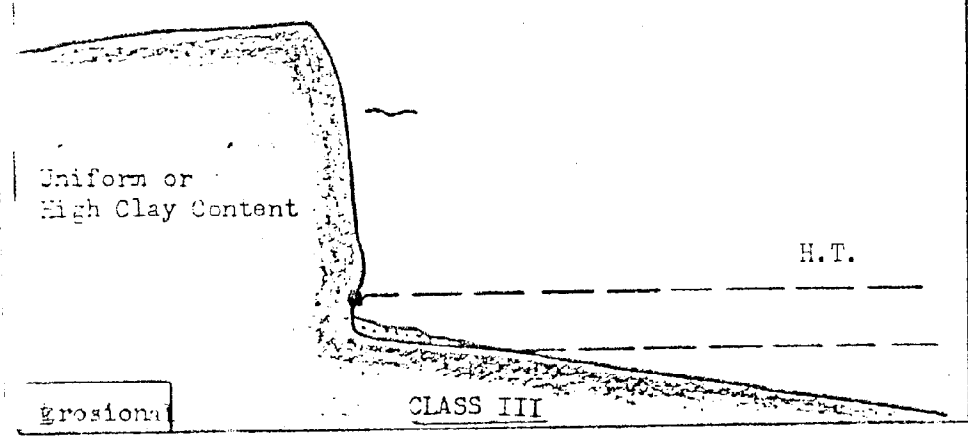
NATURAL - SHORES (I = 5%; II = 60%; III = 35%)	INTRUDED - (SHORE PROCESS & RESOURCE IMPAIRED)

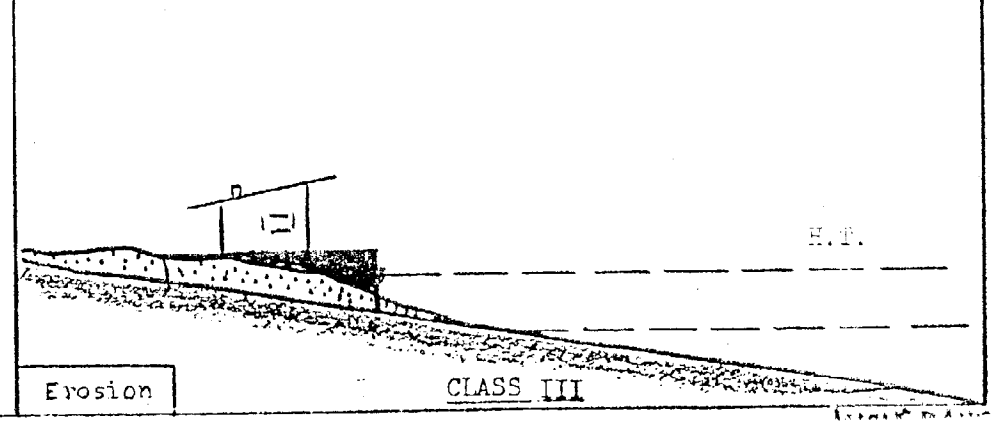












DRIFT SECTOR: AN INTEGRATED AND INDEPENDENTLY OPERATING EROSION - TRANSPORT - ACCRETION BEACH SYSTEM SEPARATED FROM ADJACENT SHORES OR SECTORS BY NATURAL OR ARTIFICIAL BOUNDARIES, OR BY SHORE DIRECTION CHANGES, - EACH SYSTEM CONTAINING ONE OR MORE MATERIAL SOURCES (FEEDER BLUFFS) SUPPLYING ONE OR MORE INTERMEDIATE AND/OR TERMINAL ACCRETION SHOREFORMS.

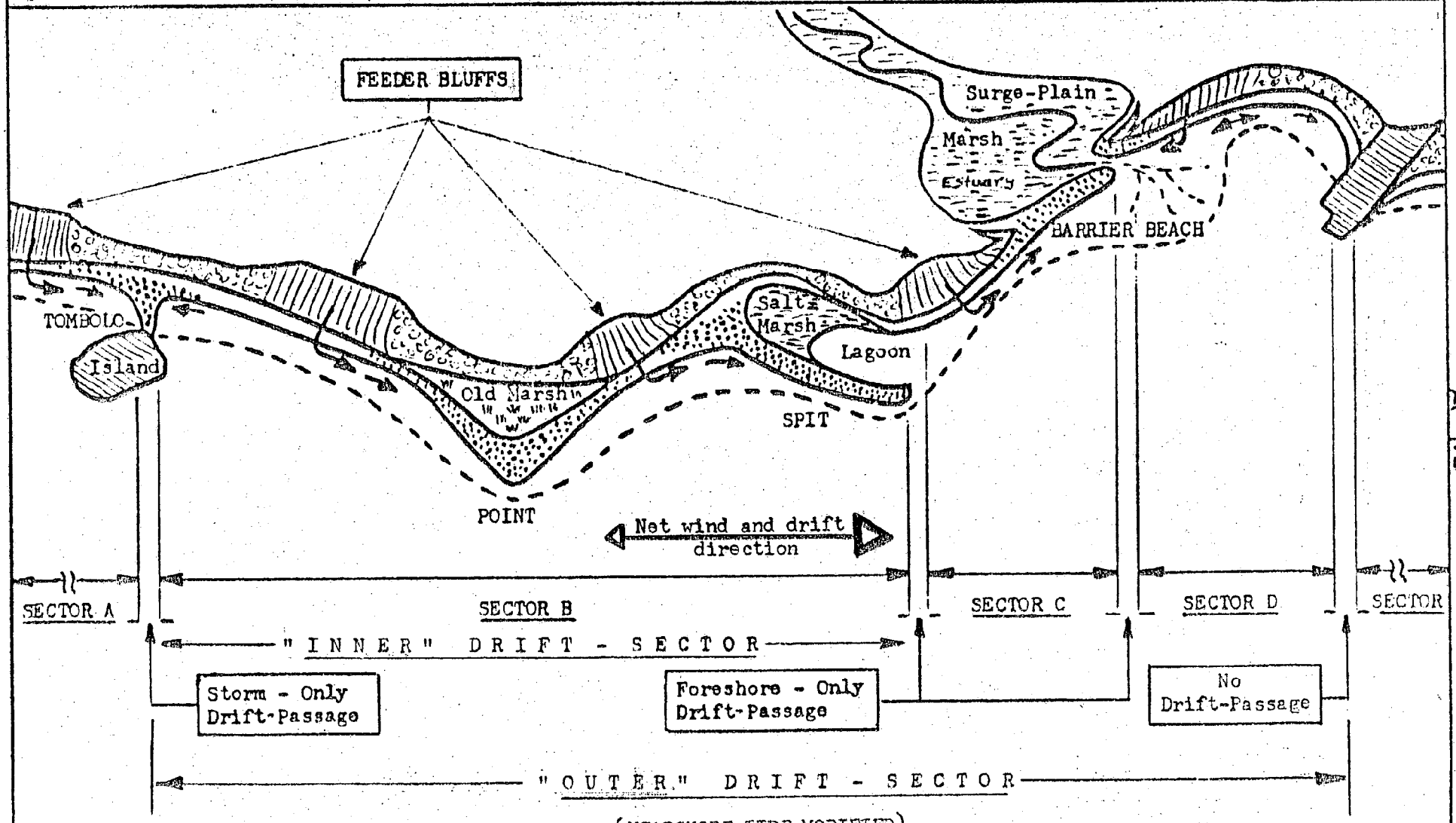


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FIG. 5A

1 A-1-5-1

CLASS II BEACHES are marginal erosion beaches, usually at the foot of gravel-containing banks and bluffs that supply the upper foreshore with a fairly heavy drift berm, but without creating a stable and dry backshore zone above MHHW level.

CLASS III BEACHES are erosional beaches under banks and bluffs that are generally low in gravel and high in clay, and where the bluff toe and upper foreshore is wave-cut below MHHW level with minimum beach material cover to protect the foreshore shelf.

This beach classification system was developed for easy public recognition and use, one that would not require a scientific knowledge or determination of beach geo-morphology. It is simply based on the presence, absence, or marginal extent of a walkable dry backshore berm under coincident high tide and wave conditions.

THE DRIFT-SECTOR SYSTEM * It is not the purpose of this beach system review to present a full text on the many components and variations of shore processes and shoreforms. Suffice it to describe the Drift-Sector as an integrated and independently operating erosion-transport-accretion beach system up to many miles in length, and separated from adjacent shores or Drift-Sectors by natural or artificial boundaries. Each Drift-Sector is made up of four basic elements. (See Figure 5A)

1. FEED SOURCE: The most prevelant beach cover and berm building material source are the beach bluffs or cliffs, or the banks of marine terraces. Wherever they are in an active operating state, they are hereafter referred to as "Feeder Bluffs".

* Text and illustrations of beach-process systems are excerpts from a future "Shore-Resource Manual", and are furnished here as a pre-publication courtesy by the author.

1. FEED SOURCE (Continued)

The rate at which beaches are nourished from feeder bluffs depends on their composition and the hydraulic energy level of the bluff reach. Orientation to a long wave fetch, and a low clay-content bluff composition results in a high and uniform rate of bluff recession and beach feeding. Non-uniform composition or stratification of clay, sand, and gravel may bring about erratic cave-ins and sluffing due to weakness planes or multi-level water tables. When the bluff has a uniformly distributed clay content, its quarry face is near vertical, and its operating rate is slow and steady.

2. DRIFTWAY: The primary drift belt of longshore material movement lies within the lower backshore and upper foreshore zone, and the driftway is thus the corridor which connects the feeder bluff with its accretion terminal shoreform. The drift cover on any driftway reach may be sparse or thick, and it may either be size-classified or well mixed depending on the relative bluff feed rate versus the wave-angle transport rate. While sand is moved at all levels of the intertidal foreshore, gravel is invariably transported along the prevailing daily high tide level in the upper foreshore. Cobbles may move only during high wave action, and boulders will move occasionally under driftwood impacts. Fine silt generally remains on the lower foreshore, along with clay-size materials that eventually reach a non-returnable level in the offshore.

3. ACCRETION TERMINALS: Longshore and littoral drift movement takes place in reversing cycles with the wind changes, and thus more than one accretion shoreform may be in its path, or form a terminal dumping area within any one Drift-Sector. Normally, however, prevailing winds create a net effect in one direction over the years, with a distinct down-drift terminus. Such accreted deposits are shoreforms such as spits and hooks, open or closed points, single or dual-berm tombolos, as well as bay and marsh (and estuarine) barrier-berm beaches.

4. SECTOR BOUNDARIES: In referring to Figure 5A, it can be seen that each independent Drift-Sector is separated from the adjacent shore or other Sector by a drift gap or barrier. These boundaries are quite absolute when they represent natural deep-water rock promontories and rock spurs, or artificial deepwater bulkheads, jetties, or groins. Leak or overlap boundaries are those which may be storm breached, or where considerable sand may drift to another sector in the lower foreshore or offshore. Such inter-sector material movement may occur across low tombolo bars and berms during storm tides, low-profile groins, or upper foreshore bulkheads. Sector boundaries also overlap, at times, where prevailing drift is split by a headland dividing adjacent Sectors with large variation in beach orientation.

RESOURCE VALUES OF ACCRETION SHOREFORMS

BASIC SHOREFORMS

Accretion shoreforms are physiographic and bio-habitat entities representing the down-drift accretion terminals of their respective Drift-Sectors. Their physical backbones consist of gravel berms in the higher energy zones, and of sand and finer gravel material in the more wind-protected areas. These primary berms making up the windward shore of the shoreforms represent our major Class I recreational beaches which, in turn, act as protective sea and storm dikes to the dependent bio-habitat lagoons, capillary tide-channels, marshes, and older marsh-meadows in their lee. Practically all inland-marine shoreforms may be classified under four basic headings:

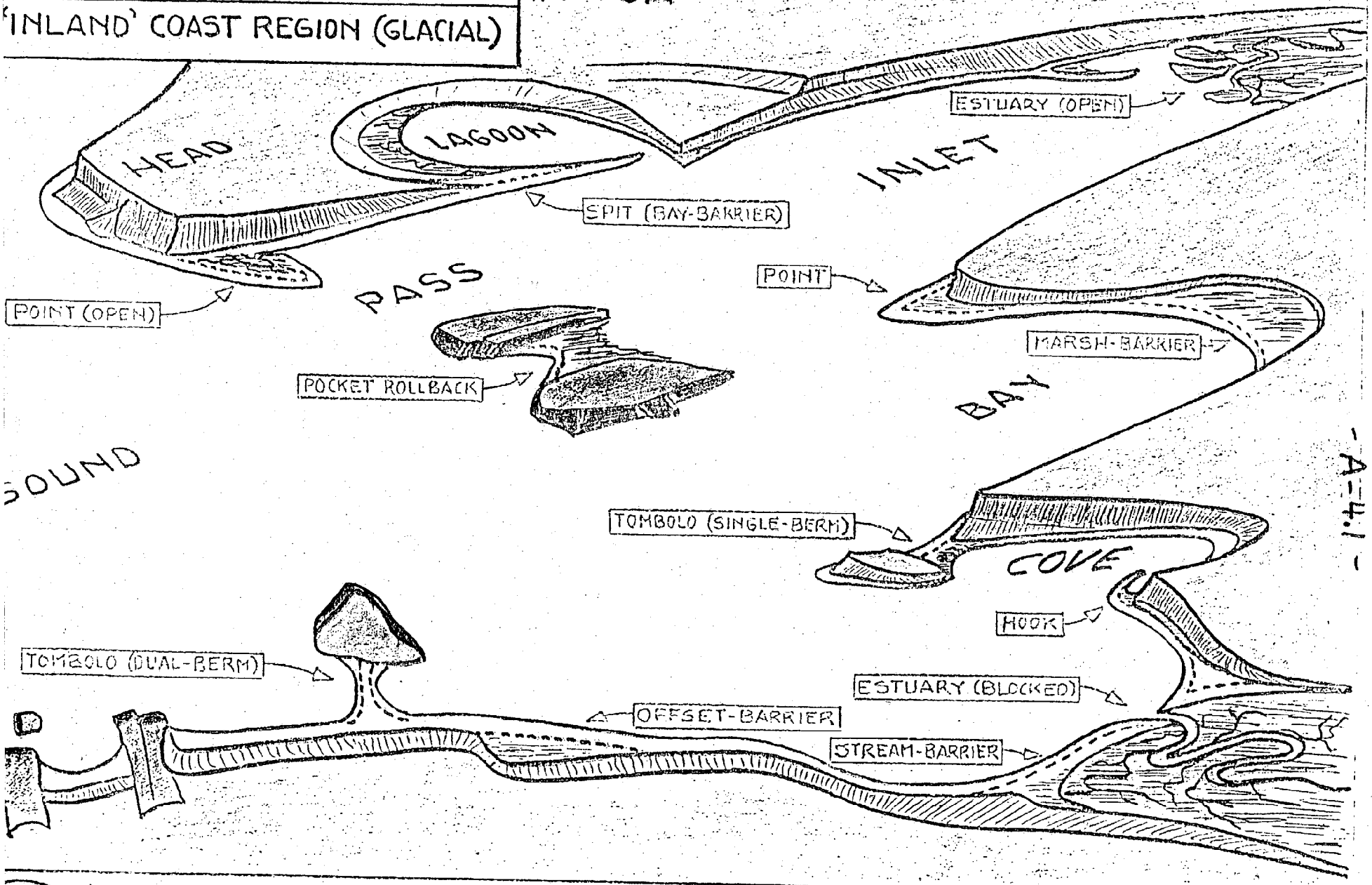
SPITS (and HOOKS): are wave-built and tide-current controlled narrow sand and gravel deposits extending parallel to, or curving out from shore, - characterized by a wave-built beach berm on the seaward side, and a marshy inside shore, unless sufficient lagoon or bay fetch exists for building a moderate inside berm beach as well.

POINTS: are low-profile shoreline promontories of more or less triangular shape, with the landward baseline forming the coastline, and the apex extending seaward. Points are invariably located at some direction break of the shoreline, and they may be over the wave-cut shelf remnant of a headland bluff, or represent a last-phase accretional deposit that had its beginnings in converging spits, the closing of a hooked spit, the talus of a former coastal slide area, or they may form on a straight coastline over a low profile tombolo-effect area. Thus points are always in various stages of development. They are characterized by the dike-like berm that storm-tides have heaped along and above the high tideline

WATERWAYS - SHOREFORMS

'INLAND' COAST REGION (GLACIAL)

FIG. 6A



CLASS-I. BERM-BEACH OF ACCRETION - SHOREFORMS

WOLF BAUER

of the two converging beaches, and which driftwood and dune-grass covered berms enclose a central inter-tidal lagoon, brackish pond, marsh, or an older high-marsh meadow.

BARRIER BEACHES: are accretion shoreforms of sand and gravel that have been deposited, like storm barriers, in front of shoreline - indented former bays and bights, estuaries, or bluff-offsets by longshore drift from feeder bluff headlands — characterized by a storm-tide berm above high tide acting as dike and seawall to the backshore bluff-shelf, meadow, marsh, lagoon, or stream-mouth tidal surgeplain.

TOMBOLOS: are causeway-like accretion spits connecting an offshore rock or island with the main shore. Inland-marine tombolos may form by either one or both of two mechanisms where longshore drift is slowed down by wave attenuation from an offshore-foreshore object, and thereby accumulates within the wave-shadow beach area — or where outside wave refraction around such an object produces converging shore waves between the object and the drift belt.

When tombolos reach maturity they constitute an accretion terminal for each side of the Drift-Sector they have managed to divide. Depending on the orientation to prevailing winds, as well as the fetch exposure of each side, a tombolo may have two Class I berm beaches, or one side may be more sheltered to produce a marshy shore and lagoon. (Single or Dual-Beach Tombolo)

(Refer also to Figure 6A)

THE ACCRETION-SHOREFORM AS A RECREATIONAL RESOURCE

Recreational shoreline experience on Puget Sound has many facets, some of which are basic to all waterfront activities, while others are peculiar to certain shoreforms and local conditions. Recreational shore use also changes with the weather, the tide level, and the seasons. Shore appreciation is further tied to individual tastes, interests, and sense of values. Thus erosional beaches with their high cliff buffer zones, especially the most common Class II type, possess varied scenic and recreational values to an increasing number of people. They are often the most inaccessible wilderness-type shore environments in our midst, and the seabluffs themselves present a dramatic showcase of glacial geology as well as biologic habitat. It is nevertheless possible to assign overall recreational priorities to certain beaches and shoreforms in terms of quantitative considerations that lend themselves to rating and comparisons with a minimum of bias.

1. UNIQUENESS: In the inland-marine waterways, accretion beaches and shoreforms represent only a small fraction of total shoreline, less than five percent -- and a significant portion of these has, and is being converted to erosion-type shores by improper bulkheading developments and shore disturbances.

2. ACCESSIBILITY: A second priority factor is that of overall access to a dependable dry, above-tide berm and walkable backshore, even under most wave-action conditions. Points, spits, and tombolos also offer protected water access by virtue of their dual-shore system.

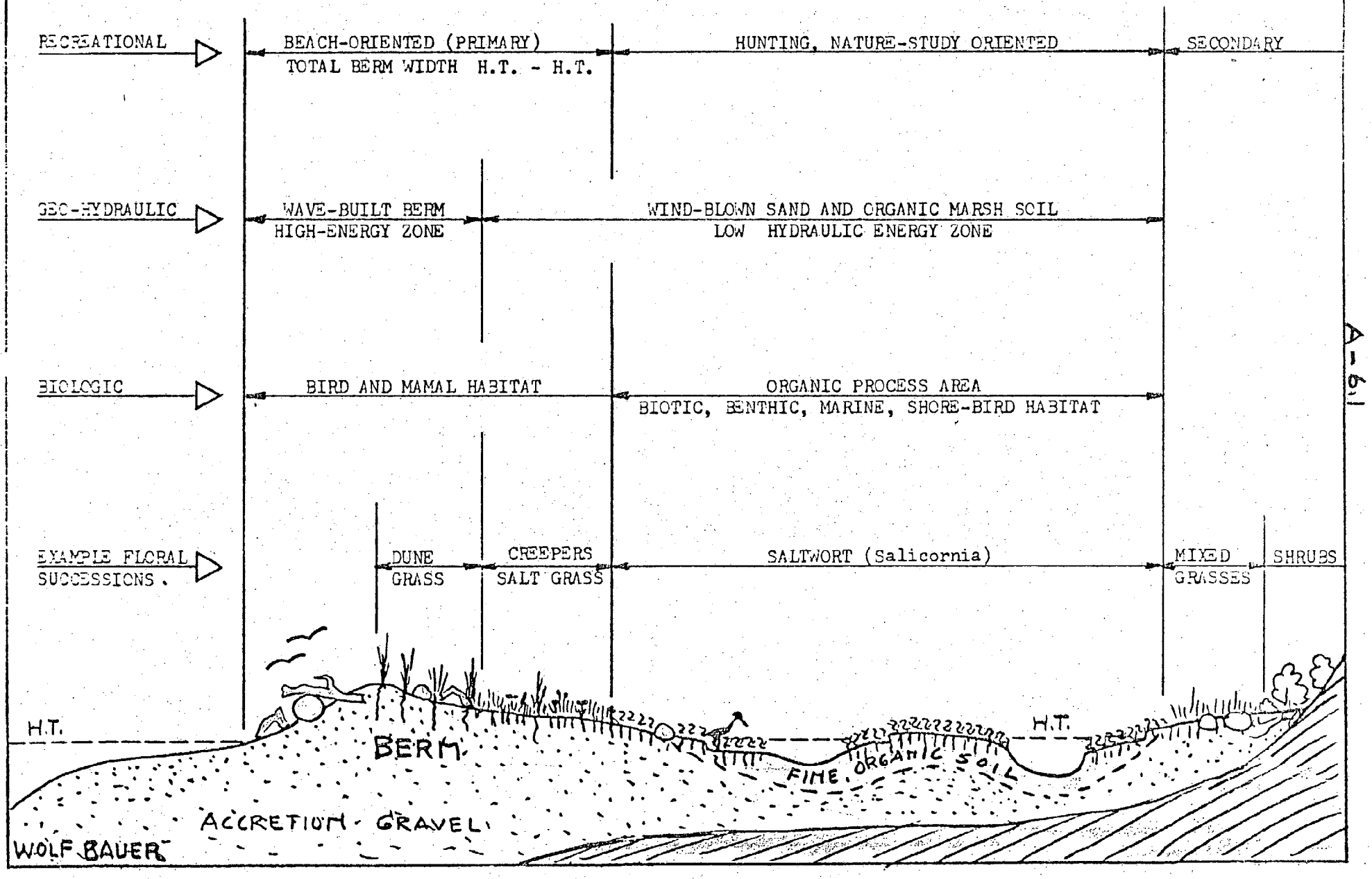
3. PRESERVATION TIME: A third priority factor is that of remaining time in terms of heritage preservation. Accessibility and flat topography have made them prime targets for real estate. What still remains has now become a truly endangered shore species.

A major plus-factor of Class I beaches, as compared to the more common erosional seabluff shores, is that of backshore use-potential. All three types of beaches have intertidal wet foreshores with tide-regulated walkability, clamming opportunities, and similar uses. However, the accretion beach has in addition to this foreshore commonality a dry driftwood berm with dune grass and flowering vegetation, a 24-hour beach environment without tidal interruptions. As the high tides and wind waves take possession of the wet and narrow erosion shores, such activities as camping, social driftwood fires, and especially dry sand and gravel picnicking and sun bathing become increasingly marginal. It is especially in areas of high-frequency beach visitation that the remaining Class I dry beaches and associated environments will be ever more sought after and valued.

SOURCE POINT OF ORIGIN ---------- FEEDER BLUFF
SUPPLY - LINE ELEMENT ---------- BULKHEAD - FREE DRIFTWAY
RESPONSIBLE DESIGN ELEMENT ---------- POROUS GRAVEL BERM

TYPICAL ACCRETION-SHOREFORM ENVIRONMENTS

FIG. 7A



A-61

THE ACCRETION - SHOREFORM AS A BIOLOGICAL RESOURCE

As in so many instances of man's invasion of natural environments, recreational shore use is not always in the best interest of the resource, or man himself. Some open space entities such as estuaries, for example, are invaluable bio-process environments at the food chain baseline, and intensive recreational use can bring about serious reductions in natural process operation. Man can affect such biologic systems in two ways, either directly in terms of consumptive or pollutive activities, or indirectly in terms of affecting the less flexible geosphere to which the the more flexible biosphere is trying to adapt.

In the Puget Sound basin scheme-of-things, the basic and constantly recurring geo-hydraulic process sequence is the Feeder Bluff - Driftway - Accretion Terminal System. Not only has this resulted in accretion shoreforms composed of high priority recreational Class I berm beaches, but a direct consequence of this process has also been the creation of bio-process habitat in the form of shallow lagoons and protected salt marshes leeward of these shoreforms. Thus the glacial gravel in a receding sea bluff is directly responsible for shallow marine, benthic, and salt-marsh - tide-channel communities — all performing cumulative functions for and within the total biosphere of the inland sea. It is this dual recreational - biological resource potential that establishes the high priority resource position of accretional shoreforms at this time. It remains to be determined whether this is a dilemma or an asset. It is an unusual juxtaposition of dry recreational and wet biological environments, both esthetically and functionally valuable in their own right.

