



Original sponsors: Sackett, Bennett,  
Ferguson and Moss

Funding Information

General Fund \$12,935,900  
Other Funds - 0 -  
\$12,935,900

1 IN THE SENATE

BY THE FINANCE COMMITTEE

2 HOUSE CS FOR CS FOR SENATE BILL NO. 364 (Finance)

3 IN THE LEGISLATURE OF THE STATE OF ALASKA

4 THIRTEENTH LEGISLATURE - SECOND SESSION

5 A BILL

6 For an Act entitled: "An Act making special appropriations to certain  
7 communities and municipalities for erosion control  
8 projects; and providing for an effective date."

9 BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF ALASKA:

10 \* Section 1. The appropriations made by sec. 2 of this Act are for  
11 capital projects or are otherwise not one-year appropriations and do not  
12 lapse under AS 37.25.010.

13 (Section 2 of this Act follows beginning on page 2.)

1 \* SEC. 2 THE FOLLOWING APPROPRIATION ITEMS ARE FOR  
 2 CAPITAL PROJECTS AND GRANTS FROM THE GENERAL FUND TO THE  
 3 AGENCIES NAMED AND FOR THE PURPOSES EXPRESSED. (ED#\_\_)  
 4 MEANS THAT THE CAPITAL PROJECT IS LOCATED SOMEWHERE  
 5 WITHIN THAT HOUSE OF REPRESENTATIVES ELECTION DISTRICT.  
 6 THIS GEOGRAPHIC REFERENCE HAS BEEN INSERTED BY STAFF AND  
 7 IS FOR INFORMATION PURPOSES ONLY.

	ALLOCATIONS	APPROPRIATION ITEMS	APPROPRIATION GENERAL FUND	FUND SOURCES OTHER FUNDS	
10	*****	*****			10
11	***** DEPARTMENT OF TRANSPORTATION/PUBLIC FACILITIES	*****			11
12	*****	*****			12
13	TRANSPORTATION				13
14	EROSION CONTROL PROJECTS				14
15	NAPAKIAK EROSION ASSESSMENT (ED 25)	100,000	100,000		15
16	*****	*****			16
17	***** GRANTS TO MUNICIPALITIES (AS 37.05.315)	*****			17
18	*****	*****			18
19	DEVELOPMENT				19
20	ED 2 INSIDE PASSAGE-CORDOVA				20
21	ANGOON-EROSION CONTROL PROJECT (ED 2)	246,300	246,300		21
22	ED 6 NORTH KENAI-SOUTH COAST				22
23	VALDEZ-ALPINE WOODS FLOOD CONTROL COMPLETION (ED 6)	300,000	300,000		23
24	ED 16 MATANUSKA-SUSITNA				24
25	MATANUSKA-SUSITNA BOROUGH-MATANUSKA/KING RIVER CONFLUENCE OLD RAILROAD DIKE STABILIZATION (ED 16)	400,000	400,000		25

1 GRANTS TO MUNICIPALITIES (AS 37.05.315) (CONT.) 1

2		ALLOCATIONS	APPROPRIATION ITEMS	APPROPRIATION FUND SOURCES	2
3				GENERAL FUND	OTHER FUNDS
3					
4	MATANUSKA-SUSITNA BOROUGH-SUTTON TO SKWENTA BANK EROSION PROTECTION (ED 16).		70,000	70,000	4
5	ED 17 INTERIOR HIGHWAYS				5
6	DELTA JUNCTION-EROSION CONTROL PROJECT (ED 17)		950,000	950,000	6
7	NENANA-RESTORATION OF ST. MARKS ADDITION (ED 17)		460,000	460,000	7
8	ED 22 NORTH SLOPE-KOTZEBUE				8
9	DEERING-EROSION CONTROL PROJECT (ED 22)		400,000	400,000	9
10	NOORVIK-EROSION CONTROL PROJECT (ED 22)		63,000	63,000	10
11	ED 23 NORTON SOUND				11
12	KOTLIK-EROSION CONTROL PROJECT (ED 23)		1,008,500	1,008,500	12
13	SHISHMAREF-EROSION CONTROL PROJECT (ED 23)		1,400,000	1,400,000	13
14	ED 25 LOWER KUSKOKWIM				14
15	BETHEL-EROSION CONTROL PROJECT (ED 25)		5,000,000	5,000,000	15
16	ED 26 BRISTOL BAY-ALEUTIAN ISLANDS				16
17	TOGIAK-EROSION CONTROL PROJECT (ED 26)		2,192,100	2,192,100	17
18	*****		*****		18
19	***** UNINCORPORATED COMMUNITY GRANTS (AS 37.05.317) *****		*****		19
20	*****		*****		20
21	DEVELOPMENT				21
22	ED 17 INTERIOR HIGHWAYS				22
23	EAGLE VILLAGE/YUKON RIVER EROSION STUDY (ED 17)		100,000	100,000	23
24	ED 19-21 FAIRBANKS DISTRICT				24
25	CIRCLE-PLANNING, DESIGN AND ENGINEERING (ED 19-21)		240,000	240,000	25

1 UNINCORPORATED COMMUNITY GRANTS (AS 37.05.317) (CONT.)

2

3

4

5

ED 22 NORTH SLOPE-KOTZEBUE

NOATAK-EROSION CONTROL PROJECT (ED 22)

ALLOCATIONS	APPROPRIATION ITEMS	APPROPRIATION GENERAL FUND	FUND SOURCES OTHER FUNDS
	6,000	6,000	

1

2

3

4

5

1 \* SEC. 3 THE FOLLOWING SETS OUT THE FUNDING OF THE  
2 APPROPRIATIONS MADE IN THE PRECEDING SECTION OF THIS  
3 ACT.

4 CAPITAL PROJECTS

5 GENERAL FUND

12,935,900

6 \*\*\* TOTAL FUNDING \*\*\*

12,935,900

7 \* \* \* \* \* TOTAL BUDGET \* \* \* \* \*

12,935,900

8 \* SEC. 4 THIS ACT TAKES EFFECT IMMEDIATELY IN  
9 ACCORDANCE WITH AS 01.10.070(C).

1  
2  
3  
4  
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8  
9

# City of Seldovia

FEB 16 1984

P.O. DRAWER 8 TELEPHONE 234-7643  
SELDOVIA, ALASKA 99663

February 14, 1984

Honorable Senator John Sackett  
Alaska State Legislature  
Pouch V  
Juneau, AK 99811

## RE: SB 364 EROSION CONTROL PROJECT

Dear Senator Sackett,

We would be most appreciative if you would consider adding Seldovia to Section 2 of SB 364. The Engineering was completed in 1982 through the Bid Document Phase. The Engineers estimate was \$4,800,000 in 1983-84 dollars. Assuming a 5% increase this would make it a \$5,040,000 Project in 1984-85 dollars.


Copies of the engineer's plans, specifications and bid documents were submitted to Seldovia's Senators and Representatives and DOT/PF when they were completed.

Senator Don Gilman is very familiar with the need for this project and hopefully he can be of assistance.

We thank you for your consideration.

Sincerely,

CITY OF SELDOVIA

  
Carl L. Hille  
City Manager

CLH/ek

cc