From the standpoint of recreation, this dual resource has fared without major problems thus far. The windward beach system has readily absorbed boat landing and beach traffic because of its usually robust gravel and driftwood composition, while any leeward marshy shores and shallow lagoons have tended to discourage polluting motor boats, or consumptive marine activities aside from seasonal bird hunting. However, it has been in its use as a real estate commodity that the effects have been devastating. Attesting to this are the bulkhead blocking of feeder bluffs and driftways, obliteration of storm-tide berm buffers, and the conversion of marshy lagoons into sterile boat basins and fills, all challenging system integrity.

THE ACCRETION - SHOREFORM AS AN ECONOMIC RESOURCE

If it were generally realized that only about five percent of our total inland marine shores are Class I dry berm type associated with accretion shoreforms and their multi-purpose backshore environments — there would be few misgivings in classifying them as an endangered species, and assigning them highest heritage resource status. In the context of that reality, as well as any long-term economics, their burial under single family residential housing and bulkheads constitutes their most misapplied and self-defeating use on the part of developer, owner, and permit-issueing government alike. Structural intrusion of the upper foreshore and backshore-berm with the subsequent destruction of rare Class I type beaches has the following economic consequences:

A. LOSSES TO THE SHORE OWNER

1. First of all it removes the very beach environment that attracted ownership in the first place, and the beach is thus lost as an economic asset in terms of later resale values tied to recreational and esthetic amenities. Proliferation of such use along a single reach of beach subsequently reduces the "immediate setting" value of the lots in the shorescape, one over which neighboring beach owners could have exerted some control for their common gain.

2. Berm and foreshore occupancy and bulkheading downgrades neighboring property values, while seriously limiting adjacent shore use because of established bulkhead alignments. Irregular alignment and spotty bulkheading also create driftwood accumulation and erosion pockets of natural beach lots between bulkheads. This, in effect, commits remaining beach lots to certain design restrictions, and limits lot utilization.

3. Placing houses into the dynamic and shifting accretion zone of the shore-process corridor invites bulkhead defense works to protect an eventually untenable position. It changes the berm and driftwood beach-building action of storm waves to one of bulkhead battering and erosive undercutting, and thus makes an enemy of the constructive forces that produced and maintained this heritage environment. The consequences of such arbitrary and misplaced structural intrusions not only invite costly maintenance, but can lead to total losses under extreme coincident storm-tide "disaster" conditions. Housing placed on accretion shoreforms within medium to high wave-energy zones may be inundated by combined wave and storm-surge

water levels of eight feet or more above MHHW along open Puget Sound and Strait shorelands. Such locations on accretion beaches will, in the future, exact heavy insurance charges or refusals. Just as the X-year frequency river flood inundates the floodway and floodway fringe of its floodplain, so does the X-year frequency storm-surge tide inundate the berms and marshy backshores that constitute the storm-tide surgeplain.

B. LOSSES TO THE DEVELOPER

1. Row-housing over the backshore berm within a planned development not only removes the magnet that would increasingly attract future families to the vicinity of such a shoreform environment, but by its view-blocking presence and beach destruction drastically reduces future interest in, or purchase and resale value of, the adjacent and backup fringelands. Such effects are neither in the long-term interest of the buying public, the heritage viewing public, or the real estate industry.

2. the colonization of points, spits, and berm barriers places housing at the lowest watertable level in the county, locations where future secondary and tertiary treatment facilities will have major cost impacts on developer and lot owner alike.

3. While the initial siting of row-housing on an accretion shoreform would appear to be a low-cost and logical development plan that returns high profit margins on high-priced waterfront property, it is often a most short-sighted approach from a business standpoint if the limited number and size lots over the beach are equated to the unlimited number of lots that could be sold and re-sold at increasing profits as time further appreciates the values that the magnet of a natural shoreform environment in terms of view and accessibility offers the surrounding uplands. Most developers of waterfront properties today still pluck the goose that laid, and could continue to lay, the golden eggs.

C. LOSSES TO THE LOCAL PUBLIC

1. In view of the fact the beach berms of accretion shoreforms generally create an adjacent low-energy zone for lagoon, marsh, or estuarine environments, it is almost impossible to develop the berm backshore without loosing the dependent bio-habitat area — even if the latter remains untouched by dredging and filling. Only when such an integrated shoreland system is of large scale, exists there an option for multi-use resource management. The destruction of one resource to create another,

whether that be beach berm backshore, adjacent marsh habitat, or a lagoon and tidal bio-process system, such action represents a taking of heritage resources without compensation to the public. Functional components of the Shore-Process Corridor do not exist and operate along arbitrary geographic or property lines, but rather along long-established ecologic boundaries. If the boundaries between resource and real estate are not established in shorelands management, long-term, and often irreversible losses of finite resources become inevitable.

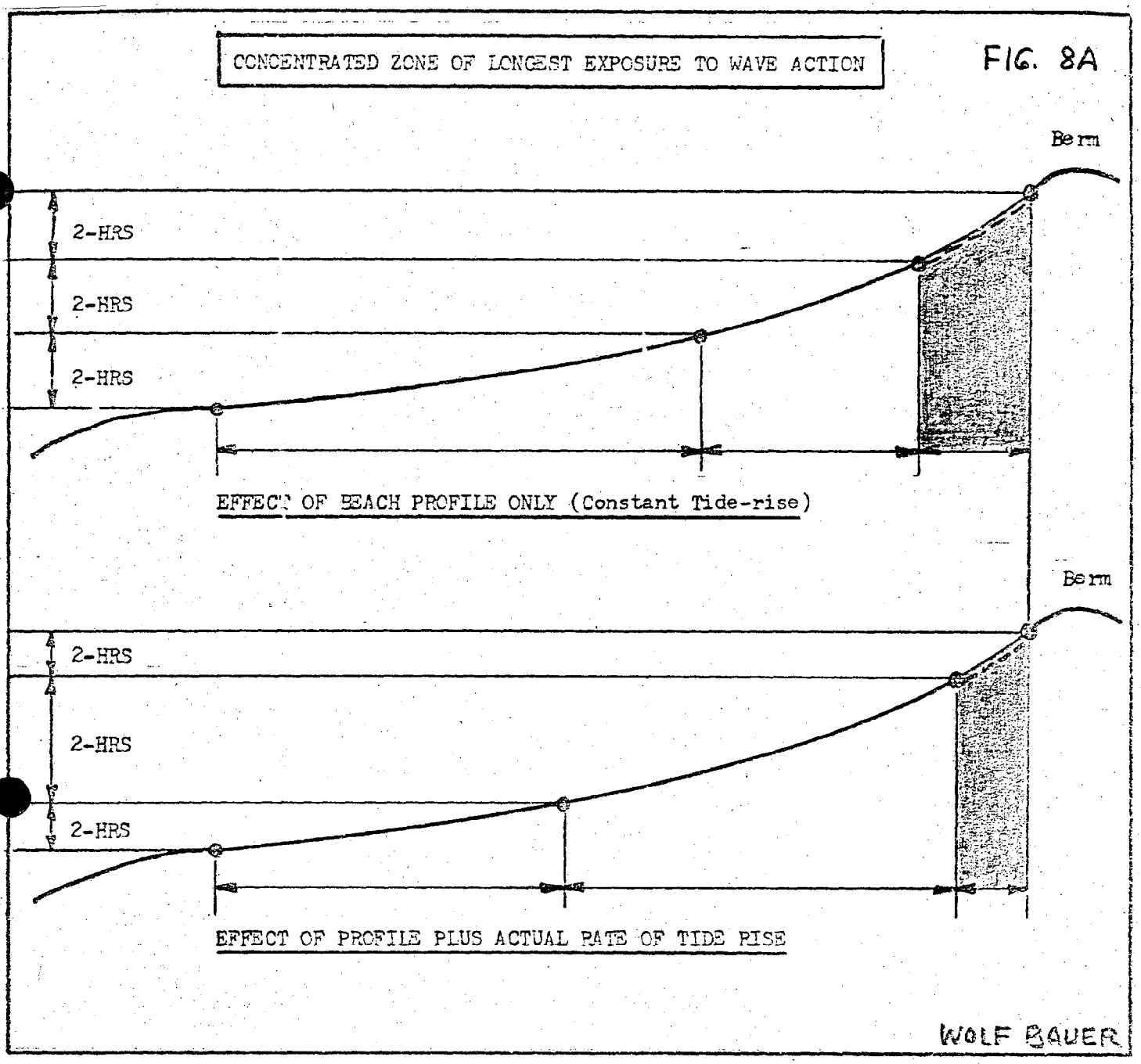
2. When accretion-beach housing burial removes the functional, recreational, and esthetic focus that such an original shoreform exerts on the surrounding lands, it also removes the potential tax base inherent in the local landscape. Not only that, but seldom are the costs of final services and utilities for such growth-restricted and limited housing sites justified. Documentary evidence continues to accumulate supporting the contention that preservation of such multi-purpose resource entities of open space through public aquisition can often be amortized through the resulting tax base increases on the surrounding lands.

POSITION PAPER 33-75
Wolf Bauer

CRITICAL PATH
OF THE
BULKHEADING SYNDROME

Man's structural intrusion into the geo-hydraulic zone of the Shore-Process Corridor has placed fixed and "dead" objects into a shifting and "live" environment, the inevitable outcome of which is their rejection by a dynamic system. In fighting this rejection, man has made the sea his enemy, rather than treating it as the friendly energy source of his seascape heritage. While the self-imposed defense of an untenable shore position may be man's property-right prerogative, it is hardly an absolute right when his actions and structures affect a longshore beach process system, and alters the erosion - transport - accretion status of adjacent shores within the local Drift Sector.

Bulkheaded structures projecting into the foreshore not only increase wave down-cutting of the foreshore shelf, but often act as groins that tend to interrupt longshore drift, leading to unbalancing geo-hydraulic effects along down-drift reaches. When bulkheads are placed at the toe of sea cliffs that act as feeder bluffs, beach maintenance and the very existence of shoreforms may be at stake. (Figure 8A Beach Profile vs. Major Wave Action Zone)



Berm - building is a vital process for the creation and maintenance of Class I beaches and accretion shoreforms. In studying the effects of decreasing water - rise rates during each final flooding cycle, when superimposed on increasing beach profile slopes as shown in the above diagram, it becomes apparent that most of the geo-hydraulic action takes place in the upper foreshore and lower backshore. Thus in terms of shoreline management in general, and of bulkheading in particular, it is important to realize that even a slight intrusion into the upper foreshore is of major beach-process significance, It should also become obvious that the mean-high-water - tideline as an arbitrary property line finds itself positioned in the middle of major geo-hydraulic action, and represents an unrealistic and improper boundary in terms of shore-resource management.

Beach shore property always abuts the public domain on the seaward side. What is more important and usually ignored, however, is the fact that those portions of waterfront lands which project into the Shore-Process Corridor are, and have always been, functional components of an integrated beach process system. Thus a part of such shorelands actually lies within a zone of instant geology and often dependent biology for which the shore owner must assume heritage responsibilities vis-a-vis his neighbors and the general public. Beach ownership thus also implies stewardship over established beach system processes in which concurrent erosion, transport, and accretion constitute the very essence of their historic resource functions and viability. The purchase of waterfront property does not buy the beach system anymore than it buys the waterway. It goes without saying that resource stewardship places certain development restrictions and/or structural setbacks upon that portion of real estate which is part of the beach-process zone. Development limitations under a policy of "shore-care", rather than one of "shore-use" that ends in beach burial, should invite equitable compensatory measures in the form of perpetual leases, tax credits, and other forms of remunerations from the public.

Whether bulkheading is in the best private and public interest or not, it continues to be one of the most misapplied, costly, and environmentally critical activities on Puget Sound shores.

It is the purpose of this position paper to discuss some of the shortcomings and problems associated with such shore "defense" measures with the hope of encouraging both technical and environmentally valid improvements over present practices and attitudes.

BULKHEAD TYPES AND FUNCTIONS Bulkheads, seawalls, and revetments may be divided into two broad categories, namely solid-walled vertical or sloped structures made of wood, steel, or concrete (boxed, cribbed, or piled), or structures and walls of various size rock or geometric shapes either dumped or laid in place, or mesh-enclosed. Marine shore bulkheads are generally meant to perform two functions, namely to act as a retaining wall for the back-up bank or fill area, or as a shore revetment to armor the shore against wave erosion and inundation. Such a structure must therefore be able to withstand both seaward movement or tipping from landward earth and hydrostatic pressures, as well as resist toe and/or side erosion and drift-log battering from high-water storm waves. It should be obvious that no one type of protective wall can perform all these functions with equal efficiency.

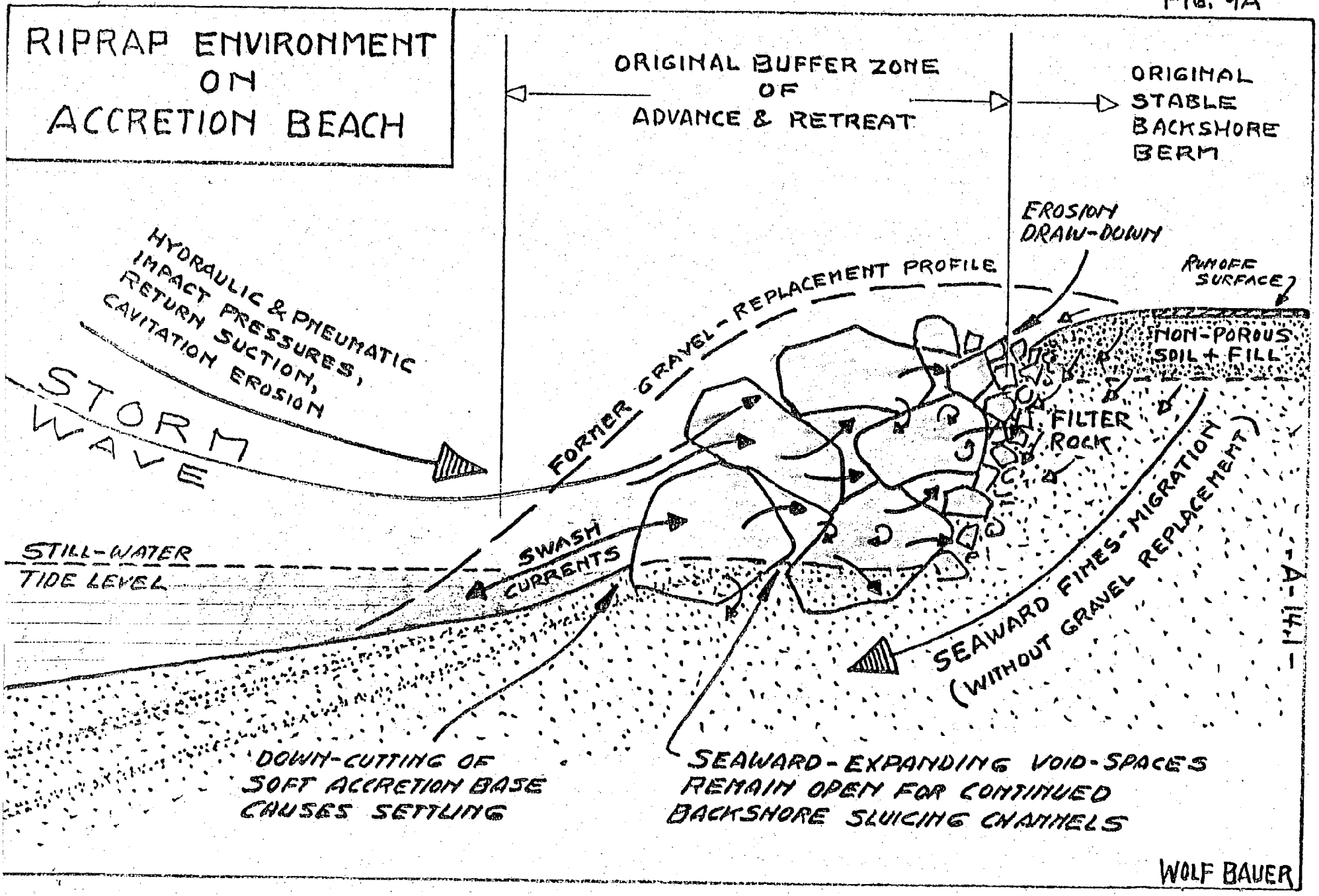
Aside from the need to maintain itself against these forces, the most common purpose of a marine-shore bulkhead is to serve as a

protective element for a backup structure or resource, such as a house, patio, parking area, road, park, etc. which intrudes and projects into the Shore-Process Corridor. The object to be protected may be located at, or near bulkhead top or storm-tide level, or at some level substantially higher than extreme high water. It may be located directly over, or at considerable distance back from the bulkhead face, distances and levels which, sad to say, often have little relationship to the boundary-range of storm wave inundation.

RIPRAP BULKHEADS AND REVETMENTS While multi-ton riprap rock is used extensively as an economic and efficient material for construction of free-standing seawalls and jetties, this material is now increasingly used for bulkheading of fills and as revetment against shore erosion — applications for which such rock has many disadvantages unless the installations are better designed than is generally the case. The advantage of using riprap lies not only in its lower in-place cost, but also in better resistence to driftlog impact, and the fact that it is more easily repaired after storm damage. These advantages, however, are not usually sufficient to outweigh some of its faults and shortcomings.

The larger the individual rock size, the larger become the void spaces that allow hydraulic material sluicing out of their backshores,

FIG. 9A


RIPRAP ENVIRONMENT ON ACCRETION BEACH
ORIGINAL BUFFER ZONE OF ADVANCE & RETREAT
ORIGINAL STABLE BACKSHORE BERM
EROSION DRAW-DOWN
RUNOFF SURFACE
HYDRAULIC & PNEUMATIC IMPACT PRESSURES, RETURN SUCTION, CAVITATION EROSION
STORM WAVE
FORMER GRAVEL-REPLACEMENT PROFILE
NON-POROUS SOIL + FILL
FILTER ROCK
STILL-WATER TIDE LEVEL
SWASH CURRENTS
SEAWARD FINES-MIGRATION (WITHOUT GRAVEL REPLACEMENT)
DOWN-CUTTING OF SOFT ACCRETION BASE CAUSES SETTLING
SEAWARD-EXPANDING VOID-SPACES REMAIN OPEN FOR CONTINUED BACKSHORE SLUICING CHANNELS
WOLF BAUER

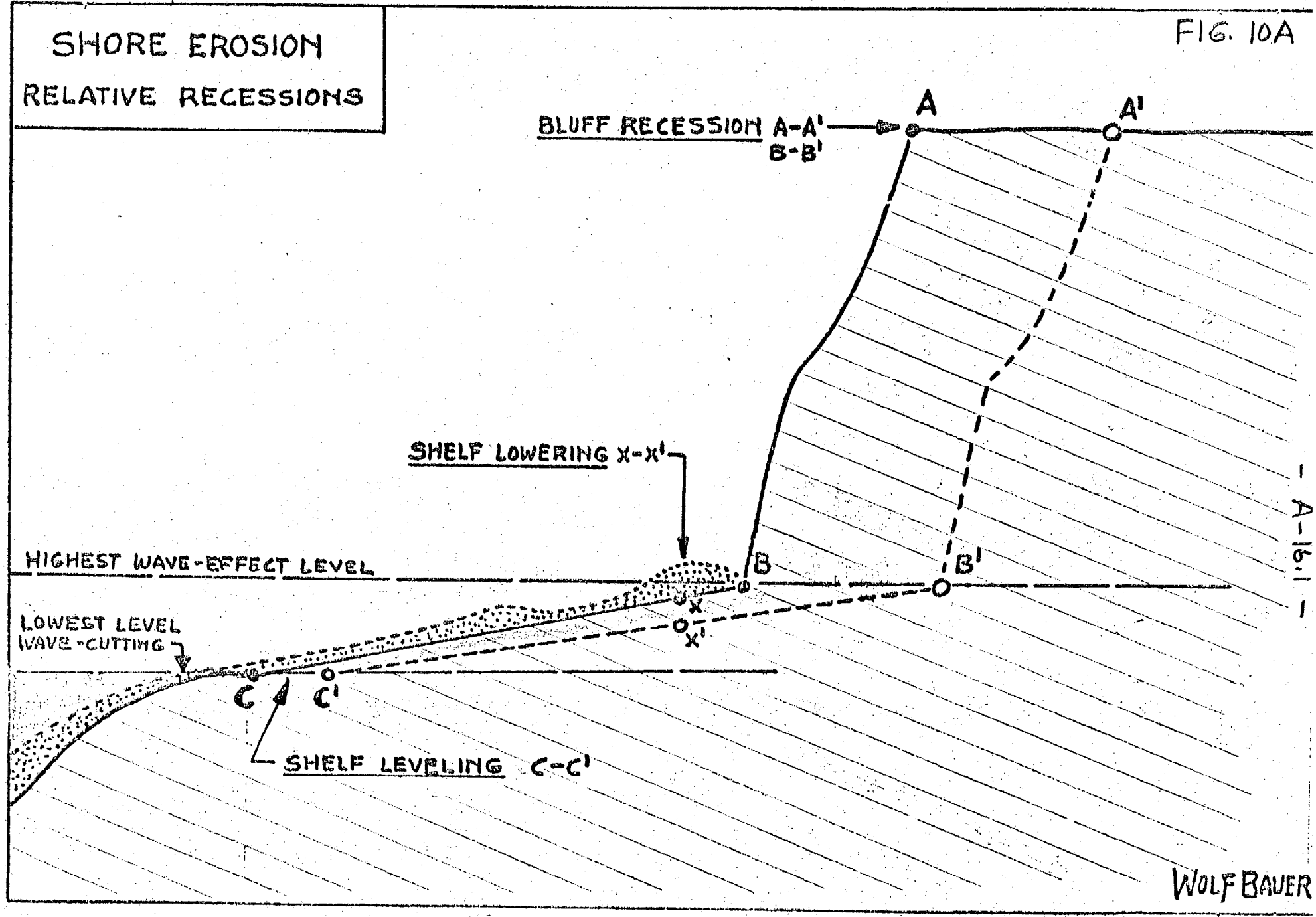
unless a broad belt of costly graded rock filter makes up their backfill. No matter how carefully such filter rock is selected and placed, however, the very nature of downward and seaward - expanding void spaces under wave-induced hydraulic pressure, suction, and cavitation of in-and-out surging currents will eventually pull all peripheral soils through the structure. Boulders too will be undercut at their bases, and tend to make them sink lower with time. The most negative feature of riprap, however, resides in the offending visual impact and environmental degradation of the shore resource. The use of such rock heaps, just as in the case of streambank revetments, has now mushroomed into a serious shore despoilage -- a syndrom that is lining our beautiful beach environments with ugly, incompatible borders and backdrops of rubble. (See Figure 9A)

GABION-TYPE BULKHEADS Gabions are wire basket (mesh) enclosed building blocks of rock aggregate somewhat of the size and shape of hay bales. Their use is beginning to be applied to marine shore defense works along our inland marine shores. While such artificial construction forms have a place in certain shore protection applications, they have inherent drawbacks under Puget Sound marine shore conditions. While their porosity and flexibility is tauted as a wave-impact advantage, they are not designed

with massive driftlog impact in mind, and their wire bonds can be, and are broken in high energy shore zones. Their so-called conforming flexibility does not eliminate foreshore undercutting, but makes gabion walls deform and move out of line rather easily—a critical weakness if they must also act as a backshore retaining wall. They represent an artificial intrusion of wire and rubble that likewise becomes an esthetic affront to our shore environments and beach experiences.

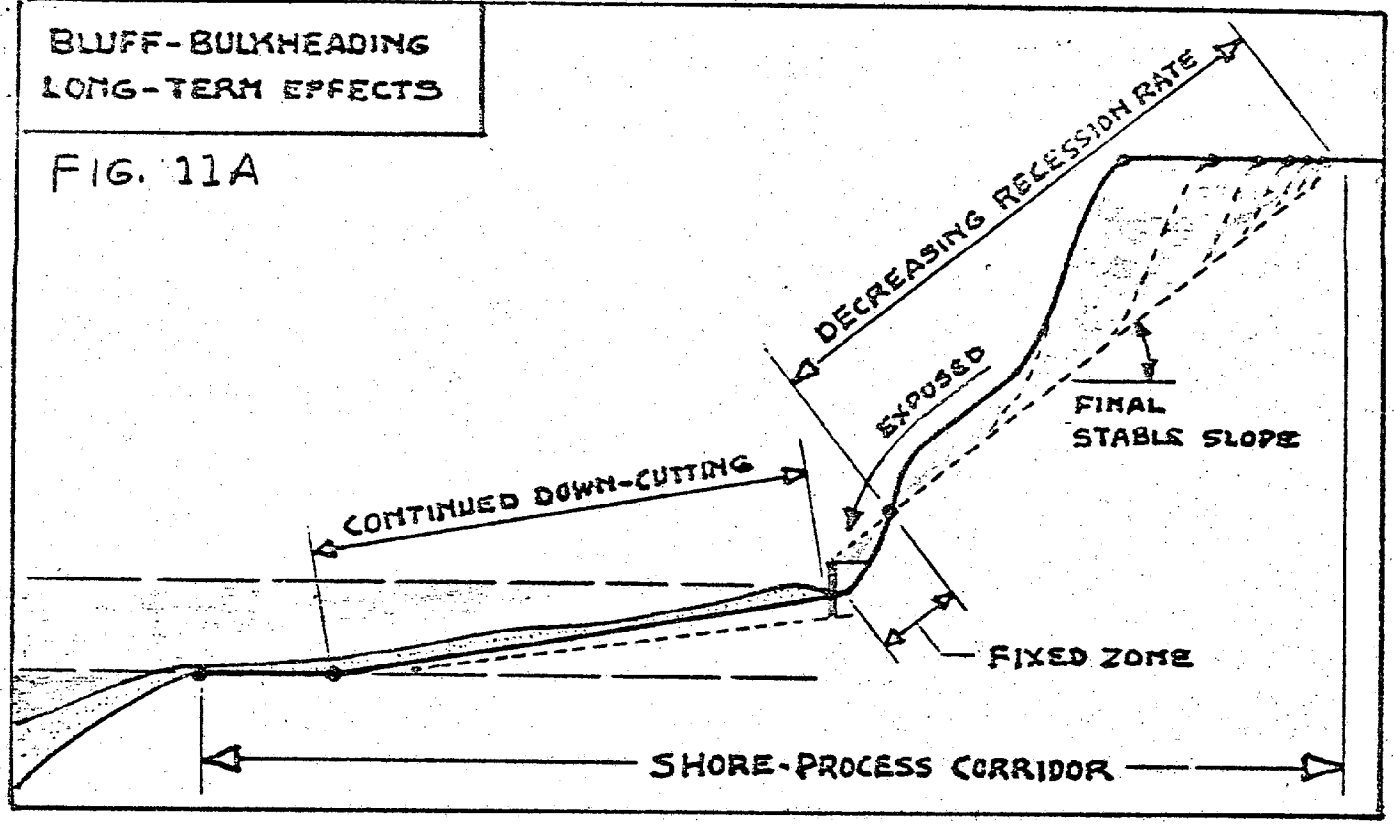
BULKHEADING ON EROSION SHORES Prevention of marine bank and bluff recession by protecting their toes from wave erosion is a short-term expedient at best. Since recessional bluffs usually front on either Class II or III erosion beaches, they are natural bulkheads in themselves, i.e. their toes are at, or below MHHW level on Class III shores, or just two or three feet above that level in back of Class II beaches.

Wave erosion operates as an undercutting mechanism against the bluff, as well as a downward scouring and abrading action over the upper foreshore (wave-cut shelf). Since the more or less soft and easily eroded glacial till of the bluff face continues to recede at the same pace as the undercutting, the bluff will seldom overhang the toe for very long, as it might if the cliff were solid rock. If, on the other hand, a concrete bulkhead is erected against the toe of a


SHORE EROSION
RELATIVE RECESSIONS
FIG. 10A
BLUFF RECESSION A-A'
B-B'
A
A'
SHELF LOWERING X-X'
HIGHEST WAVE-EFFECT LEVEL
B
B'
X
X'
LOWEST LEVEL
WAVE-CUTTING
C
C'
SHELF LEVELING C-C'
A-16-1
WOLF BAUER

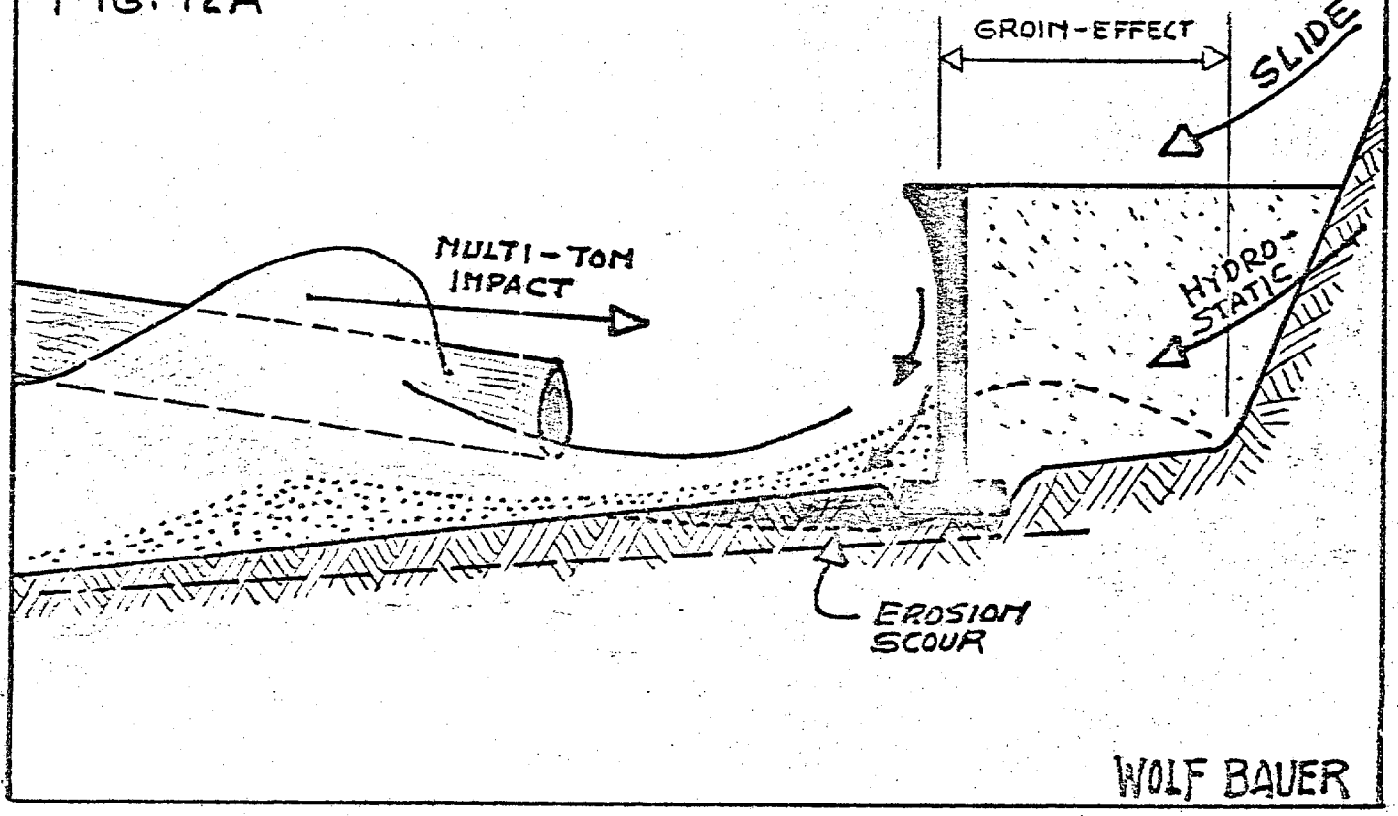
BLUFF-BULKHEADING
LONG-TERM EFFECTS

FIG. 11A



BULKHEAD - ENVIRONMENT
ON EROSION BEACH

FIG. 12A



bluff, and with its base cut into the solid foreshore shelf, toe recession will be momentarily halted, while scouring and downcutting of the foreshore shelf continues and accelerates in front of the structure. (See Figures 11A and 12A) Such erosion is not only due to loss of, and thinning of cushioning beach cover of sand and gravel normally piled against the bluff toe, but the steep face of the seawall turns the breaker swash into a near-vertical, high-velocity scouring current. Such action finally undercuts the bulkhead base with resulting seaward tipping or structural collapse.

In high energy beach zones, driftlog battering often damages the bulkhead before undercutting succeeds, depending on the hardness of the foreshore shelf, or the depth of drift cover protecting it. If the bulkhead is not aligned with adjacent ones, or projects by itself into the foreshore, then side erosion and cavitation by refracted corner waves further hasten its instability and destruction.

In terms of so-called bluff protection, solid and riprap type bulkheads and revetments placed against the toes of such cliffs cannot, and do not stop recession of their upper faces and rims. Only when such an embankment has been contoured to a slope that is flatter than its angle-of-repose, or the local slippage plane, will toe bulkheading have a direct bearing on further high bluff recession. Such artificial slope alterations are seldom possible. The usual

revetment of a six to twelve foot high bulkhead at the bottom of a fifty or two-hundred foot cliff has little effect on upper face erosion, nor on any sluffing and sporadic slide tendencies. Most active feeder bluffs in the Puget Sound Basin have steep, unstable, critical-slope faces that would continue recession to a flatter and more stable profile irrespective of retaining walls or complete elimination of bottom wave impacts. Not only are such attempts at recession control futile, they impact negatively on the functional integrity of their Drift-Sector system, and hence on other private holdings and the public domain.

BULKHEADING ON ACCRETION BEACHES The technical problems connected with storm-wave protection along Class I berm beaches are somewhat different from those relating to Class II and III erosion shores discussed previously. Here the foreshore is not usually a wave-cut shelf of in-situ glacial material that has been compacted by ice pressure and/or clay bonding, but rather one which forms a water-saturated and unconsolidated base of loose and deep sand and gravel. While the intertidal wave-cut foreshore shelves of bluff beaches are invariably flat-sloped and more or less fixed at either a Class II or Class III profile elevation, the foreshore of accretion beaches may be either flat or steep, and may show considerable elevation changes after each storm. Such changes may occur within various cycles ranging from weekly to

seasonal, and to multi-year intervals. Thus the placement of any type of fixed-location bulkhead structure into such an ever-shifting geo-hydraulic environment adds many variables and problems.

Shoreforms accreted out into or alongside deeper waters often have steep foreshore profiles that allow storm-tide breakers to impact their backshores with greater force than is the case on beaches with shallow wave-breaking foreshores. Frequent profile changes expose berm-located bulkheads to varying levels and points of attack. Undercutting of the soft base is much more of a problem here, and even with box design, spread-footing concrete bulkheads — sub-base liquefaction, sand mobility, and rapid downcutting causes settling, tipping, and sometimes complete overturning.

The final effect of building upon a berm foreshore and backshore is that of changing a Class I accretion beach into a Class II or III erosion beach, while burying a rare resource. There is simply no technically efficient high storm-tide defense measure that will not also be detrimental to the existing geo-hydraulic and bio-habitat environments of an accretion shoreform and its beach. Only when geographic scale is such as to allow sufficient setback of housing, roads, or other structures without encroachment on the associated backshore marsh or lagoon habitat may realistic and workable boundaries between resource and real estate be established and honored.

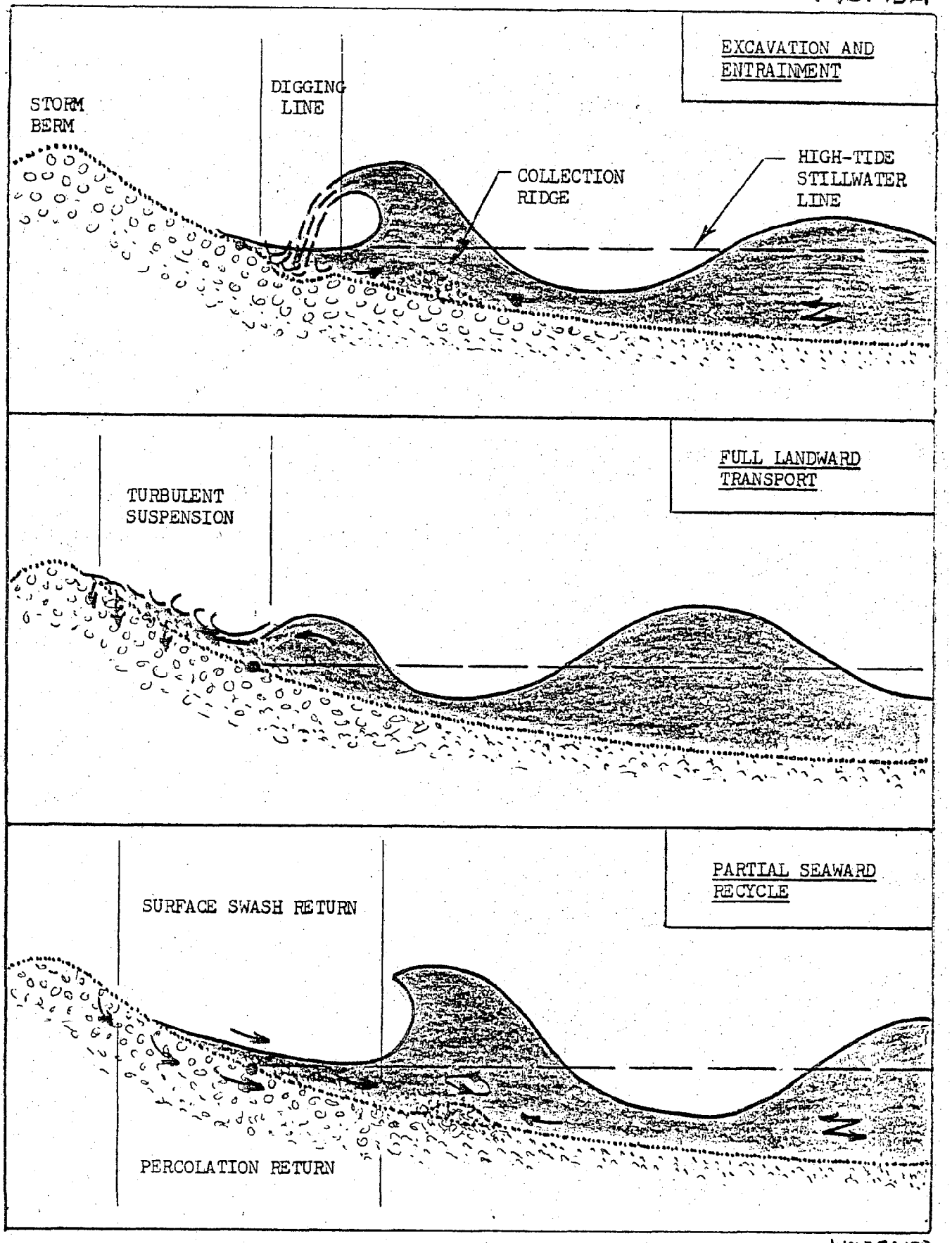
BEACH ENHANCEMENT VERSUS DEFENSE

Unlike the well-studied and documented geo-hydraulic and geo-pneumatic interactions of beach sands with high-energy waves and winds along the open ocean coastline, the lower level wave dynamics impacting gravel-type shore materials along our inland marine waters create some markedly different shore-process systems and environments. A basic difference arises from the fact that the source of beach cover material in the Puget Sound Basin and Straits is of relatively recent origin, i.e. thousands rather than millions of years. Such material is constantly being derived from coarse-grained glacial debris where beaches tend to live, so to speak, from hand-to-mouth along the wind-operated transport gradient of each Drift-Sector, and where variations in the material budget often have early shore-process repercussions. The finer grained beach sands of the open coast, on the other hand, derive from both river silts and ancient dunes and sediments that have accumulated as vast fore and nearshore sand reservoirs that are constantly being recycled by wind and waves with a massive flywheel-balance effect. The frequent and sizeable geo-pneumatic action that creates foredune and deflation plain environments in many parts of the coast is largely missing in the inland shorescape, where the formation of accretion shoreforms is primarily controlled by breaker swash currents working on gravel-size material. Not only are the swash currents of ocean breakers deeper and of longer duration (wave length), but the interstices

DYNAMIC SHORE SYSTEM

(VERTICAL TRANSPORT COMPONENTS)

FIG. 13A



WOLF BAUER

of ocean-beach sandgrains present much greater friction to swash percolation. This results in relatively stronger and more erosive back-swash currents than is the case in gravel beach cover. Depending on the ratio of sand-to-gravel, or range of gravel size — high-tide shore waves may erode and lower the profile of a sand berm beach as the surface current of the return swash pulls the sand seaward, while much of this current is lost by percolation through porous gravel. Thus under similar storm conditions, a sand-berm beach may be eroded, while a gravel-berm beach may be accreted. (See Figure 13A)

The writer's study of hundreds of Puget Sound accretion shoreforms has shown that stable, seldom-breached beach berms are created and maintained when updrift feeder bluffs contain sufficient gravel of those sizes which the local peak-wave action can just barely classify and move in a net-drift direction along the beach. Whenever such maximum gravel-size fractions are missing, or where the proportion of smaller sizes and sand is too great for proper wave classification, accretion shoreforms and their berm spines are unstable, frequently breached, and subject to erratic cycles of erosion and accretion. It should be obvious that these same unbalancing conditions are often induced in naturally stable accretion systems by updrift blockage of material supply, as by feeder bluff revetments, foreshore bulkheading and groining, or the dissection of a Drift-Sector system by boat channels and jetties.

The characteristics of a storm-resistant accretion berm are usually those of a porous ridge of loosely-held gravel that can absorb considerable overtopping swash by percolation, as well as a berm that is broad enough to allow some momentary (less than four hours) peak-storm erosion to occur along its high tide edge without being breached (erosion - accretion buffer zone). Any fixed structures or non-porous surfaces and fills will act to reduce these features of coarse-gravel mobility, porosity, and berm width, and will impair the inherent geo-hydraulic performance of such a berm. Such impairment usually precipitates subsequent defense measures that further destroy nature's self-maintaining storm buffer.

Gravel berm-building action under moderate high wave conditions presents us with a valuable example of an ideal wave-impact barrier that operates as a porous and flexible dike or seawall bulkhead. Such a storm berm not only dissipates wave energy by void-space diffusion of water, but by dampening wave and driftlog impacts within a resilient barrier that can absorb work energy through its flexible mass.

"BERMHEADS" VERSUS BULKHEADS The writer's experience has shown that one of the potentially happy solutions to certain beach erosion problems in Puget Sound rests in the fact that we can go nature one better by supplying certain

gravel-starved erosional Class II and Class III beaches with specially-sized berm-building gravel that will not only reduce the rate of erosion, but will in addition produce a natural type backshore berm to serve as a recreational dry Class I driftwood beach of which there is a great scarcity. (Only about 5% of all our inland marine shores) In view of the fact that Puget Sound shorelands contain millions of tons of gravel, such building beach-cover material is everywhere available. It is therefore technically and economically feasible to reduce the need for that type of bulkheading which has, up to now, only served to downgrade so much of this shore resource heritage.

Many years of observing and documenting the sorry sight and consistent failures of innumerable marine bulkhead installations under all kinds of conditions has convinced the writer that properly designed and placed gravel berms could replace, in many instances, expensive wooden, steel, or concrete defense works. Such natural Bermheads would not only provide erosion protection for the backup shoreland, but would also reduce down-cutting of foreshores on erosional beaches, while significantly lowering first cost and maintenance. Perhaps the greatest benefits, however, will result through esthetic appeal by replacing an artificial, alien structure, with a shore-compatible environment that quickly becomes "naturalized" with driftwood and backshore flora. Such "bermheads" may become narrow Class I beaches, where they either beef up or restore an original

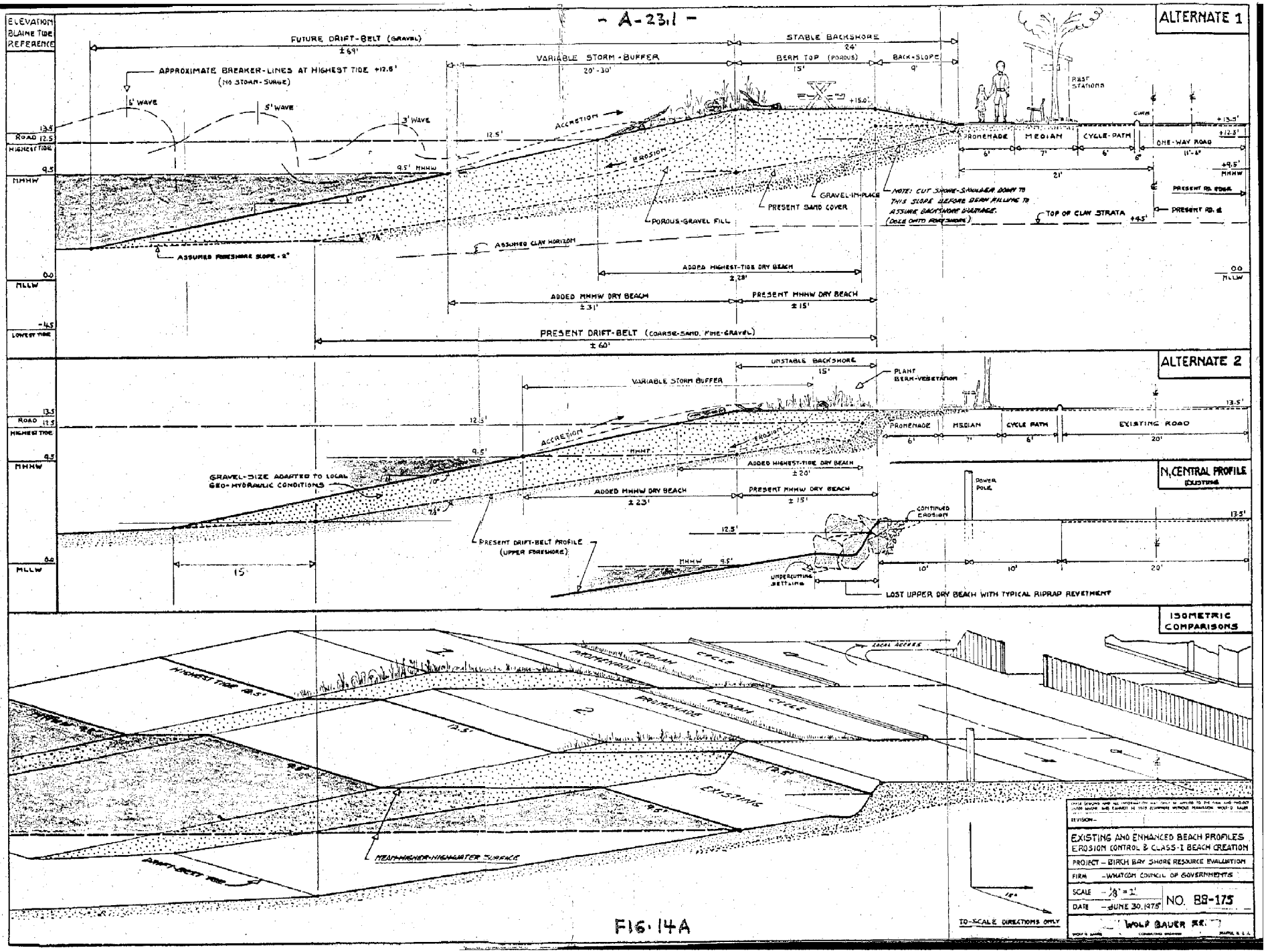

ELEVATION BLAINE TIDE REFERENCE
ALTERNATE 1
FUTURE DRIFT-BELT (GRAVEL)
±69'
STABLE BACKSHORE
24'
VARIABLE STORM-BUFFER
20'-30'
BERM TOP (POROUS)
15'
BACK-SLOPE
9'
APPROXIMATE BREAKER-LINES AT HIGHEST TIDE +12.6'
(NO STORM-SURGE)
1' WAVE
5' WAVE
3' WAVE
ACCRETION
EROSION
+15.0'
REST STATIONS
PROMENADE
MEDIAN
CYCLE-PATH
ONE-WAY ROAD
+13.5'
+12.5'
+9.5' MHHW
PRESENT RD. EDGE
PRESENT RD. ℄
TOP OF CLAY STRATA +4.5'
GRAVEL-IN-PLACE
PRESENT SAND COVER
POROUS-GRAVEL FILL
NOTE: CUT SHORE-SHOULDER DOWN TO THIS SLOPE BEFORE BEAM RAILING TO ASSURE BACKSHORE DRAINAGE. (DOES ONTO FORESHORE)
ASSUMED CLAY HORIZON
ASSUMED FORESHORE SLOPE - 2°
ADDED HIGHEST-TIDE DRY BEACH
±28'
ADDED MHHW DRY BEACH
±31'
PRESENT MHHW DRY BEACH
±15'
PRESENT DRIFT-BELT (COARSE-SAND, FINE-GRAVEL)
±60'
13.5
ROAD 12.5
HIGHEST TIDE
9.5
MHHW
0.0
MLLW
-4.5
LOWEST TIDE
ALTERNATE 2
UNSTABLE BACKSHORE
15'
VARIABLE STORM BUFFER
PLANT BERM-VEGETATION
PROMENADE
MEDIAN
CYCLE PATH
EXISTING ROAD
6'
7'
6'
20'
GRAVEL-SIZE ADAPTED TO LOCAL GEO-HYDRAULIC CONDITIONS
ADDED HIGHEST-TIDE DRY BEACH
±20'
ADDED MHHW DRY BEACH
±23'
PRESENT MHHW DRY BEACH
±15'
N. CENTRAL PROFILE
EXISTING
POWER POLE
CONTINUED EROSION
PRESENT DRIFT-BELT PROFILE (UPPER FORESHORE)
UNDERCUTTING SETTLING
LOST UPPER DRY BEACH WITH TYPICAL RIPRAP REVETMENT
15'
10'
20'
ISOMETRIC COMPARISONS
HIGHEST TIDE 9.5'
MEAN HIGHER-HIGH WATER SURFACE
AMPLITUDE
EXISTING
LOCAL ACCESS
TO-SCALE DIRECTIONS ONLY
REVISION -
EXISTING AND ENHANCED BEACH PROFILES
EROSION CONTROL & CLASS-I BEACH CREATION
PROJECT - BIRCH BAY SHORE RESOURCE EVALUATION
FIRM - WHATCOM COUNCIL OF GOVERNMENTS
SCALE - 1/8" = 1'
NO. 88-175
DATE - JUNE 30, 1975
WOLF BAUER ASSOC.

FIG. 14A

accretion beach, or create a dry backshore where none existed before. Whether such bermheads can be placed seaward of existing and failing bulkheads, or must replace them, depends on the latters' projection into the foreshore, or their position in the tidal horizon. It also hinges on the local wave-energy level, location within the Drift-Sector system, shore orientation, and convex or concave shoreline curvature in terms of prevailing wave angle, groining requirements, foreshore width and slope, beach cover depth and supply, and finally whether the foreshore represents an in-situ shelf or accretion base.

Gravel-type flexible bermheads, as a technically and environmentally acceptable shore defense measure, cannot replace single, and individually projecting bulkheads for the same reason that isolated bulkheads are already failure-programmed, and often interfere with their driftway operation. Thus the application of bermhead placement amounts to a gradual high-tide shore re-alignment over a minimum reach — a project that entails, in most instances, the cooperative effort of shore owners to each side. The design and placement of a protective bermhead beach does not represent beach feeding, nor the simple dumping of gravel to buffer existing structures. Rather it involves a seaward realignment of the active upper driftbelt at the expense of some middle foreshore space. This is most difficult along a beach oriented as an active driftway, and may even call for submerged groining with oversize cobble-type berm-core material in conjunction with gravel sizing for minimum storm-wave movement. In all cases it must preserve the existing longshore drift operation.

The writer is reluctant to advocate such beach enhancement programs as a universal approach until at least the major remaining unimpaired accretion shoreforms and their Class I beaches have been secured and protected as an endangered species. There are, nevertheless, overriding circumstances, at times, where the unhappy combination of people concentration and wet, erosional Class III beaches create a frustrating shore situation that begs correction in the public interest. (An example of such a dilemma exists along the east shore of Puget Sound between Tacoma and Everett where more than 99% of the shoreline is without backshore at high tides — precisely where also the highest people pressure in the State impacts on a marine shore.)

ENVIRONMENTAL IMPACTS The creation and superposition of a backshore upon any foreshore is, of course, an intrusion into the Shore Process Corridor. It is, in fact, a consumptive use of the foreshore resource, and should be justified only when a proper scale - ratio maintains surrounding eco-system viability. Such an intrusion, first of all, shifts the high tideline seaward, while it buries all or part of the upper foreshore, along with any established inter-tidal benthic flora and fauna. Such negative impacts need to be considered, minimized, or eliminated. They must in all cases be balanced against a justification based on highest public benefits in any one situation.

While a narrow bermhead protective or recreational dry berm beach would occupy primarily the upper foreshore of minimum benthic

importance, there may also be times where the burial loss of several thousands of clams, representing a single recreational resource, must be weighed against additional thousands of people-visits in which a dry high-tide beach fills the needs for many additional resource opportunities denied by a wet erosional shore.

The expression "tampering with nature" needs to be applied within the realistic context of a constantly unbalanced nature trying to balance itself along a high-to-low energy gradient. A natural cyclic system may be enhanced by applying corrective cycles to improve the natural environment. Such improvements may be affected by the addition of scarce or missing components to an inferior or weak natural system. Whatever the artificial, or artificially-induced enhancement process — it is not so much the means, as it is the end-effect and desired results that count. With this brief introduction to a relatively new approach to the problems of natural and intruded shores, let us now evaluate its applicability to the local shore environments.

Element 6

Element 6 - LAND USE STUDY

Introduction

The Shoreline Management Act has been in effect about six years, the City of Seattle processed its first application and granted a permit in the fall of 1971. How has the permit system worked? What, if any, have been the visible and use activity effects of this form of land/water use management?

The purpose of this project was to begin to answer these and other questions, to establish the base for annual measurement of use and activity changes occurring on our shorelines, and to determine with as much precision as possible how Seattle shorelines are actually used, so that the effects of the Act and the Program can be evaluated. In addition, knowing in precise detail what activities take place on Seattle shorelines provides a base against which to compare the permit data (also automated as another project under this CZM grant), as another evaluative measure.

These evaluations may then supply the factual basis for amendment of the Seattle Shoreline Master Program.

Methodology

All uses within the shoreline district were documented, except single-family residential units on land, including apartment houses and house boats.

Four sources of land use data were used, two of them available from City records: the License and Consumer Affairs Department records and Fire Department records. The other sources used as cross checks were the Polk and reverse directories. City Light or Water Department records which might have been used were not readily available. None of the four sources were completely accurate. However, extensive telephone checks with occupants improved the level of accuracy, so that we have a confidence level above 95 percent for the specific land/water uses at any given address, age of structure, water dependency and related factors.

The information has been geocoded, so that it can be mapped or can be analyzed by location such as Lake Union or the Duwamish Harbor Island industrial area, for example. Following is a list of the data obtained:

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Introduction

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The information has been geocoded, so that it can be mapped or can be analyzed by location such as Lake Union or the Duwamish Harbor Island industrial area, for example. Following is a list of the data obtained:

List of Land Use Data Items

1. Name of firm
2. Address
3. Telephone number
4. Kroll Map number
5. Principal activity
6. Multiple uses
7. Auxiliary activities
8. Number of stories
9. Age of structure
10. Moorage berths, if any
11. Zoning
12. Shoreline environment
13. Access to shoreline
14. Water dependency

In addition, there is space to add building and site area as well as shoreline length figures and Assessor's data when that becomes available.

Land Use Categories

Uniqueness is not unique to the shoreline district: at least one-third of the 300 odd use categories are for one-of-a-kind establishments. As might be expected, the range of uses is very wide and includes, among many others, a mattress factory, a quilting company, a brass foundry, a fly-wheel welder, a marine sanitation company, a funeral home, an employment counselor, a library consulting service, and an auctioneer.

The largest number of any use is multiple-residential structures with 103. The next largest number is boat sales with 73. Next come marinas with 72; restaurants, 45; distributors, 38; marine freight, 36; accounting services, 36; small boat building, 27; and architects, 24.

Insurance firms accounted for 18; engineers (all types) number 16; real estate and investment services combined, 33; graphic art and design services, 21.

There are 13 beauty shops (and three barbers); 11 management services; 16 general contractors; and 14 specialty gift shops, not counting many boutiques and other retail establishments.

Of the 10 units or more group, most were structures of 20 units or less. A small group, (8), were in the 50-100 unit range, and three had more than 100 units. Madison Park had the greatest density and largest number of multiple units (1,101). Of the two largest structures, one has 232 and one has 304 units; both are at Madison Park. Leschi had 324 multiple units, West Seattle 462, and the Shilshole area about 200, 156 of which are in one condominium.

Age of Structures

The data are not complete at this time, but cover about two-thirds of the entries. Of those which have a date, the distribution follows:

Date of Construction	Buildings	
	Number	Percent
1881 through 1919 (40 years)	73	12.3
1920 through 1929	66	10.6
1930 through 1939	94	15.2
1940 through 1949	71	11.5
1950 through 1959	108	17.5
1970 through 1969	151	24.6
1970 through 1976	51	8.3
Total	617	100.0

The dates in the listout show certain peaks. For example, in the first group, three buildings were constructed before 1900; five from 1900-1909 and 65 between 1910-1919. This compares very favorably with construction dates for subsequent decades, considering that many have been demolished to make way for newer buildings.

The dates 1910, 1920 and especially 1930 occur frequently in the listout of construction dates. This rounding out may be due to a tendency to date a building to the nearest decade. 1910 and 1920, however, were both in a series of boom years. For Seattle, 1930 was the last year of high construction before the depression took hold, and most of the construction done in the 1940's was done in the last half of the decade, following World War II. The low number of structures for the 40 year period prior to 1910 is due to several factors; fewer buildings were constructed prior to 1900 and, of course, few of those remain in use after 80 to 90 years.

At the other end of the scale, if the 70's are averaged to a full decade, the total would be only 102; only 2/3 of the 1960's, the peak period.

Permits Received by Type of Applicant

Partly as a way of measuring whether the permit system is increasing public access to the shoreline and partly to define the clientele, permits were analyzed by type of applicant.

About one-fourth (24.7%) of all permits went to public agencies over the five-year period. The Port, with 23 permits, had 5.8%; Parks, 4.8%; other City agencies (mostly Engineering) 6.5%; and DNR, 2.8%. The remaining 4.8% are scattered amont Metro, the State Highway Department, two universities, and the Corps of Engineers.

Of private applicants, organizations account for 1.5% and single family residents, 13%. Thus, three-fifths (60.8%) of all shoreline permits were issued to provide individuals and corporations for commercial, manufacturing, or other industrial uses.

On the basis of the figures above and the permit data, the permit system in and of itself does not necessarily encourage any increase in public access to the shorelines on either public or private properties. The time series does show an increase in Parks permits from one in 1971 to 7 in 1976, but these are a small part of the total.

Mapped Land Use Data

All data map shows all establishments studied and sets the pattern of non-single family use for the city.

Access

As for permit data, selected land use data items were mapped, generally relating to access and other shoreline goals. Maps show commercial and industrial uses which have direct shoreline access, and those which are on upland lots. The printout data as well as the maps show that a substantial humber of establishments do not have direct access to the shoreline, but that access could be provided at most points along the non-residential shoreline, all other things being equal.

Access is defined as being located on a property with water frontage.

Residential

As noted in description of the data, multi-family residential units and houseboats are mixed in with other uses in several areas; single-family residential units were not counted. These multi-residential uses are also mapped. A high degree of clustering is apparent. When houseboats alone are mapped at large scale, they also exhibit strong clustering.

Boat Building and Repair, Marinas and Boat Sales

Again, the findings are not surprising. These activities are all closely related in location and most are located on the Canal or Lake Union. The strong relationship between these activities is an indication of their interdependence.

Conclusions from Land Use Data

The land use data indicate that a minority of shoreline uses are water dependent, and it suggests that if reserving shorelines for water dependent uses is a City goal, encouragement other than a shoreline use permit system is needed.

If water dependence is defined in a strict sense, only about 20% of all establishments located on the shoreline are actually water dependent. Adding houseboats brings up the percentage to about 40%, still less than half.

The Duwamish River from Kellogg Island south has a variety of specialty industrial uses which service other industries. Virtually none are water dependent although the primary uses which they serve may be.

The land use data also reveal the very wide range of uses on the Seattle shorelines, although without being able to assign frontage to each separate use, it is difficult to evaluate the significance of many of the 100-odd unique uses. However, where there are more than half a dozen establishments with the same use, the fact that their space requirements tend to be similar makes comparisons more meaningful. Thus, the aggregate total of all boating-oriented uses provides a measure of the importance of pleasure boating as a land use activity on the shorelines, as well as its economic significance. In the same way, the very high number of business and professional services establishments also is significant. The age of structures tells a good deal about existing building stock; if this could be related to building permit data for earlier years, an even better understanding of the nature of shoreline development and potential redevelopment could be gained.

Clustering of similar uses, which occurs in several areas, tells us that these activities have certain specific locational requirements not met by other sites and which can be deduced from analyzing the site characteristics. Thus, any new establishment of the same type will also have the same locational requirements. This information strengthens not only our understanding of interrelated activities, but can be used in future shoreline land use planning.

CZM 306

SHORELINE LAND USE STUDY - 1977

METHODOLOGY

by

John B. Crull

This project was funded in part by a Coastal Zone Management Contract from the Office of Coastal Zone Management through the Washington State Department of Ecology.

METHODOLOGY

OUTLINE OF ELEMENTS AND PROCEDURES

A) Development of data source requirements

B) Investigation and review of possible data sources

C) Selection of six primary and seven secondary sources.

1) Primary Sources

a) Business License Applications
b) Fire Department Building Inspection CArds
c) Polk Directory
d) Reverse Directory
e) Kroll Zoning Maps
f) Shoreline Maps

2) Secondary Sources

a) Seattle Park Department
b) Seattle Engineering Department
c) U.S. Coast Guard
d) U.S. Navy
e) U.S. Army Corps of Engineers
f) Metro
g) Port of Seattle

D) Development of Land Use Classification Code

1) Survey of Existing Codes

a) Standard Industrial Code (SIC)
b) Standard Land Use Classification Code (SLUC)
c) Classification of Land Use (SCAG)
d) Kitsap Co. Land Use Code
e) U.S.G.S. Land Use and Land Cover Classification Code
f) Two-Digit Classification Code for Area-Coextensive Surface Accounting in the Puget Sound Region
g) Seattle Building Department Real Property Inventory and Improved Property Report

2) Seattle Shoreline Classification of Land Use

a) Activity Codes
b) Summary of Land Use Classification System
c)

E) Design of Computor Card Column Entries

F) Design of Data Collection Form

G) Determination of Street Segments and address ranges to be included in study.

H) Collection of LIcense Department Data

1) Secure permission
2) Collection of B & L numbers
3) Recording of data

I) Collection of Fire Department Data

1) Secure permission
2) Schedule station visits
3) Collect and record data

J) Collection of Kroll and Shoreline map data

K) Collection of Polk and Reverse Director Data

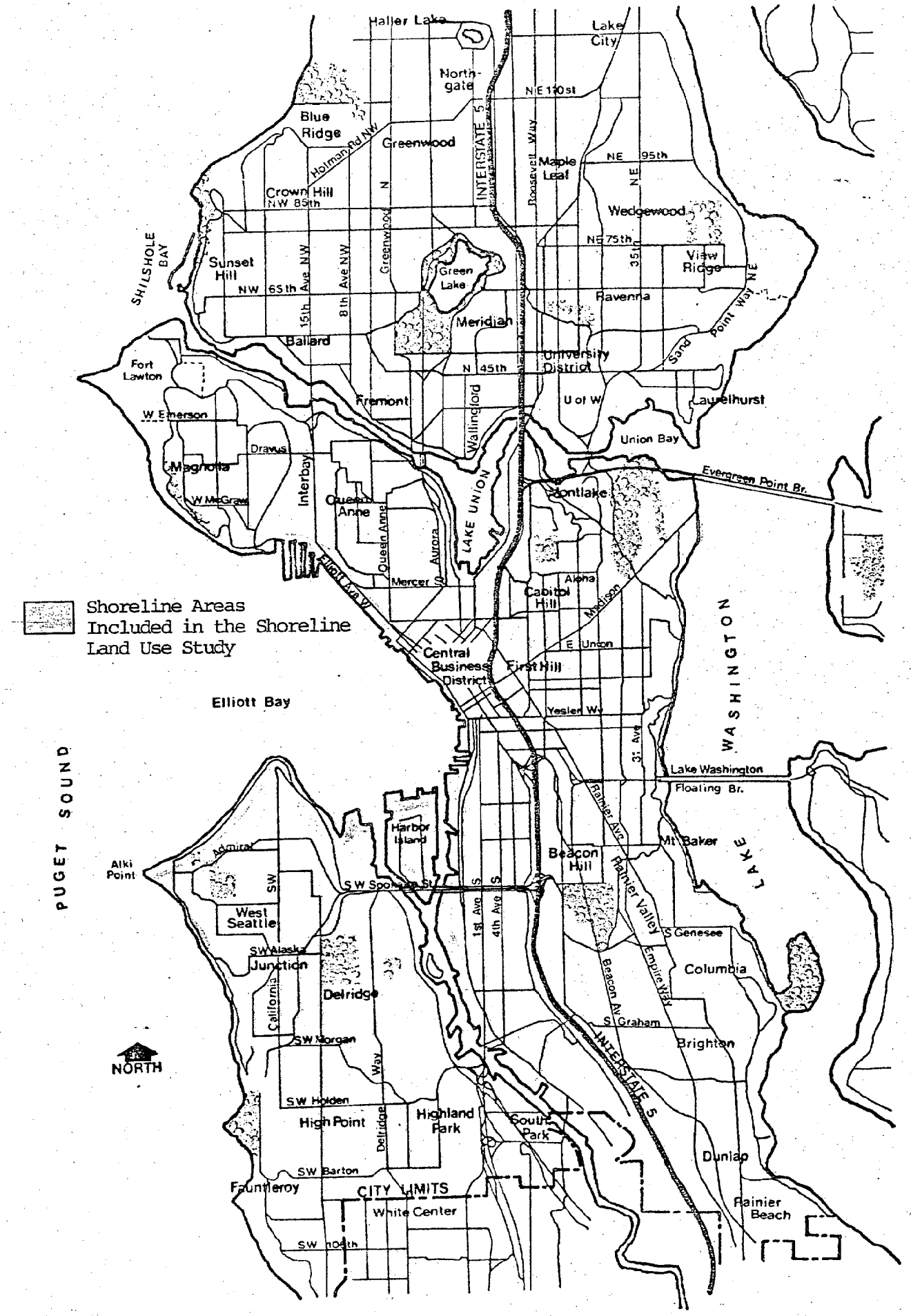
L) Data Weaknesses

M) Assignment of Identification Numbers

N) Data Processing

O) Updating of the Data File

1) Updating problems


Shoreline Areas
Included in the Shoreline
Land Use Study
Haller Lake
Lake City
Northgate
NE 110st
Blue Ridge
Holman Rd NW
Greenwood
Crown Hill
NW 85th
INTERSTATE 5
Roosevelt Way
Maple Leaf
NE 95th
Wedgewood
NE 75th
View Ridge
Sand Point Way NE
SHILSHOLE BAY
Sunset Hill
NW 65th
15th Ave NW
8th Ave NW
Greenwood N
Green Lake
Ravenna
35th NE
Meridian
Ballard
Fort Lawton
N 45th
University District
Fremont
U of W
Laurelhurst
W Emerson
Wallingford
Union Bay
Dravus
Magnolia
Interbay
W McGraw
Queen Anne
Aurora
LAKE UNION
Montlake
Evergreen Point Br.
Elliott Way W
Mercer
Alpha
Capitol Hill
Madison
E Union
Central Business District
First Hill
Elliott Bay
Yesler Wy
WASHINGTON
3rd Ave
Lake Washington
Floating Br.
PUGET SOUND
Harbor Island
Rainier Ave
Mt Baker
Alki Point
Admiral
SW
SW Spokane St
Beacon Hill
LAKE
West Seattle
1st Ave S
4th Ave S
Rainier Valley
S Genesee
SW Alaska
Junction
California
Delridge
Empire Way
Columbia
Beacon Av
S Graham
Brighton
SW Morgan
NORTH
Way
INTERSTATE 5
SW Holden
High Point
Highland Park
South Park
Dunlap
Delridge
SW Barton
Fauntleroy
CITY LIMITS
White Center
Rainier Beach
SW 104th

A) The list of potential sources surveyed for the Shoreline Land Use Study included those suggested by the CZM 305 Report on Data Automation. Several additional sources were considered that were not included in the 305 Report.

All sources were evaluated against the followint criteria:

a) The data must be systematically and comprehensively collected.

b) The data must be updated and kept current on a regular basis.

c) The source must be easily accessible both initially and in the future.

d) Duplication of information should be minimized.

e) Sources supplying a greater number of needed data entries are preferable to those supplying a fewer number.

f) The data must be well suited to commercial and industrial portions of the shoreline.

B) List of Sources Considered

Seattle Building Department	Card file
Seattle Community Development Department	Shoreline Permits
Seattle Engineering Department	List of street ends
Seattle Lighting Department	Account & Billing Information
Seattle Fire Department	Building Inspection Cards
Seattle License Department	Business Licenses
Seattle Office of Policy Planning	Colored Zoning Maps
Seattle Parks Department	Park Property Listing
Seattle Water Department	Account and Billing Information
Metro	Location of Sewage Plants
Port of Seattle	Inventory of Port Properties
King County Assessor	Commercial Records
U.S. Coast Guard	Inventory of Properties
U.S. Navy	Inventory of Properties
U.S. Army Corps of Engineers	Inventory of Properties
Kroll Maps	Address & Zoning Information
Shoreline Maps	Shoreline classifications and frontages

List of Sources Considered - continued

Aerial Photography	Land Use Information
Polk Directory	Occupancies
Bell Reverse Directory	Occupancies
Bell Telephone Directory	Verification of Occupancy

C) Data Sources Selected

Primary Sources

1) Seattle License Department - Business License Applications

a) License files are well suited to the non-residential portions of the shoreline included in the study. Every business whether operating from a private residence or commercial fishing vessel is required to possess a business license. Since the Licenses are used for taxation purposes, the files are current and complete.

b) Businesses no longer operating are dropped and new ones are added routinely.

c) The Business License application is a public record and therefore is easily accessible. Files are referenced by hand geocoded cards containing the B & L numbers. All files are located at one central place.

d) Business Licenses provide the following information:

-Name of Business
-Name of owner
-Type of Ownership (individual, partnership, or corporation)
-Description of Activity in detail
-Phone number of the business.
-Future updating of the License data is facilitated by a monthly printout of new Business License that is sent to DCD from the License Department.

2) Seattle Fire Department - Building Inspection Cards

a) Every commercial, industrial and residential (triplex or larger) building is inspected every year by the Fire Department. Records of these inspections are kept in the form of"Building Inspection Cards." These files are uniformly maintained and updated throughout the study area.

b) Fire Department Inspection Cards provide the following information which is applicable to the Study:

-Name of the business and/or name of the building
-Date of Construction
-Number of Stories
-Number of Apartment Units

c) The files are well organized and keyed to a map of the Inspection area. By using the map and numbered blocks, the shoreline data can be easily located. The cards are not found in a central location, however, Each Fire Station inspects its own response area. There are 18 stations inspecting the Study Area.

FILING FEE-$1.00 NON-REFUNDABLE

CITY OF SEATTLE
DEPARTMENT OF LICENSES AND CONSUMER AFFAIRS
102 SEATTLE MUNICIPAL BUILDING
SEATTLE, WASHINGTON 98104

APPLICATION FOR BUSINESS LICENSE

PLEASE PRINT OR TYPE - Be sure all information is complete. If additional space is needed, attach supplemental sheets.

NAME _____

TRADE NAME _____ BUSINESS PHONE _____

BUSINESS ADDRESS _____ ZIP CODE _____

KIND OF BUSINESS IN DETAIL _____
(INDICATE WHETHER WHOLESALE, RETAIL, ETC.)

STARTING DATE OF BUSINESS IN SEATTLE _____

☐ INDIVIDUAL ☐ PARTNERSHIP ☐ CORPORATION ☐ OTHER

NAME, RESIDENCE ADDRESS AND PHONE NO. OF OWNER, PARTNERS, CORP. OFFICERS, (TITLES)

_____

_____

NAME, ADDRESS AND PHONE NO. OF RESIDENT AGENT OR LOCAL MANAGER:

_____

OTHER BUSINESS LOCATIONS IN SEATTLE:

STREET	ZIP CODE	PHONE	IF WAREHOUSE STOCK ONLY CHECK BOX
			☐
			☐
			☐

IF YOU PURCHASED BUSINESS, DID YOU TAKE OVER: ENTIRE BUSINESS ☐ PORTION THEREOF ☐

FORMER OWNER'S NAME _____ BUSINESS LICENSE NO. _____

ADDRESS _____ PHONE NO. _____

DOES THE BUSINESS CONFORM TO THE REQUIREMENTS OF THE ZONING CO

YES ☐ NO ☐

ZONING REPORT

REMARKS: _____

_____

SIGNATURE OF APPLICANT _____ TITLE _____ DATE _____

FOR OFFICE USE ONLY

REGULATORY LICENSES CODE	TYPE	EXPIRES

	DATE	INITIALS
PLATE		
LICENSE MASTER CARD		
ADDRESS		
DBA FIELD INSP.		
COMPUTER		

FORMER OWNER OWES _____ 109 MADE BY _____

REG. LIC. HELD _____

B-[illegible] REV. [illegible]

RETURN WHITE AND YELLOW COPIES WITH YOUR REMITTANCE. KEEP PINK COPY.

DATA SOURCES

Field	Source
ID Number	
Card Order Number	
Card Status	
Date	
Kroll Map Number	KROLL MAPS
Address Number	LICENSE DEPT DATA FIRE DEPT DATA POLK DIRECTORY REVERSE DIRECTORY
Street Name	
Geocoding	
Zoning	ZONING KROLL MAPS
Shoreline Environment	SHORELINE MAPS
Total Parcel Area (Total 65–68, Land 69–72, Water 73–76)	
Access to Shoreline	KROLL MAPS
Building Data Previously Entered	
Number of Stories	FIRE DEPT DATA
Total Gnd Fl Area Sq. Ft.	
Date of Construction	FIRE DEPT DATA
Name of Business	LICENSE DEPT DATA POLK DIRECTORY REVERSE DIRECTORY
Description of Activity	LICENSE DEPT DATA
Starting Date of Business	LICENSE DEPT DATA
General Code	LAND USE CODE
Activity Code	LAND USE CODE
Auxiliary Code	LAND USE CODE
Ownership Code	LICENSE DEPT DATA
Use Area Sq Ft	
Water Dependent	
Number of	

COLUMN NUMBERS

d) An information trading system is being developed whereby DCD Land Use information will be exchanged for any additions or alterations in the inspection card files. Such an arrangement would preclude future visits to the individual Fire Stations for updating of the data.

3) Polk and Reverse Directories

The two directories provide a listing of addresses and occupants that is checked against the other two primary data sources.

The Polk Directory is updated yearly and the Reverse every three months.

Polk Directory:

-Addresses in numerical order
-Name of occupant, building or householder
-Telephone number
-Indication of new listing
-Includes vacancies

Reverse Directory:

-Address in numerical order
-Name of occupant
-Telephone number

4) Kroll Zoning Maps

The maps are essential to the study and supply information for four data requirements:

a) The maps were used to assemble the list of street segments and address ranges included in the study. This listing is necessary for the collection of data from every other source.

b) The map number is used as a general geographical locater for each record.

c) The maps are used to determine the zoning classification for each record.

d) The Kroll maps are used in conjunction with the Shoreline Maps for the measurement of shoreline frontage.

5. Shoreline Maps

The 1" = 200' Shoreline Master Program maps are used for two data entries in the Study.

a) Shoreline Environments as outlined in the SSMP are derived from the maps.

b) The Shoreline Maps show the actual shoreline and is used to calculate the amount of frontage each use has.

Secondary Sources

1) Seattle Park Department - List of Park Properties

Public properties are not listed by any of primary source unless a building is present on property. It is therefore necessary to obtain additional information pertaining to open space and public lands. Most parks do not have a precise address, rather, a general location address such as Beach Drive S.W. & S.W. Alaska Street. Properties addressed in this manner were assigned precise addresses for geocoding purposes (4300 Beach Drive S.W.)

2) Seattle Engineering Department - List of Street Ends

The list of street ends is used for calculating the amount of public access present within the study area. Most street ends are 60 ft. wide.

3) U.S. Coast Guard - USCG Properties

The Coast Guard supplied all of the necessary data pertaining to their properties located on the Seattle waterfront.

4) U.S. Navy - Navy Properties

The Navy supplied all necessary data pertaining to their properties located on the Seattle waterfront.

5) U.S. Army Corps of Engineers - Corps Properties

The Corps supplied all necessary data pertaining to their properties located on the Seattle waterfront.

6) Metro - Metro Properties

Metro supplied all necessary data pertaining to their properties located on the Seattle waterfront.

7) Port of Seattle - Port Properties

The Port of Seattle supplied all necessary data pertaining to their properties located on the Seattle waterfront including a 1977 catalog of properties.

D. Development of a Land Use Classification Code

1) Survey of Existing Classification Codes

a) Standard Industrial Classification

Manual (SIC) produced by the U.S. Office of Management and Budget, 1972

The SIC code represents the first attempt to develop a standardized system of classifying economic activities.

The basic four-digit code is provided in the form of a hierarchy of categories, with the most general level represented by the first digit, second level by the second digit, and so on.

The code has become a solid base around which several Land Use Codes have been developed. However, the SIC alone will not adequately serve as a Land Use Code as any feature that is not associated with an economic activity is not included in the Manual.

b) Standard Land Use Classification Code (SLUC) produced by the U.S. Urban Renewal Administration and the Bureau of Public Roads, 1965

Like the SIC code, the Standard Land Use Classification Code was developed to standardize land use coding. The code consists of a four-digit hierarchial activity code with three auxiliary codes. The classification code used in this study has been derived from the SLUC code. Those changes that have been made in code are either additions of elements that are peculiar to Seattle or deletions of elements that do not occur in Seattle.

c) SCAG classification of Land Use produced by the Southern California Association of Governments, 1972

The SCAG code is a regional adaptation of the SLUC code with some alterations occurring in the Residential and Agricultural sections. Certain elements of the code have been incorporated into the Seattle shoreline code.

Other Activity Codes Surveyed

d) Kitsap County Land Use Code - developed by the U of W Remote Sensing Lab.

The code consists of an abbreviated four-digit code with a regional rather than urban orientation.

e) U.S.G.S. Land Use and Land Cover Classification Code for use with Remote Sensor Data, paper 964.

This newly developed code is also more appropriately applied to a regional area.

f) Two Digit Classification for Area-Coextensive Surface Accounting in the Puget Sound Region, produced by the Puget Sound Council of Governments.

The code is over generalized for this study and better suited to a smaller scale inventory.

g) Seattle Building Department Real Property Inventory - and Improved Property Report.

The code was developed by the Building Department to classify City properties. Although elements of the system are applicable to the Shoreline Study, overall nature of system is not.

Shoreline Classification of Land Use

The four-digit code settled upon for this study is essentially a derivitive of the SLUC code. The format, however, is likely that of the SCAG code in that it is arranged onto 8-1/2 x 11" sheets of paper in the normal orientation. The SLUC code is arranged with the lines in a vertical rather than horizontal manner.

Approximately 25% of entries have been altered, added, or deleted to adapt the code to the Seattle environment.

In addition to the four-digit activity code, three additional digits have been provided; a one-digit general code; a one-digit auxiliary code; and a one-digit ownership code.

A lengthy index of land use activities was produced to accompany the code for reference purposes.

Examples of each can be found in this section.

LAND USE CLASSIFICATION

CATEGORIES AND CODE NUMBERS

ACTIVITY CODES (columns 42- 48 on card 2)

General Code (column 42)

0 - No general code
1 - Located on a pier or over water
2 - Located in a shopping center or shopping complex
3 - Office or professional building
4 - OPEN
5 - OPEN
6 - Operating from private residence
7 - OPEN
8 - OPEN
9 - OPEN

Activity Code (columns 43-46)

Refer to Land Use Classifications (NOT INCLUDED HERE)

Auxiliary Code (column 47)

0 - Not an auxiliary code
2 - Central or administrative office
3 - Warehousing or storage - inside or outside
4 - Automobile parking lot or garage
5 - Operations, repair and maintenance
6 - Under construction
7 - Boat Moorage
8 - Sales representative or branch office
9

Ownership Code (column 48)

0 - Private, individual or partnership
1 - Corporation
2 - City of Seattle
3 - King County
4 - State of Washington
5 - Federal Government
6 - Port of Seattle
7 - Metro
8 - Foreign Government, individual or corporation
9

SUMMARY OF LAND USE CLASSIFICATION SYSTEM
ONE- AND TWO-DIGIT LEVELS

1 LIVING AREAS

- 11 Household Units
- 12 Group Quarters
- 13 Residential Hotels
- 14 Mobile Home Parks or Trailer Courts
- 16 Transient Lodgings
- 18 Supplemental Residential
- 19 Residential, NEC (Not Elsewhere Classified)

2-3 MANUFACTURING INDUSTRIES

- 21 Food and Kindred Products
- 22 Textile Mill Products
- 23 Apparel and Other Finished Products Made From Fabrics, Leather, and Similar Materials
- 24 Lumber and Wood Products (Except Furniture)
- 25 Furniture and Fixtures
- 26 Paper and Allied Products
- 27 Printing, Publishing, and Allied Industries
- 28 Chemicals and Allied Products
- 29 Petroleum Refining and Related Industries
- 31 Rubber and Miscellaneous Plastic Products
- 32 Stone, Clay, and Glass Products
- 33 Primary Metal Industries
- 34 Fabricated Metal Products
- 35 Professional, Scientific, and Controlling Instruments, Photographic and Optical Goods, Watches and Clocks
- 39 Miscellaneous Manufacturing

4 TRANSPORTATION, COMMUNICATIONS, AND UTILITIES

- 41 Railroad, Rapid Rail Transit, and Street Railway Transportation
- 42 Motor Vehicle Transportation
- 43 Aircraft Transportation
- 44 Marine Craft Transportation
- 45 Highway and Street Right-of-Way
- 46 Automobile Parking
- 47 Communications
- 48 Utilities
- 49 Transportation, Communications, and Utilities, NEC

5 TRADE, WHOLESALE AND RETAIL

- 51 Wholesale Trade
- 52 Retail Trade - Building Materials, Hardware, Farm Equipment and Supplies
- 53 Retail Trade - General Merchandise

5
- 54 Retail Trade - Food
- 55 Retail Trade - Automotive, Marine Craft, Aircraft, and Accessories
- 56 Retail Trade - Apparel and Accessories
- 57 Retain Trade - Furniture, Home Furnishings and Equipment
- 58 Retail Trade - Eating and Drinking Places
- 59 Miscellaneous Retail Trade

6 SERVICES

- 61 Finance, Insurance, and Real Estate Services
- 62 Personal Services
- 63 Business Services
- 64 Repair Services
- 65 Professional Services
- 66 Contract Construction Services
- 67 Governmental Services
- 68 Educational Services
- 69 Miscellaneous Service Organizations

7 CULTURAL, ENTERTAINMENT AND RECREATIONAL

- 71 Cultural Activities and Nature Exhibitions
- 72 Public Assembly
- 73 Amusements
- 74 Recreational Activities
- 75 Resorts and Group Camps
- 76 Parks
- 79 Other Cultural, Entertainment, and Recreational Activities, NEC

8 RESOURCE PRODUCTION AND EXTRACTION

- 81 Agriculture
- 82 Agricultural Related Activities
- 83 Forestry Activities and Related Services
- 84 Fishing Activities and Related Services
- 85 Mining Activities and Related Services
- 89 Other Resource Production and Extraction, NEC

9 UNDEVELOPED LAND AND WATER

- 91 Undeveloped and Unused Land Area (except forests)
- 92 Water Areas
- 93 Vacant Floor Area and Buildings
- 94 Under Construction

G) Use of Shoreline and Kroll maps to determine the street segments and address ranges included in the study area.

Both sets of maps were used to compile a list of streets and the associated address ranges (Figure). The list can be used with all necessary data sources as a means of accepting or rejecting various parcel information by address.

If the address is outside the acceptable range but a substantial portion of the property is within, the parcel will be included in the study.

In most cases, the properties included in the study extend

STREETS and AVENUES	ADDRESS NUMBERS		ADDRESS RANGE (thru and including the following numbers)
	EVEN	ODD	
Salmon Bay Waterway to Lake Union			
South Shore			
W. Commodore Way	X		2100 - 3200
W. Emerson Place	X		1900 - 2100
W. Emerson Street	X		1500 - 1900
21 Avenue West	X		4000 - 4300
W. Ewing Street	X		200 - 1200
W. Nickerson Street	X		100 - 200
Nickerson Street	X		100 - 800
13 Avenue West	X	X	4000
8 Avenue West	X	X	3700 - 3800
6 Avenue West	X	X	3600
3 Avenue West	X	X	3600
3 Avenue North	X	X	3000
W. Florentina Street	X	X	300
W. Etruaia Street	X	X	400

STREETS and AVENUES	ADDRESS NUMBERS		ADDRESS RANGE (thru and including the following numbers)
	EVEN	ODD	
Shilshole Bay to Lake Union			
North Shore			
Seaview Avenue N.W.		X	5400 - 7900
N.W. 54 Street		X	2900 - 3400
N.W. Market Street		X	2400 - 2900
Shilshole Avenue N.W.		X	1400 - 2400
N.W. 45 Street		X	800 - 1500
Leary Way N.W.		X	3800 - 4500
N. Canal Street		X	100 - 300
N.W. 35 Street		X	100 - 300
N.W. Canal Street		X	100 - 400
N. 34 Street		X	400 - 800
N. 35 Street		X	100 - 300
N.W. 35 Street		X	100 - 300
28 Avenue N.W.	X	X	5300
24 Avenue N.W.	X	X	5300 - 5400
14 Avenue N.W.	X	X	4300 - 4400
11 Avenue N.W.	X	X	4300 - 4400
9 Avenue N.W.	X	X	4100 - 4200
N.W. 42 Street		X	800
N.W. 40 Street	X	X	600 - 700
N.W. Bowdoin Place	X	X	400 - 500
6 Avenue N.W.	X	X	3900
9 Avenue N.W.	X	X	300 - 400
N. 35 Street		X	100 - 300

STREETS and AVENUES	ADDRESS NUMBERS		ADDRESS RANGE (thru and including the following numbers)
	EVEN	ODD	
Lake Union			
Fairview Avenue N.		X	800 - 1200
Fairview Avenue E.	X	X	1200 - 3200
Eastlake Avenue E.		X	2800 - 2900
Minor Avenue E.		X	2200 - 2500
Valley Street	X		900 - 1100
Fuhrman Avenue E.	X	X	3200
E. Martin Street	X	X	100
E. Edgar Street	X	X	100
E. Hamlin Street	X	X	100
E. Roanoke Street	X	X	0 - 100
E. Lynn Street	X	X	10 - 90
E. Galer Street	X	X	0 - 100
Yale Avenue N.	X	X	1100
Fairview Place N.	X	X	1200
Terry Avenue N.	X	X	800 - 900
Westlake Avenue N.	X	X	800 - 2900
N. Northlake Way	X	X	900 - 2500
N.E. Northlake Way	X	X	0 - 500
N. Northlake Place		X	1700

STREETS and AVENUES	ADDRESS NUMBERS		ADDRESS RANGE (thru and including the following numbers)
	EVEN	ODD	
Portage Bay			
N.E. Northlake Way	X	X	600 - 800
N.E. Northlake Place		X	600 - 800
N.E. Boat Street	X	X	900 - 1400
15 Avenue N.E.	X	X	3600
Portage Bay Place E.	X	X	3100 - 3200
Fuhrman Avenue E.	X		2900 - 3300
E. Shelby Street	X	X	1200
E. Hamlin Street	X	X	1200
Boyer Avenue E.	X		2400 - 2800
E. Miller Street	X	X	1500
E. Calhoun Street	X		1500
16 Avenue E.		X	2400 - 2500
W. Montlake Blvd. E.		X	2500
E. Hamlin Street		X	1800 - 1830
E. Shelby Street	X		1800

STREETS and AVENUES	ADDRESS NUMBERS		ADDRESS RANGE (thru and including the following numbers)
	EVEN	ODD	
Central Waterfront			
Elliott Bay			
W. Garfield Street	X	X	1500 - 2400
Alaskan Way W.	X	X	100 - 1500
Alaskan Way	X	X	0 - 2900
Alaskan Way S.	X		0 - 1900
Elliott Avenue W.		X	100 - 300
Elliott Avenue		X	2300 - 3000
Board Street	X	X	0 - 51
Clay Street	X	X	0 - 51
Cedar Street	X	X	0 - 51
Vine Street	X	X	0 - 51
Wall Street	X	X	0 - 51
Western Avenue		X	100 - 2200
S. Washington Street	X	X	0 - 50
S. Massachusetts Street	X	X	0 - 50

STREETS and AVENUES	ADDRESS NUMBERS		ADDRESS RANGE (thru and including the following numbers)
	EVEN	ODD	
East Waterway, West Waterway, Duwamish Waterway			
East Bank			
E. Marginal Way S.		X	1700 - 67--
			7300 - 7600
S. Nevada Street	X	X	0 - 50
S. Idaho Street	X	X	0 - 50
S.W. Idaho Street	X	X	1100
S. Oregon Street	X	X	0 - 50
S. Spokane Street	X	X	0 - 50
S.W. Spokane Street	X	X	900
		X	1000 - 1300
	X	X	1400 - 1700
S. Brandon	X	X	0 - 50
Ohio Avenue S.	X	X	5400
Diagonal Avenue S.	X	X	0 - 50
S. Fidalgo Street	X	X	0 - 50
1 Avenue S.	X	X	5900 - 7200
S.W. Front Street	X	X	0 - 99
S.W. Michigan Street	X	X	0 - 200
Occidental Avenue S.	X	X	6500
2 Avenue S.	X	X	6500
S. River Street	X	X	100 - 300
Fox Avenue S.		X	6700 - 7000
S. Holly Street	X	X	200 - 300
S. Brighton Street	X	X	200 - 300
S. Willow Street	X	X	200 - 400

STREETS and AVENUES	ADDRESS NUMBERS		ADDRESS RANGE (thru and including the following numbers)
	EVEN	ODD	
East Waterway, West Waterway, Duwamish Waterway			
West Bank			
S.W. Florida Street	X		2600 - 2900
26 Avenue S.W.	X		2300 - 3300
Iowa Avenue S.W.	X		3300 - 3800
Chelan Avenue S.W.	X	X	3200 - 3400
West Marginal Way S.W.	X		3500 - 7000
S.W. Dakota Street	X	X	1100
S.W. Idaho Street	X	X	1100
S.W. Alaska Street	X	X	1200
S.W. Edmonds Street	X	X	1100 - 1200
12 Avenue S.	X	X	4700 - 4900
S.W. Front Street	X	X	300 - 500
S.W. Michigan Street	X		200 - 500
2 Avenue S.	X	X	7000 - 7200
Occidental Avenue S.	X	X	7100 - 7200
3 Avenue S.	X	X	7200 - 7300
4 Avenue South	X	X	7200 - 7300
5 Avenue South	X	X	7400
7 Avenue South	X	X	7600
8 Avenue South	X	X	7700
10 Avenue South	X	X	7800 - 7900
S. Fontanelle Street	X	X	400 - 500
S. Webster Street	X	X	500 - 600
S. Riverside Drive	X	X	500 - 700
S. Holden Street	X	X	700
S. Chicago Street	X	X	800 - 900
S. Kenyon Street	X	X	800 - 900
S. Portland Street	X		700 - 800

STREETS and AVENUES	ADDRESS NUMBERS		ADDRESS RANGE (thru and including the following numbers)
	EVEN	ODD	
Harbor Island			
11 Avenue S.W.	X		1800 - 3500
16 Avenue S.W.		X	1800 - 3400
S.W. Massachusetts Street	X		1100
13 Avenue S.W.	X	X	1700 - 1800
Klickitat Avenue S.W.		X	3200 - 3400
S.W. Florida Street	X		1100 - 2000
S.W. Lander Street	X	X	1700 - 1900
West Seattle			
Harbor Avenue S.W	X	X	1000 - 2300
Alki Avenue S.W.	X	X	1000 - 3200
Rainier Beach			
Seward Park Avenue S.	X		9000 - 9400
Rainier Avenue S.	X		9400 - 9500
Leschi			
Lakeside Avenue S.	X		100 - 400
Lake Washington Blvd.	X		100 - 400
Madison Park			
43 Avenue E.	X		1600 - 2000

H) Collection of License Department Data

The collection of data from all of the current Business License applications within the study area can be divided into three processes.

1) Securing of permission to use the Business License Files.
2) Collection of B & L numbers
3) Recording of data

A) An initial survey of License Department data was made prior to any official correspondence. This survey was made with the assistance of Karen Goodnow of the License Department.

On January 26, 1977, an official request for use of the files was made to Director Galle. The request was accepted and Assistant Director Keith Kleinhen arranged for our access to the files.

The arrangement involved a sharing of responsibility between the two departments in carrying out the data collection. DCD would collect the individual B & L numbers and record the data from the applications. The License Department will use the list of B & L numbers collected by DCD to pull and refile the 1300 records. All time used for filing is billed to DCD.

B) The list of street segments is used to collect B & L numbers from the manually geocoded address file. To minimize interference with the License Department's daily routine, only one person can work with the address file at any given time. Two weeks were required to complete the collection of B & L numbers.

Three to four hundred applications were pulled for recording each day. The recording phase was completed in one week. Data was recorded directly onto the Data Collection Form.

Data collected from the License files:

-Name of Business
-Address of Business
-Telephone number
-Type of Business in detail
-Type of Ownership

It was originally planned that the starting date of business could also be obtained from this source. However, this entry on the application reflects the most recent change in ownership characteristics and not the earliest opening date.

Many applications were found to be either incompletely filled out or over generalized. In these cases it was necessary to telephone the businesses to verify or complete the information.

Land Use Elements that are not present in Business License files:

-All vacant buildings, portions thereof and properties
-All residential properties
-All publicly owned properties
-Branch or Subsidiary
-Businesses operating under Licenses of parent

E. Design of Computor Card Column Entries

Design of the data cards was based on a listing of all of the data that can be obtained from the sources plus allowance for future entries. In addition to the data, there must be room for identification numbers, card order numbers, a card status number and the date.

Approximately 10 drafts of data and card designs were tried before an acceptable format was achieved.

The final format consists of a series of trailing cards from two to any needed number.

Cards 3, 4 . . . are identical in format to card 2. Each additional card is assigned a new Card Order Number and is for records with multiple activities. Each activity is entered on a new card.

F. Design of Data Collection Form

In order to simplify and expedite data handling, a collection form was designed that matches the computor card design. Data contained on this form can be key punched from directly and thereby eliminating a time-consuming transposition of data to a workable form.

The Data Collection form is essentially an adaptation of the card design to allow space for information entry.

The forms provide an excellent way of storing the working data and are a filing system of land use information in and of themselves.

Like the card design, the Form design is developed thraugh a series of modifications before its acceptance in the final form.

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SHORELINE LAND USE STUDY
DATA CARD ENTRIES

CARD 1

Items		Columns	
(1)	IDENTIFICATION CODE 4- Sequential ID number 1- Card order number	1-5	(5)
(2)	CARD STATUS AND DATE 1- Status, coded 4- Date, mo/yr	6-10	(5)
(3)	KROLL MAP NUMBER	11-13	(3)
(4)	ADDRESS	14-43	(30)
(5)	GEOCODING	44-61	(18)
(6)	ZONING	62-63	(2)
(7)	SHORELINE ENVIRONMENT	64	(1)
(8)	TOTAL PARCEL AREA	65-68	(4)
(9)	LAND AREA	69-72	(4)
(10)	WATER AREA	73-76	(4)
(11)	ACCESS TO SHORELINE	77	(1)

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SHORELINE LAND USE STUDY
DATA CARD ENTRIES — CARD 2, 3, . . .

Items		Columns	
(1)	IDENTIFICATION CODE 4- Sequential ID number 1- Card order number	1-5	(5)
(2)	CARD STATUS AND DATE 1- Status, Coded 4- Date, mo/yr	6-10	(5)
(3)	BUILDING DATA PREVIOUSLY ENTERED	11	(1)
(4)	NUMBER OF STORIES	12-13	(2)
(5)	TOTAL GROUND FLOOR AREA (sq ft)	14-17	(4)
(6)	DATE OF CONSTRUCTION (yr)	18-21	(4)
(7)	NAME OF BUSINESS	22-37	(15)
(8)	STARTING DATE OF BUSINESS	38-41	(3)
(9)	USE CODE 1- General code 4- Activity code 1- Auxiliary code 1- Ownership code	42-48	(7)
(10)	USE AREA (sq ft)	49-52	(3)
(11)	WATER DEPENDENCE	53	(1)
(12)	NUMBER OF HOUSEHOLD UNITS	54-56	(3)
(13)	NUMBER OF MOORAGE BERTHS	57-60	(4)

Computer Column Design

IBM

PROGRAM | PUNCHING INSTRUCTIONS | GRAPHIC PUNCH | PAGE OF

PROGRAMMER | DATE | CARD ELECTRO NUMBER

1–4	5	6	7–10	11–12	13–14	15–20	21–36	37–40	41–43	44–45	46–47	48–49	50–52	53–54	55–56	57–60	61–62	63–64	65–68	69–72	73–76	77–78	79–80
I.D. NUMBER	CARD NUMBER	CARD STATUS	DATE	KROLL MAP NO.		ADDRESS			GEOCODING								ZONING	SHORELINE ZONE	TOTAL PARCEL AREA	LAND AREA	WATER AREA	ACCESS	ERROR
I.D. NUMBER	CARD NUMBER	CARD STATUS	DATE	ZONE	ADDRESS ENTERED	NO. OF STORIES	TOTAL GRD FL. AREA	DATE OF CONST	NAME OF BUSINESS		STARTING DATE OF BUSINESS	GENERAL CODE	ACTIVITY CODE	AUXILIARY CODE	OWNERSHIP CODE	USE AREA Sq Ft	WATER DEPENDENT	NO. HOUSEHOLD UNITS	NO. OF MOORAGE BERTHS				
I.D. NUMBER	CARD NUMBER	CARD STATUS	DATE		ADDRESS ENTERED	NO. OF STORIES	TOTAL GRD FL. AREA	DATE OF CONST	NAME OF BUSINESS		STARTING DATE OF BUSINESS	GENERAL CODE	ACTIVITY CODE	AUXILIARY CODE	OWNERSHIP CODE	USE AREA Sq Ft	WATER DEPENDENT	NO. HOUSEHOLD UNITS	CARDS 3, 4, 5... ARE ADDED AS NECESSARY FOR MULTIPLE USES				

1 8 10 14 16 20 25 30 35 40 45 50 55 60 65 71 73 80

* A standard card form, IBM electro 6502, is available for punching source statements from this form. Instructions for using this form are in any IBM System/360 assembler language reference manual. Address comments concerning this form to IBM Nordic Laboratory, Publications Development,

SHORELINE LAND USE DATA FORM

CARD 1 CARD 2

COLUMN NUMBERS

CARD 1: 1 | 5 | 6 | 7 10 | 11 13 | 14 43 | 44 61 | 62 63 | 64 | 65 68 | 77

CARD 2: 1 5 | 6 | 7 10 | 11 | 12 13 | 14 17 | 18 21 | 22 37 | 38 41 | 42 | 43 46 | 47 | 48 | 49 52 | 53 | 54

ID Number	Card Order Number	Card Status	Date	Kroll Map Number	Address Number	Street Name	Geocoding	Zoning	Shoreline Environment	Total Parcel Area	Access to Shoreline	Building Data Previously Entered	Number of Stories	Total Grd Fl Area Sq. Ft.	Date of Construction	Name of Business	Description of Activity	Starting Date of Business	General Code	Activity Code	Auxiliary Code	Ownership Code	Use Area Sq Ft	Water Dependent	Number of
										69 72 Land															
										73 76 Water															
										65 68 Total															
										69 72 Land															
										73 76 Water															

NUMBER OF

EXPLANATION OF DATA FORM AND DATA CARD ENTRIES

The data form has been designed for both data collection and key punching. Columns on the form are in the same order as those on the data cards.

The first 10 columns on each card have the same format; however, the card order number will be different for each card of the record. Columns 11-69, located in the center portion of the form, are to be entered on the first card. The last section (columns 11-54) on the form are entries for the 2nd card.

Any additional cards will represent additional uses and will be identical to card 2.

The entry on the form labeled Description of Activity refers to the type of business or auxiliary activity taking place at a particular address. This portion will not be transferred to the data card but will be used to assign land use code numbers.

New cards can be added at any time by retaining the first 10 columns for the same identification sequence present on cards 1 and 2.

Cards 1 and 2

Item 1 (Columns 1-5) IDENTIFICATION CODE

ID Number (1-4)

Each parcel will be given a unique number beginning with 0001 and progressing sequentially (0002, 0003, 1 1 1). Every card pertaining to a particular parcel (or address) will be assigned the same ID number.

(Column 5) card order number

Each card will be assigned a card order number which refers to the placement of the card in a particular record ("A" record refers to all cards that possess the same ID number).

The card containing the location information will be card 1; cards 2, 3, 4, and soon will all be identical in format and will refer to the building and activity elements.

Item 2 (Columns 6-10) CARD STATUS AND DATE

Card status (column 6) indicates whether the entry is new, revised or deleted.

Code

0 - New
1 - Revised
2 - Deleted

The date (columns 7-10) indicates the date (mo/yr) that the new or revised entry is made.

Code

Example 12 77 = mo/yr = 12/77
01 76 = m0/yr = 01/76

Card #1

Item 3 (Columns 11-13) KROLL MAP NUMBER

The Kroll Map Number is used to denote the general location of the parcel.

Code

001
↓

Item 4 (Columns 14-43) ADDRESS

The address of each parcel must be entered in full and correctly so that the computer will not reject the card.

Item 5 (Columns 62-63) ZONING

Code	Zones	
01	RS 9600	Single Family Residence Low Density
02	RS 7200	Single Family Residence Medium Density
03	RS 5000	Single Family Residence High Density
04	RW	Residential Waterfront
05	RD 7200	Duplex Residence Medium Density
06	RD 5000	Duplex Residence High Density
07	RM 1600	Multiple Residence Lowest Density
08	RM 800	Multiple Residence Low Density
09	RMH 350	Multiple Residence High Density
10	RMV 200	Multiple Residence High Density Variable Height
11	RMV 200	Multiple Residence Highest Density Variable Height
12	RM-MD	Multiple Density - Mixed Density
13	BN	Neighborhood Business
14	BI	Intermediate Business
15	BC	Community Business
16	BM	Metropolitan Business
17	CM	Metropolitan Commercial
18	CMT	Metropolitan Commercial Temporary
19	CG	General Commercial
20	M	Manufacturing
21	IG	General Industrial
22	IH	Heavy Industrial

Item 7 (Column 64) SHORELINE ENVIRONMENT

(As set out in the Seattle Shorleline Master Program)

Code	Environment
1	Conservancy Natural
2	Conservancy Management
3	Urban Residential
4	Urban Stable
5	Urban Development
6	Urban Stable/Lake Union
7	Urban Stable/Central Waterfront

Item 8 (Columns 65-76) PARCEL AREA

Total Area (columns 65-68)
Land Area (columns 69-72)
Water Area (columns 73-76)

Area is represented in the following manner:

Code

The 4th column in each category indicates the power of 10 that the number is raised to)

Example: 3245 = 3.24×10^5 = 324,000 sq. ft.

2402 = 2.4×10^2 = 240 sq. ft.

Item 9 (Column 77) ACCESS TO SHORELINE

Access refers to a parcel abutting the shoreline or having shoreline frontage.

Code

1	Access does exist.
0	Addess does not exist.

CARD 2, 3 . . .

Item 1 (Columns 1-5) IDENTIFICATION CODE

Same as Card #1 Item 1

Item 2 (Columns 6-10) CARD STATUS AND DATE

Same as Card #1, Item 2

Item 3 (Column 11) BUILDING DATA PREVIOUSLY ENTERED

Code

0 Not previously entered.
1 Items 4-6 (Columns 12-21) have been entered on a preceding card for a particular structure.

(Columns 12-21 are to be filled in only one time for each building even if there is more than one activity taking place within the building.)

Item 4 (Columns 12-13) NUMBER OF STORIES

Code

01
02
↓

Item 5 (Columns 14-17) TOTAL GROUND FLOOR AREA in Sq. Ft.

Refers to the indoor floor area of the 1st story.

Code

Example 3225 = 3.22×10^5 = 322,000 sq. ft.

Item 6 (Columns 18-21) DATE OF CONSTRUCTION

Code

Year 1975

Item 7 (Columns 22-37) NAME OF BUSINESS

Abbreviated, if necessary.

If there is room in the box, include the telephone number also. The phone number will not be keypunched but may be needed to obtain additional information.

Item 8 (Columns 38-41) STARTING DATE OF BUSINESS

Code

899 Refers to the last 3 digits of the year (1899)
976 Refers to the last 3 digits of the year (1976)

Item 9 (Columns 42-48) USE CODE

Refer to attached Use Code.

Item 10 (Columns 49-52) USE AREA Sq. Ft.

Refers to the total square footage used for a coded use (Item 9).

Code

Example 3225 = 3.22×10^5 = 322,000 sq. ft.

Item 11 (Column 53) WATER DEPENDENCE

As defined in Section 155. of the Seattle Shoreline Master Program.

Code

0 Not a water-dependent use.
1 A water-dependent use.

Item 12 (Columns 54-56) NUMBER OF HOUSEHOLD UNITS

Code

001
002
↓

Item 13 (Columns 57-60) NUMBER OF MOORAGE BERTHS

Code

0001
0002
↓

I) Collection of Fire Department Data

The initial survey of Fire Department data was carried out with the assistance of Lt. Schick.

A request to use the information contained on the Fire Department's Building Inspection cards was made to Chief Hanson on March 14, 1977. The inspection cards are located at each of the nineteen Fire Stations that have inspection districts within the study area.

Chief Zwaller scheduled the visits to each of the nineteen stations based on a list that DCD supplied.

The data from the Building Inspection cards was recorded at the stations by EMD staff and entered onto the forms at a later date.

Data Collection from the Inspection Cards:

-Name of Business or building
-Address
-Telephone number
-Date Constructed
-Number of stories
-Number of Residential Units

The Fire Department inspects all industrial, commercial and residential buildings (triplex or larger) in the city on an annual or biennial basis.

In order to expedite the data collection, information was not recorded onto each form at the Fire Station. All of the data was recorded and transferred to the forms at a later date.

CZM 306 - Shoreline Land Use Study

List of Fire Stations with Inspection Districts Extending into Urban Shoreline Areas

Phone Number for all stations: 4091

Station No.	Area	Address	Water Body
2	Denny Regrade	2334 4th Ave.	Elliott Bay
4	West Waterway	2550 26th Ave. SW	West Waterway
8	SW Queen Anne	110 Lee Street	Lake Union
09	Fremont	3829 Linden Ave. N	Lake Wn. Ship C
10	Downtown	301 2nd Avenue S	Elliott Bay
11	1st Avenue S Bridge	1514 SW Holden Street	Duwamish Waterw
17	University	1020 NE 50th Street	Portage Bay
18	Ballard	1523 NW Market Street	Salmon Bay
19	East Waterway	1 S. Spokane Street	East Waterway
20	NW Queen Anne	3205 13th Avenue W	Lake Wn. Ship C
22	N. Capitol Hill	901 E. Roanoke Street	Lake Union, Portage Bay
26	South Park	800 S. Cloverdale St.	Duwamish Waterw
27	Boeing Field	1000 S. Myrtle Street	Duwamish Waterw
29	West Seattle	2139 Ferry Avenue SW	Elliott Bay
30	Leschi	2931 Mt. Baker Blvd.S.	Lake Washington
33	Rainier Beach	9645 Renton Ave. S.	Lake Washington
34	Madison Park	633 32nd Avenue E.	Lake Washington
36	Kellogg Island	3600 23rd Avenue SW	Duwamish Waterw
41	Magnolia	2416 34th Avenue W.	Elliott Bay

5

V O D G

Verbal Orders Don't Go

SEATTLE FIRE DEPARTMENT - INTRA-DEPARTMENT MEMO

FR: Battalion 1 Date March 22, 1977

TO: All concerned Reply?

RE: Memorandum of March 22, 1977

CS 516.19

The Department of Community Development will be visiting these stations on the days listed regarding their survey of Shoreline Land Use.

April ~~18~~	- Station 10, all day	
~~19~~	- Station 2 , all day	
~~20~~	- Station 17, 0900-1200	Station ~~22~~, 1300-1600
~~21~~	- Station 20, 0900-1200	Station ~~8~~, 1300-1600
~~22~~	- Station 41, 0900-1200	Station ~~9~~, 1300-1600
April ~~25~~	- Station 36, 0900-1200	Station ~~14~~, 1300-1600
~~26~~	- Station 11, 0900-1200	Station ~~26~~, 1300-1600
~~27~~	- Station 18, 0900-1200	Station ~~34~~, 1300-1600
~~28~~	- Station 19, 0900-1200	NO Shoreline info
29	-	Station ~~27~~, 1300-1600
May ~~2~~	- Station 33, 0900-1200	
~~3~~	- Station 5	Station ~~30~~, 1300-1600 NO shoeline info
~~4~~	- Station 29, 0900-1200	~~6~~ 1300-1600
		2 1300-1600

All station visits Completed May 4 -1977

J B Bull

FIRE DEPT INSPECTION CARDS

ADDRESS:* 1420 - 4 AVENUE — Plat [illegible] Index [illegible]
NAME ADDRESS — Area 1 — Phone Reg. [illegible]

OCCUPANCY:* [illegible]

OCCUPANT:* KAI SUTTELL [illegible]

OWNER
AGENT:* [illegible] C/O HARLEY RUBEN ECONOMOR Co 10 RM 201

DATE CONST'D: 1/1/2 — TYPE BLDG: II — NO. of STORIES: 10 — CELLAR/ ~~BASEMENT~~: ____ — STAND-PIPE: [illegible]

AUTO-SPRINKLER: ~~(O)~~ (W) ~~(D)~~ (P) ____ — VALVE LOC: [illegible] — LOC SFD CONNECT: ____

FIRE EXT. SYSTEMS: ____ — FIRE ESCAPE: ____

CERTIFICATE OF OCCUPANCY: ____

PERMIT SCHEDULE	SPECIAL INSPECTION SCHEDULE	SPECIAL INFORMATION
57966 010 RM 310 DENTAL LAB	PRE- Yes FIRE: No ____ Date ____	

OCCUPANCY DATA CARD (OCCUPY ROOM 413-915)

ADDRESS:* 1425 - 4 AVENUE RM-918 98101 — Plat F-1 Index [illegible]
NAME ADDRESS (ZIP) — Area 1 No.* 10-[illegible]
Phone Reg. 624-0753 Phone Emer [illegible]

OCCUPANCY: G - MASTER CRAFT MANUFACTOR — No. of Units

OCCUPANT:* MR PAUL H RUSCHKA — TITLE: PRESIDENT

OWNER
AGENT:* JOSHUA GREEN CORP ADDRESS: 1425 [illegible] ROOM 918 PHONE: [illegible]

DATE CONST'D 1913 — TYPE BLDG. II — NO. of STORIES 10 — CELLAR ____ — STANDPIPE LOC. [illegible]

AUTO-SPRINKLER (~~O~~)(P) ____ — WHERE VALVE LOC. [illegible] — SIAMESE LOC. ____

FIRE EXT. SYSTEMS: ____ — FIRE ESCAPE LOC. ____

CERTIFICATE OF OCCUPANCY CLASSIFICATION: ____

PERMIT SCHEDULE	SPECIAL INSPECTION SCHEDULE	SPECIAL INFORMATION
60578	PRE- Yes FIRE: No Date	Occupy Room- 913 14
60576		916-918
60577		

SAMPLE INSPECTION CARD

J) Collection of Data from the Kroll and Shoreline Maps

The Kroll Zoning maps, previously used to determine street segments, were used in a second step to supply zoning information.

Each form (or record) was checked against the maps, and the zone that applied to each address was entered onto the form.

In a similar manner the Shoreline maps were used to supply the shoreline environment of each property.

Both sets of maps were used in conjunction to determine whether or not each of the 1458 records have access to the shoreline. (Access is applied here to mean that the property on which a business is located has shoreline frontage.)

K) Data Collection from the Polk and Reverse Directories

After the data from the other primary sources was collected and arranged into a numerical order by address, each record was checked against current volumes of both directories.

The Polk Directory provides a complete listing of occupants by address. Some vacant structures are recorded, but the actual amount of vacant building space is probably not accurately represented.

Like the Polk, the Reverse Directory provides a listing of occupants by address. Only occupants with a telephone number are recorded in the directory.

For uses that do have telephone numbers, the Reverse Directory is highly accurate, but all other information is not present.

L) Data Weaknesses

Due to time restraints on project, many of the gaps or weaknesses of the data sources were not compensated for. These weaknesses are listed here so that any future work on the project will involve an effort to minimize them in the future.

-All data is tailored to use or occupancy and not property ownership. Property ownership or property lines are not reflected in the study.

-Undeveloped property may not have an occupant and therefore may not show up in any of the data sources.

-All uses are represented in a like manner. There is no indication of the size, value or volume of production. Two businesses which produce the same product are represented in the same way even though they may be operating on widely different scales.

-One business may be undertaking several distinct uses that are not reflected in the data. An example might be U.S. Plywood Corp. given the activity code 2421 - (Saw Mills general) which may also be operating as a logging contractor (2410), pulp mill (2610), Plywood & Veneer products (2431), Wooden containers (2440) . . .

Warehouses that are located at the actual business site do not show up in the data.

-There was not enough time to make field inspections. Thus all of the data is from recorded sources. The actual situation may not be accurately represented in the data.

-In numerous instances it was necessary to call businesses to complete the form. This most often occurred when a record appeared in only one or two of the sources. The remaining data must be obtained by interview. A telephone interview was required in about 35% of the records.

-None of the sources were as complete as expected.

Both Business Licenses and Fire Inspection Cards were no more than 80% complete. The Inspection Cards were found not to be current in several instances.

The two directories were not much better.

Combining all of the sources raised the overall coverage to approximately 95%.

A great deal of time was spent completing data for records that only appear in one source.

M) Assignment of Identification Numbers

All records were assembled and arranged in numerical order and then divided into geographical areas for numbering.

Each geographical area was given series of 500 numbers. The list of areas and numbers is included here.

CZM 306 SHORELINE LAND USE STUDY

Identification Number Sequencing System

Numbers	Shoreline Segment	Last Number Used
0001-0500	Fremont Br to Gasworks Park	0042
0501-1000	Gasworks Park to the UofW	0580
1001-1500	East Side of Lk Union So Side of Portage Bay	1300
1501-2000	So and West Sides of Lk Union	
2001-2500	No Shore of the Ship Canal	
2501-3000	So Shore of the Ship Canal	
3001-3100	Madison Park	
3101-3200	Leschi	
3201-3300	Rainier Beach	
3500-4000	City Property (Parks)	
4001-5000	Central Waterfront	
5001-5500	Harbor Island	5035
5501-6000	West Seattle	5620
6001-6500	East Side of the Duwamish	
6501-7000	West Side of the Duwamish	
7001- 7500	Moorage	

N) Data Processing

Following the previous steps, the Data Collection Forms were sent to the Urban Data Center at the University of Washington for the key punching and geocoding.

Each record contains from two to seven data cards depending on the number of uses assigned to the record.

Fifteen percent of the records were rejected from the geocoding process and were geocoded by hand. The majority of these rejections were parks and other unaddressable parcels.

It should be noted that all data records are represented by a single address. There is no indication of aerial or lineal extent in the Geobasis program. Parks are given a single point address.

O) Updating of the Data File

Constant updating is essential to the effectiveness of the study. In commercial and industrial areas the land use may change at rapid rate.

Updating efforts have been planned in the following manner:

a) Monthly printouts of all new Business Licenses are received from the License Department. Each month the printout is reviewed and those businesses operating in shoreline areas are recorded for annual entry into the automated file.

b) A system for trading of the Land Use Data with the Fire Department for any additions or deletions in the Inspection card data is currently being developed.

c) New editions of the Reverse Directory and the Polk Directory will be reviewed on a regular basis to update any occupancy data.

d) The Seattle Departments of Lighting and Water are being investigated for possible future sources of occupancy data. If an arrangement can be made to access these automated files the updating process would be greatly simplified.

e) Future updating will involve field checking of data. Inclusiong of this practice will also enable EMD to test the accuracy of other sources.

f) By mid-year 1978 the King County Assessor's Commercial Property files will be automated and retrievable. The potential of access to this body of data will greatly enhance the scope of the study. Assessor's records provide property values, ownership, improvements, improvement values, and property boundries.

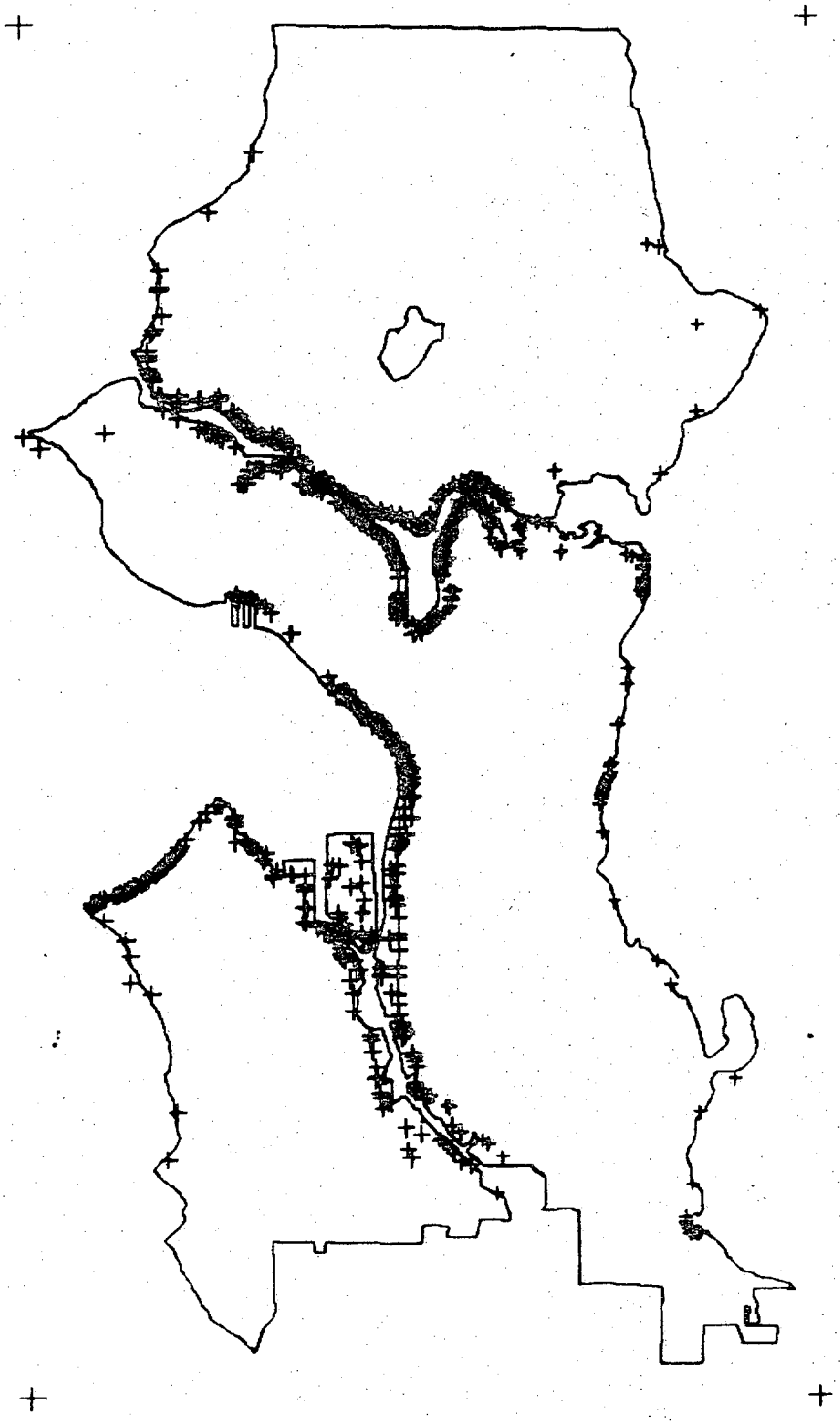
g. Time must be allocated to the up-dating process in the yearly work programs.

Updating Problems

The single greatest problem in keeping the data current involves tracking existing business changes of address. Business License data is approximately 85% accurate in recording changes in location.

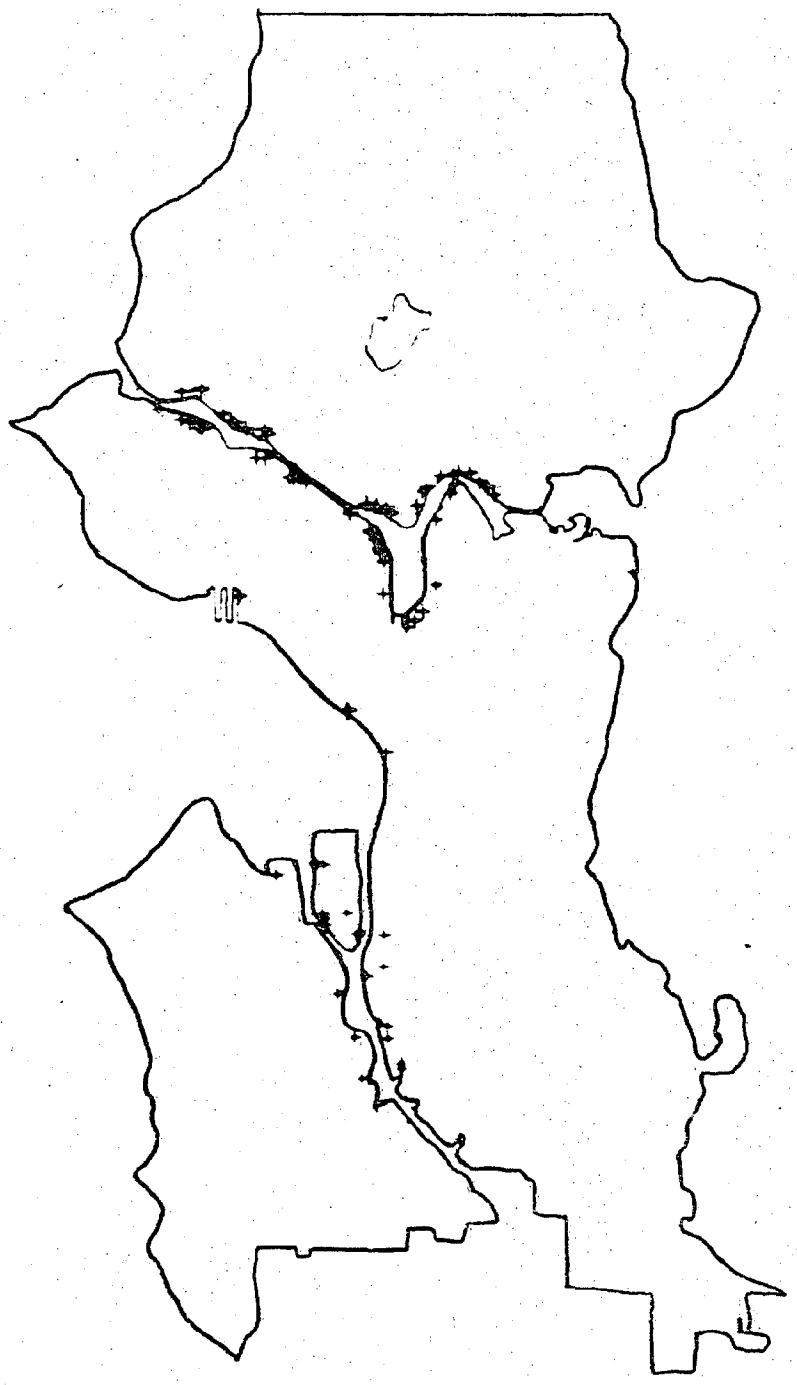
The two directories may indicate the new listings. Neither indicates a move from a previous address.

Access to the Lighting or Water Departments' records would solve this problem. Until that time, field checking is the most reliable method.



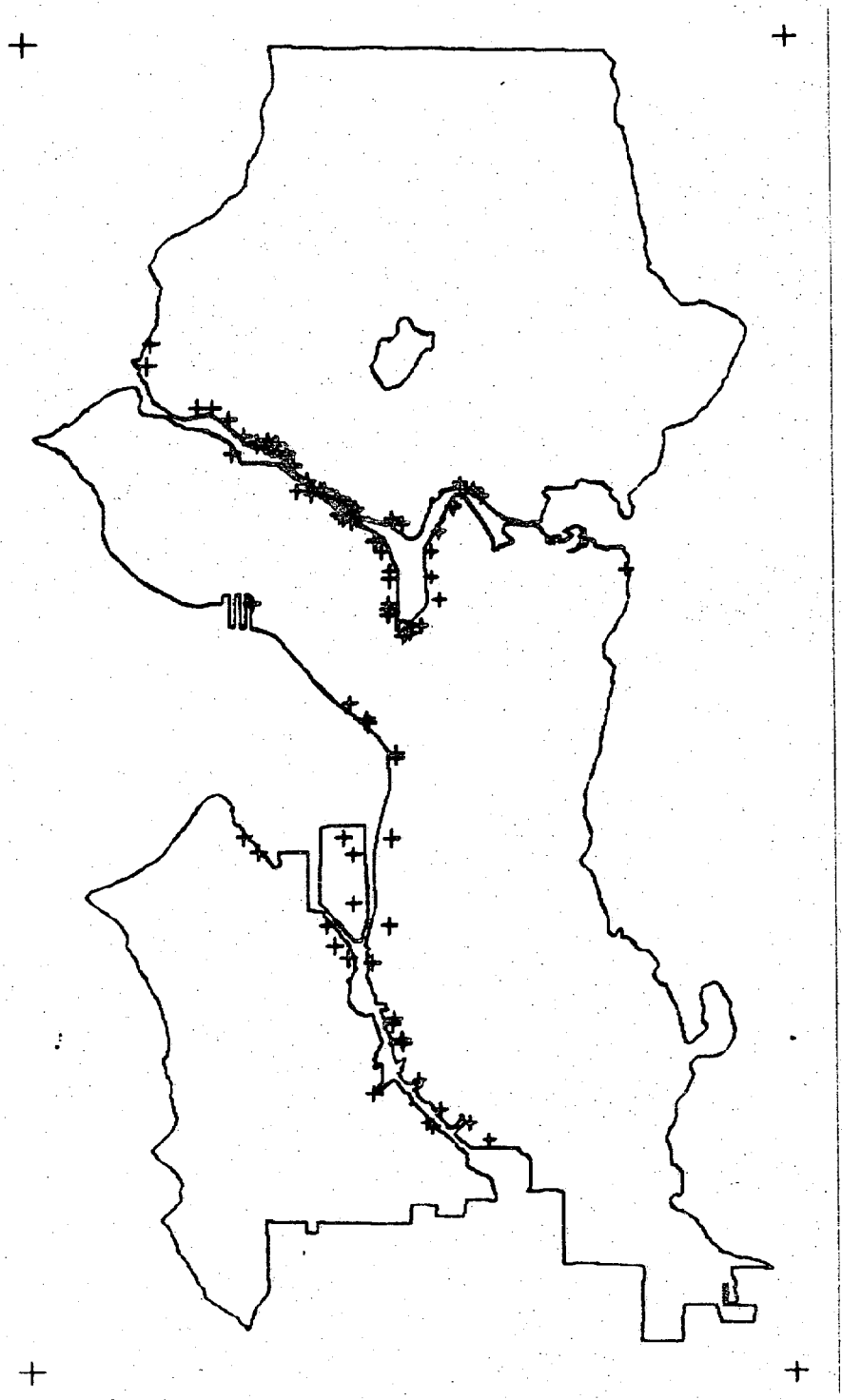
SHORELINE LAND USE 1977

ALL 1458 USES INCLUDED IN
THE SHORELINE
LAND USE STUDY



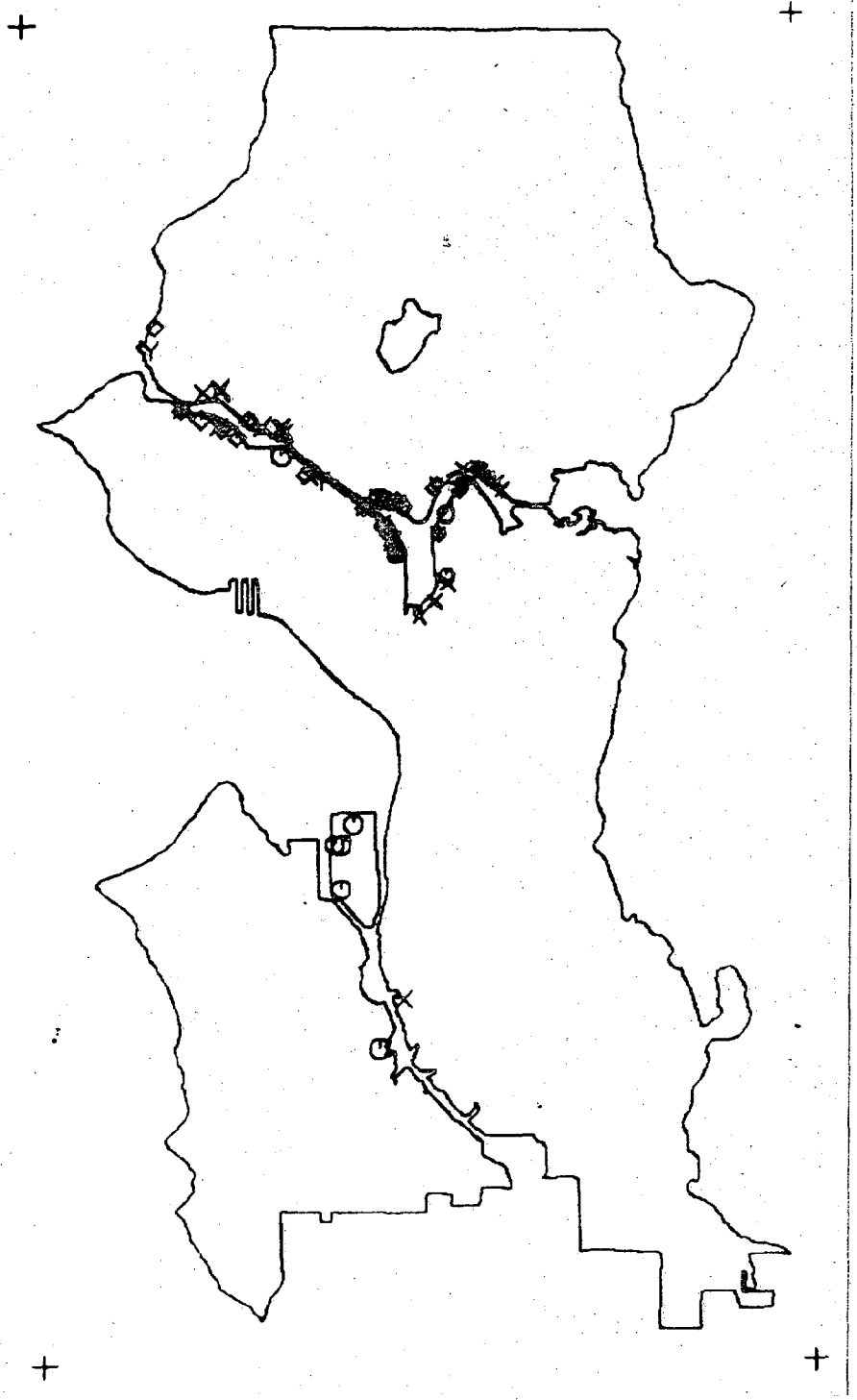
SHORELINE LAND USE 1977

\+ - 2000's AND 3000's INDUSTRIAL
WATER DEPENDENT USES



SHORELINE LAND USE 1977

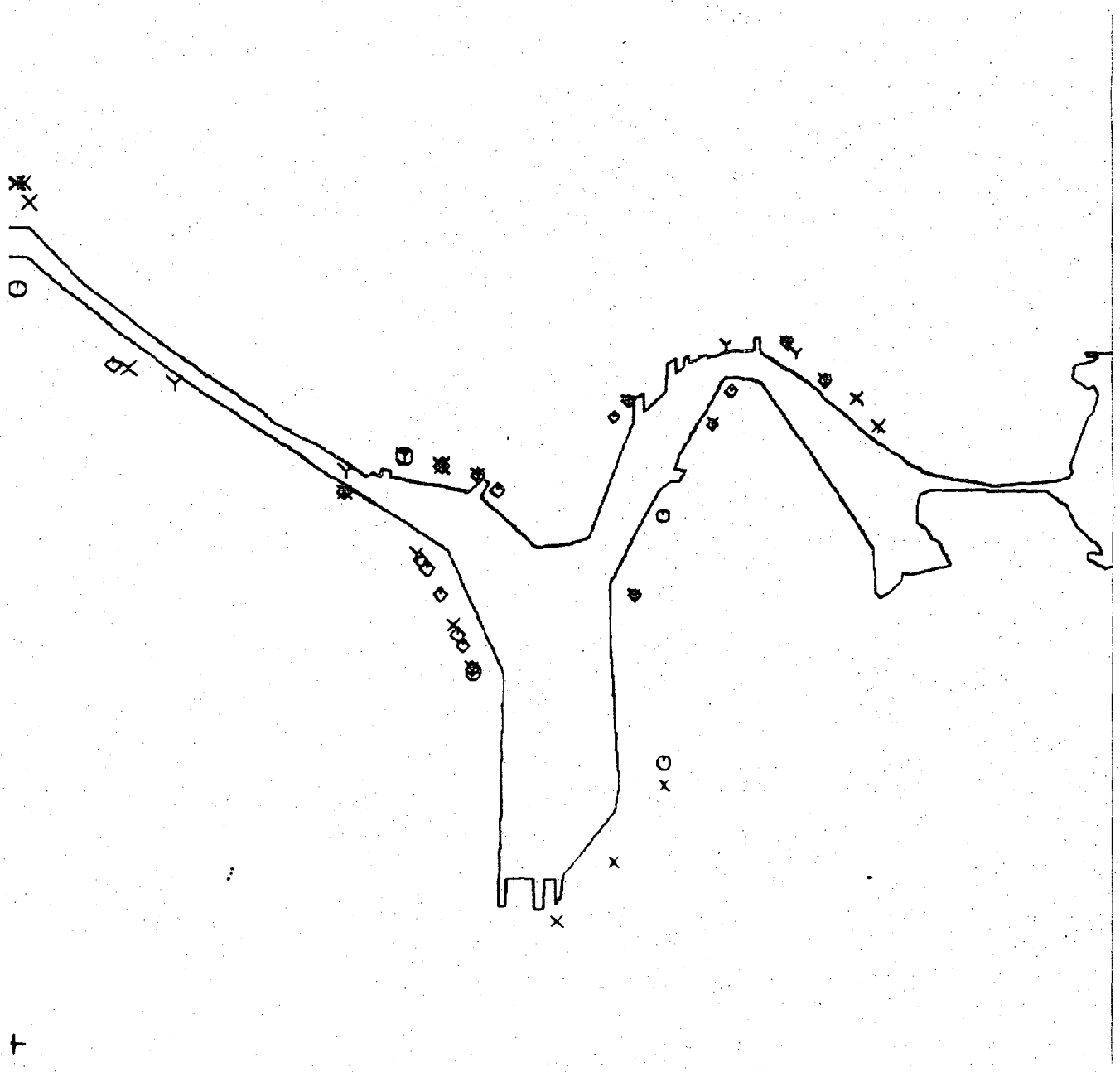
\+ 2000's and 3000's INDUSTRIAL
NON-WATER DEPENDENT USES



SHORELINE LAND USE 1977

BOAT BUILDING AND REPAIR

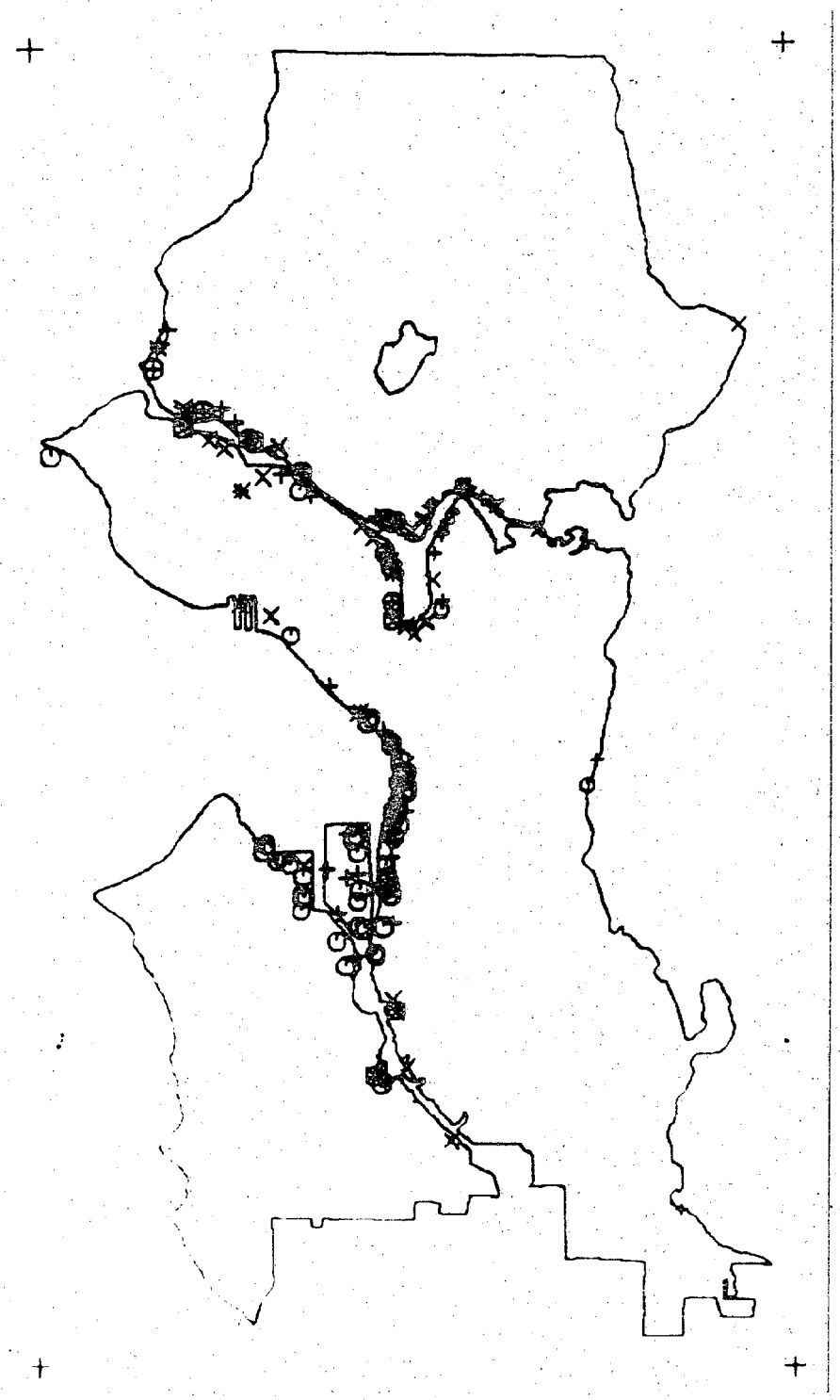
0 - 3444 - LARGE SHIPS
X - 3445 - ENGINES AND ACCESSORIES (MFG)
- 3446 - SMALLER COMMERCIAL BOATS
Y - 3447 - PLEASURE CRAFT



SHORELINE LAND USE 1977

BOAT BUILDING AND REPAIR - LAKE UNION

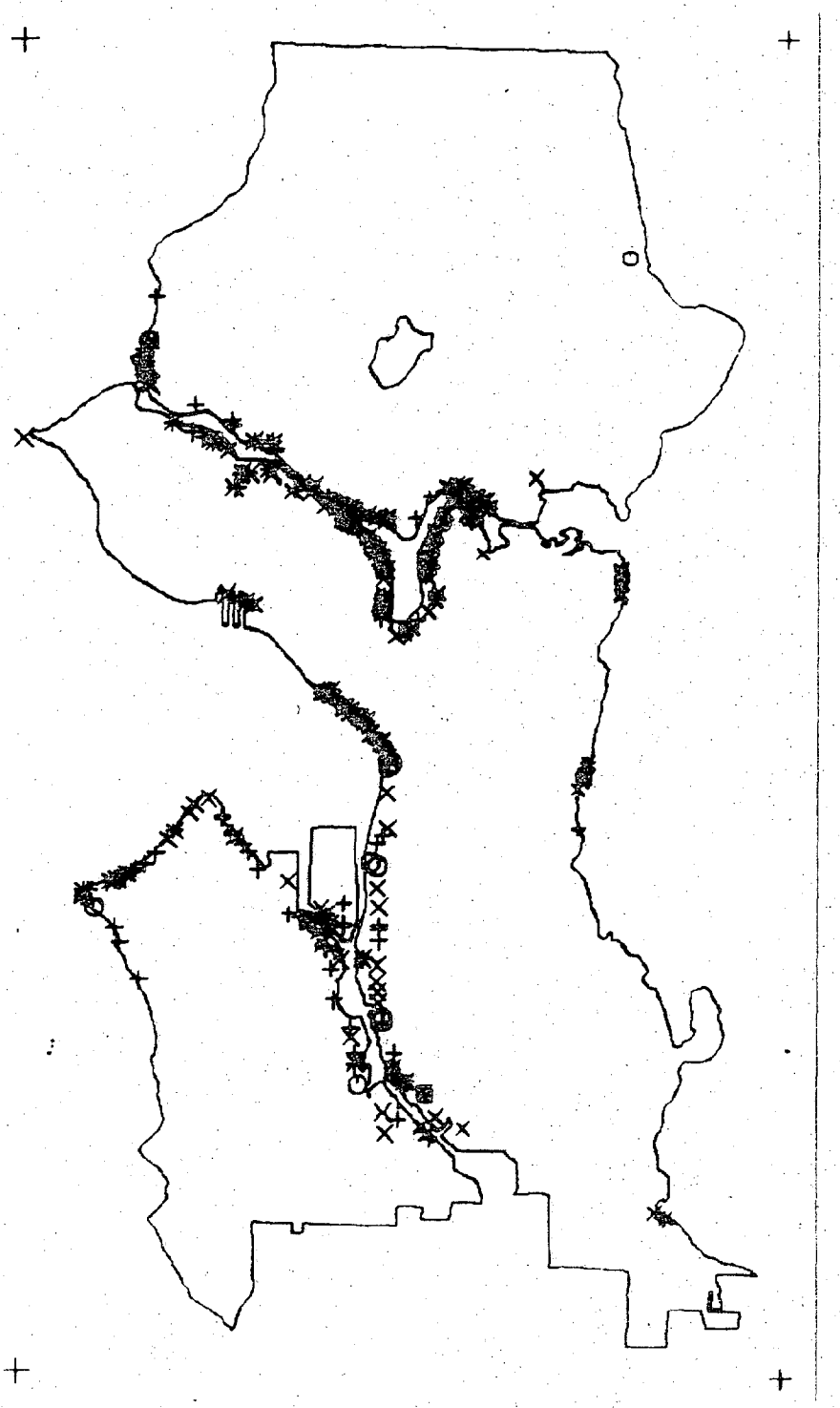
0	-	3444 - LARGE SHIPS
X	-	3445 - ENGINES AND ACCESSORIES (MFG)
	-	3446 - SMALLER COMMERCIAL BOATS
Y	-	3447 - PLEASURE CRAFT



SHORELINE LAND USE 1977

COMMERCIAL WATER DEPENDENT USES

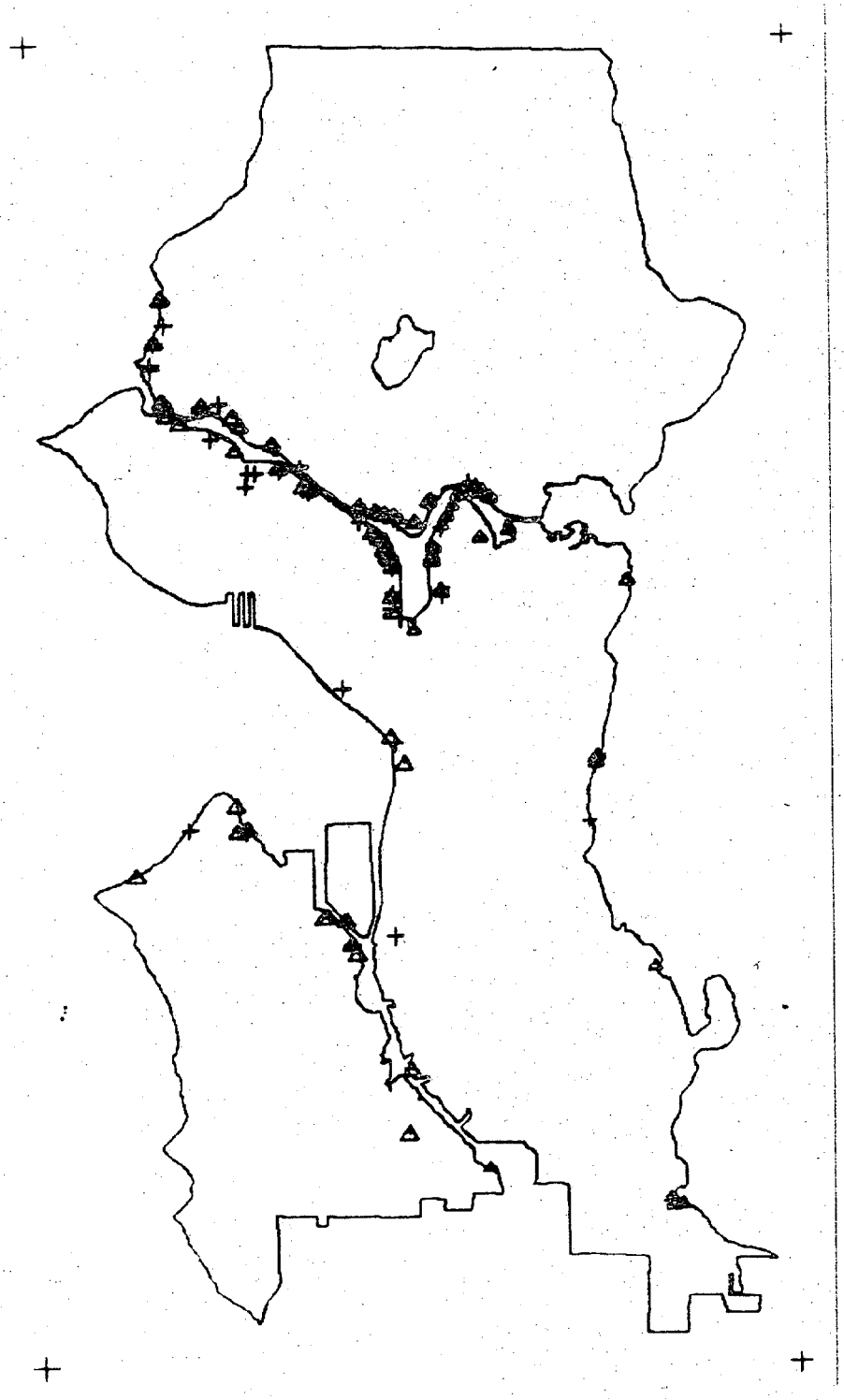
O - 4000's - TRANSPORTATION, COMMUNICATIONS, AND UTILITIES
+ - 5000's - TRADE, WHOLESALE AND RETAIL
X - 6000's - SERVICES



SHORELINE LAND USE 1977

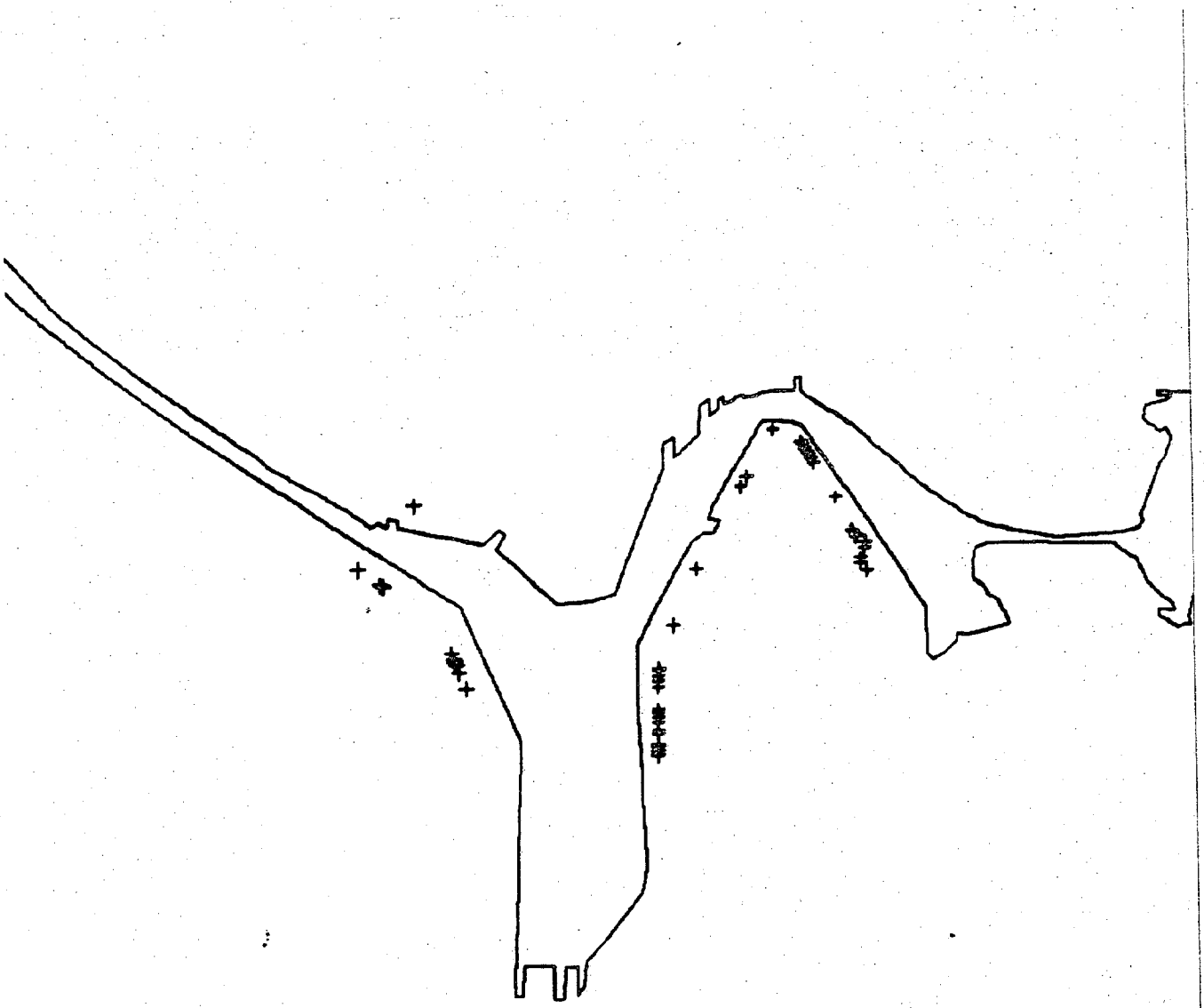
COMMERCIAL NON-WATER DEPENDENT USES

0 - 4000's - TRANSPORTATION, COMMUNICATIONS, AND UTILITIES
\+ - 5000's - TRADE, WHOLESALE AND RETAIL
X - 6000's - SERVICES



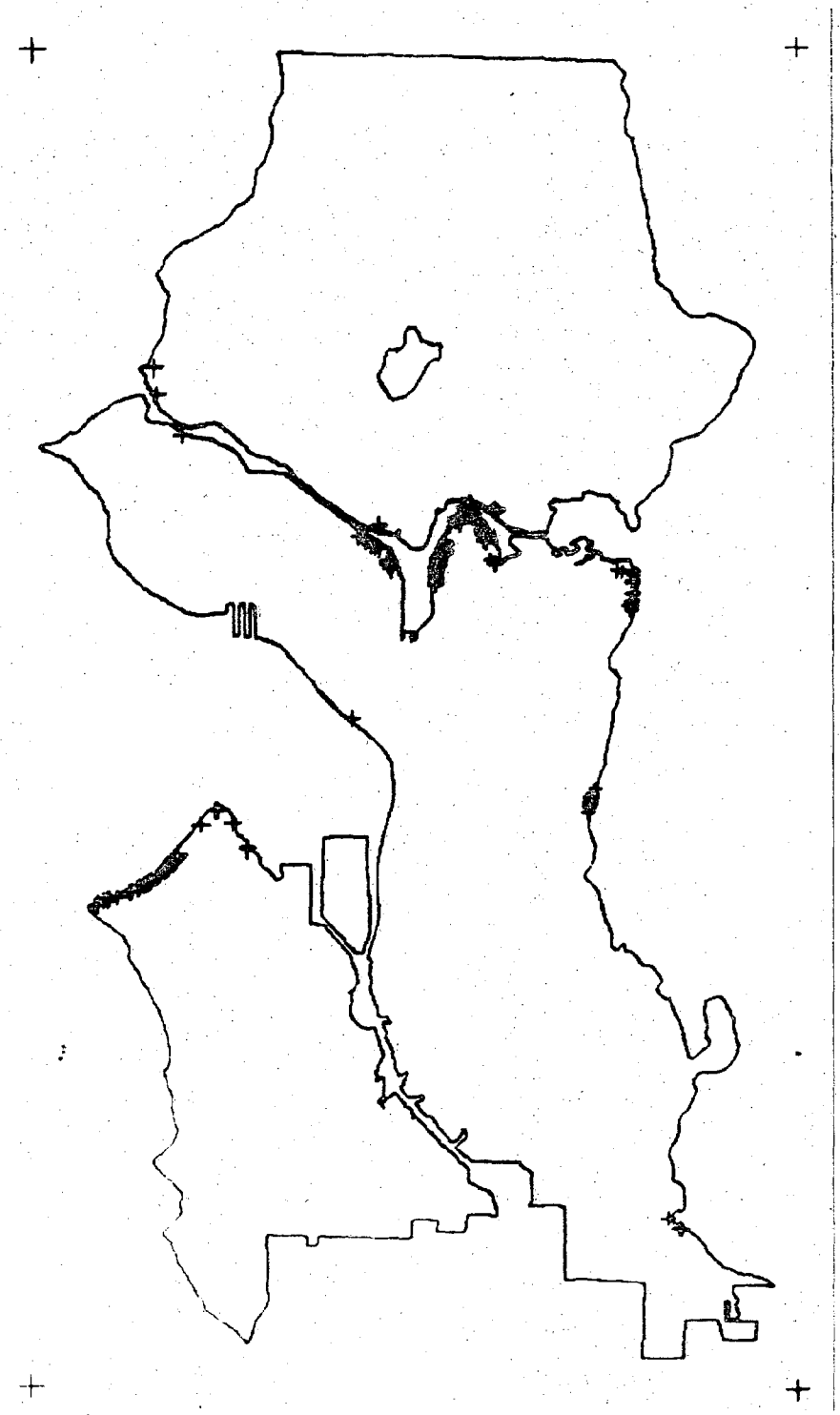
SHORELINE LAND USE 1977

△ - 7440-7449 - MARINAS
\+ - 5185 & 5591 - BOAT AND ACCESSORY SALES



SHORELINE LAND USE 1977

HOUSEBOAT MOORAGES - LAKE UNION



SHORELINE LAND USE 1977

RESIDENTIAL USES (HOUSEBOATS AND MULTIPLE FAMILY DWELLINGS)

Element 7

Element 7 - SHORELINE MASTER PROGRAM

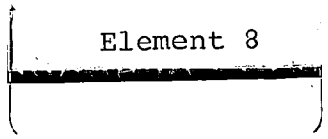
Introduction

For any public regulation to success, that is, to meet its assigned objectives, there must be general understanding and acceptance by the public.

Because this need is critical to the success of the Shoreline Master Program, it is essential to make the program available to as many people as possible. Therefore, special efforts were made to assure that the program would be readily available to all. CZM assistance provided a major portion of the printing cost of the adopted draft.

Copies were placed in all public libraries and in the three universities' libraries. Copies were also sent to all community councils, members of the Citizens Advisory Council, the City Council, local, state and federal public agencies, and the press. In addition, following the press printed announcements that copies were available, many citizens obtained copies.

CZM assistance also made possible a sturdy and attractive cover, as well as the map which was a separate contract (see Element 8) element but was inserted into the SMP.


Element 8

Element 8 - SHORELINE MAP

Introduction

The Shoreline Map, showing the location of the various shoreline districts, was printed separately from the Master Program so that the map could be more readily used as a reference, and so that the entire city could be included on one map at a readable scale.

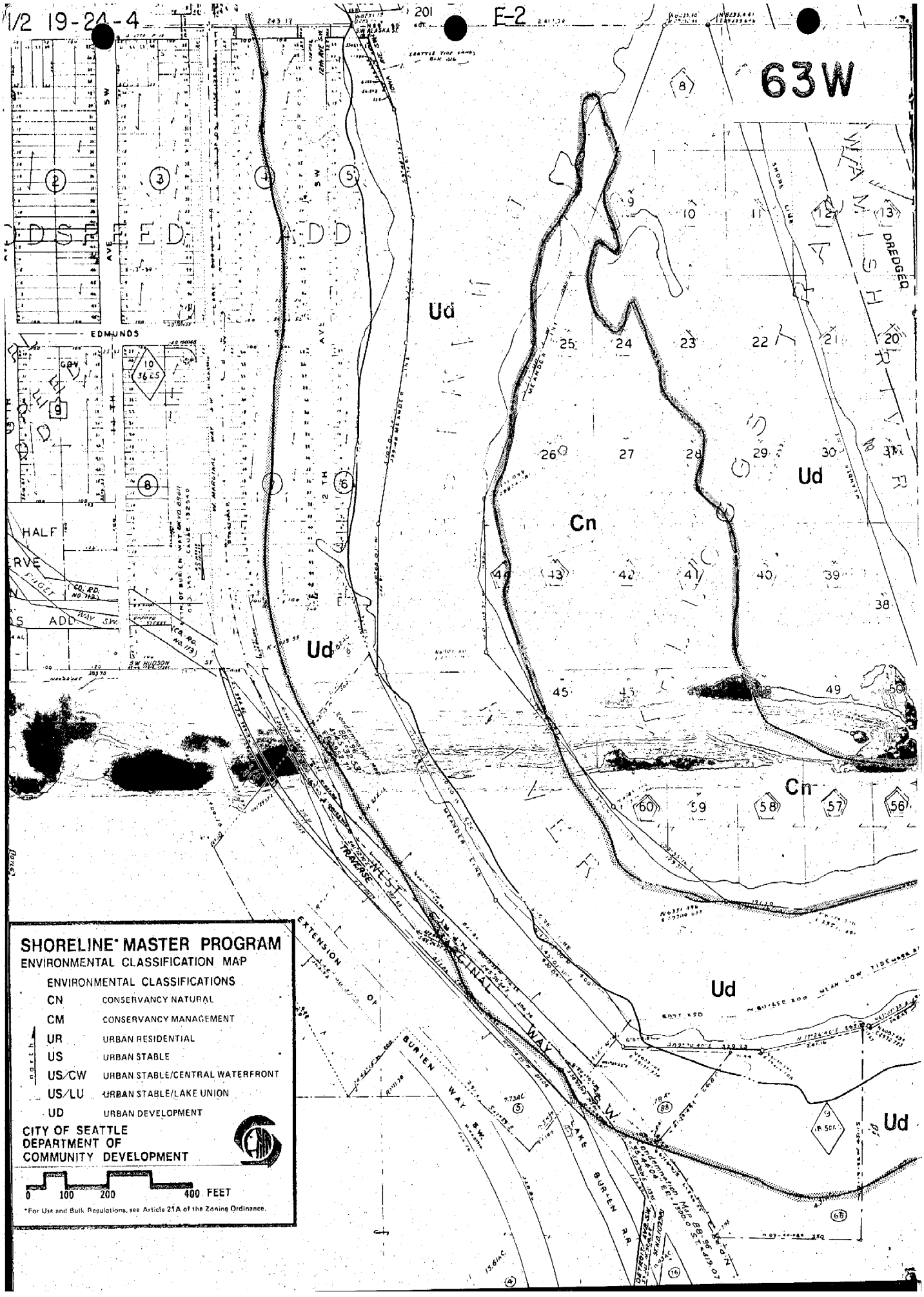
The map was inserted into copies of the Shoreline Master Program.

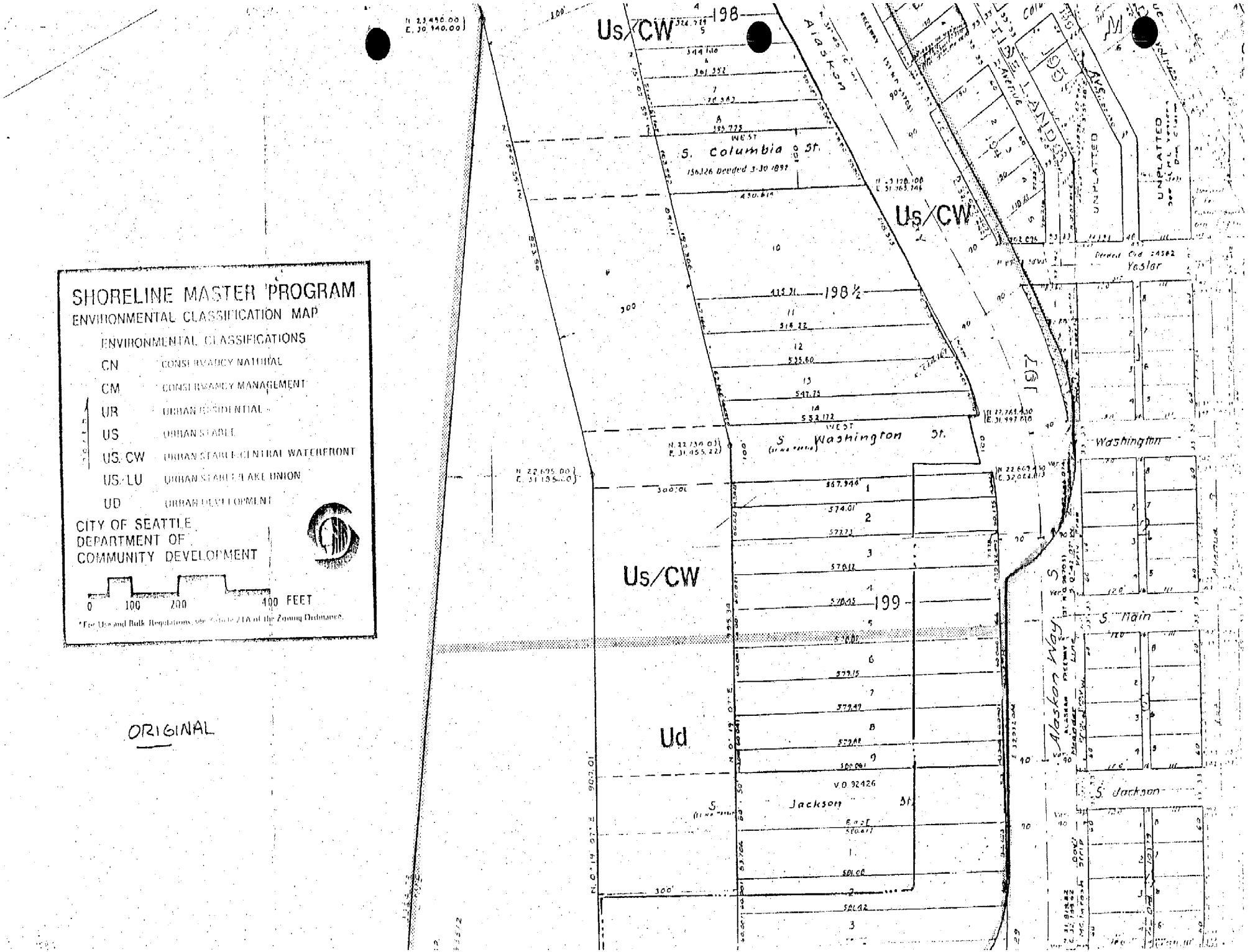
CZM - 5B Final Report

Element 9 - UPDATE OFFICIAL MAPS

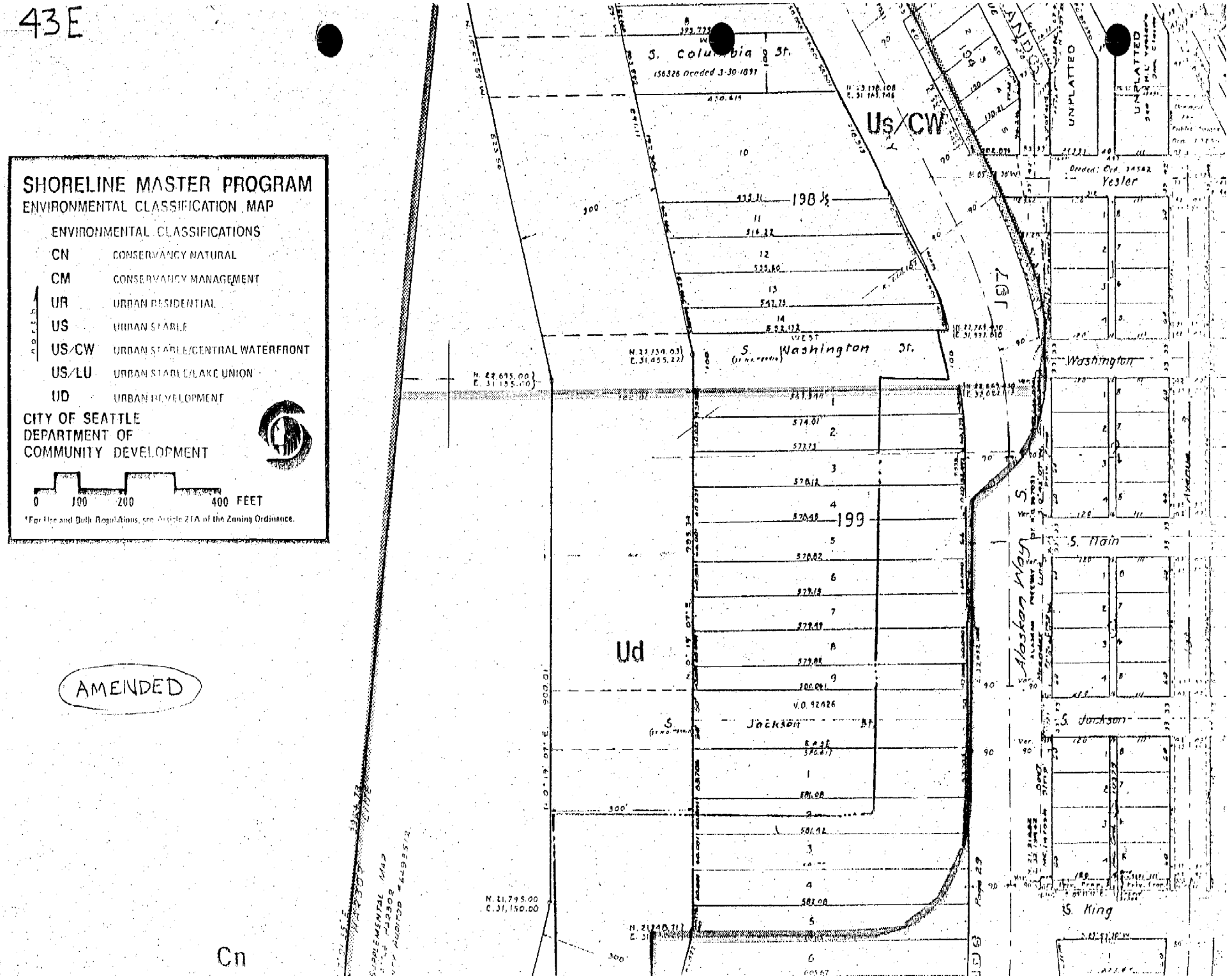
Introduction

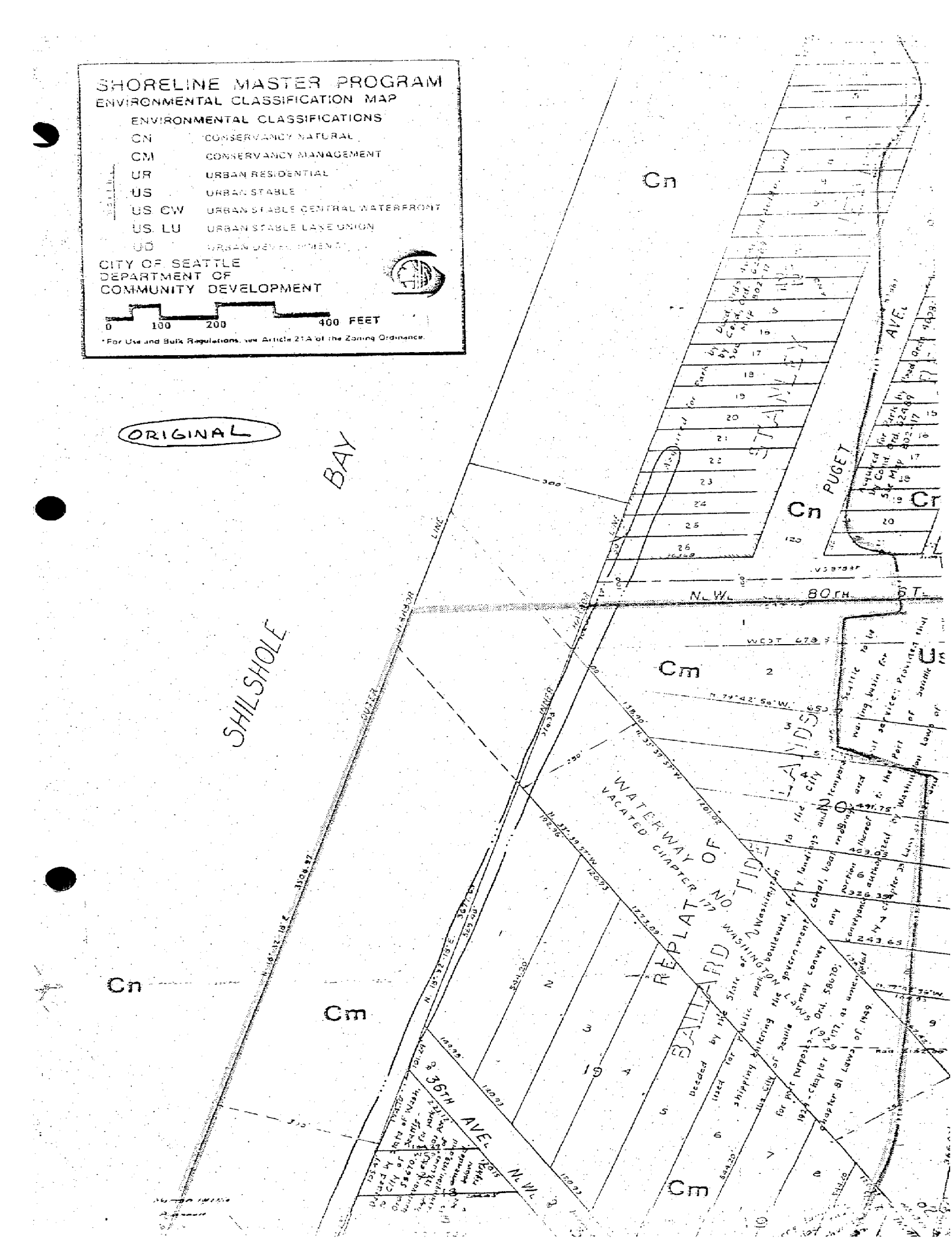
Official maps were prepared for the Shoreline Master Program during the previous grant period. However, following the year of official reviews by the Planning Commission, the City Council and DOE a number of changes were necessary. These changes required a number of map changes, and a pertinent example is attached. In addition, harbor lines in several areas were changed or added. Making the changes also included research and consultation with the Port of Seattle and the City's Engineering Department.


1/2 19-24-4
E-2
63W
Ud
Cn
Ud
Cn
Ud
Ud
SHORELINE MASTER PROGRAM
ENVIRONMENTAL CLASSIFICATION MAP
ENVIRONMENTAL CLASSIFICATIONS
CN CONSERVANCY NATURAL
CM CONSERVANCY MANAGEMENT
UR URBAN RESIDENTIAL
US URBAN STABLE
US/CW URBAN STABLE/CENTRAL WATERFRONT
US/LU URBAN STABLE/LAKE UNION
UD URBAN DEVELOPMENT
CITY OF SEATTLE
DEPARTMENT OF
COMMUNITY DEVELOPMENT
0 100 200 400 FEET
*For Use and Bulk Regulations, see Article 21A of the Zoning Ordinance.


SHORELINE MASTER PROGRAM
ENVIRONMENTAL CLASSIFICATION MAP
ENVIRONMENTAL CLASSIFICATIONS
CN CONSERVANCY NATURAL
CM CONSERVANCY MANAGEMENT
UR URBAN RESIDENTIAL
US URBAN STABLE
US/CW URBAN STABLE/CENTRAL WATERFRONT
US/LU URBAN STABLE/LAKE UNION
UD URBAN DEVELOPMENT
CITY OF SEATTLE
DEPARTMENT OF
COMMUNITY DEVELOPMENT
0 100 200 400 FEET
*For Use and Bulk Regulations, see Chapter 23A of the Zoning Ordinance.
ORIGINAL
Us/CW
Ud
198
198½
199
197
S. Columbia St.
S Washington St.
S Jackson St.
Alaskan Way
Washington
S Main
Yesler
UNPLATTED
LANDING
WEST
EAST

43E


SHORELINE MASTER PROGRAM
ENVIRONMENTAL CLASSIFICATION MAP
ENVIRONMENTAL CLASSIFICATIONS
CN CONSERVANCY NATURAL
CM CONSERVANCY MANAGEMENT
UR URBAN RESIDENTIAL
US URBAN STABLE
US/CW URBAN STABLE/CENTRAL WATERFRONT
US/LU URBAN STABLE/LAKE UNION
UD URBAN DEVELOPMENT
north
CITY OF SEATTLE
DEPARTMENT OF
COMMUNITY DEVELOPMENT
0 100 200 400 FEET
*For Use and Bulk Regulations, see Article 21A of the Zoning Ordinance.
AMENDED
Cn
Us/CW
Ud
S. Columbia St.
S. Washington St.
S. Jackson St.
S. Main
S. King
Alaska Way
198 1/2
199
UNPLATTED
Yesler
Washington
Jackson
Main
King
1ST AVE


SHORELINE MASTER PROGRAM
ENVIRONMENTAL CLASSIFICATION MAP
ENVIRONMENTAL CLASSIFICATIONS
CN CONSERVANCY NATURAL
CM CONSERVANCY MANAGEMENT
UR URBAN RESIDENTIAL
US URBAN STABLE
US. CW URBAN STABLE CENTRAL WATERFRONT
US. LU URBAN STABLE LAKE UNION
UD URBAN DEVELOPMENT
CITY OF SEATTLE
DEPARTMENT OF
COMMUNITY DEVELOPMENT
0 100 200 400 FEET
*For Use and Bulk Regulations, see Article 21A of the Zoning Ordinance.
ORIGINAL
Cn
Cm
SHILSHOLE BAY
PUGET
N.W.L. 80TH ST.
WATERWAY NO. 2
VACATED CHAPTER 177
REPLATTED
N.W.L. 36TH AVE.

SHORELINE MASTER PROGRAM
ENVIRONMENTAL CLASSIFICATION MAP

ENVIRONMENTAL CLASSIFICATIONS

CN	CONSERVANCY NATURAL
CM	CONSERVANCY MANAGEMENT
UR	URBAN RESIDENTIAL
US	URBAN STABLE
US/CW	URBAN STABLE/CENTRAL WATERFRONT
US/LU	URBAN STABLE/LAKE UNION
UD	URBAN DEVELOPMENT

CITY OF SEATTLE
DEPARTMENT OF
COMMUNITY DEVELOPMENT

*For Use and Bulk Regulations, see Article 21A of the Zoning Ordinance.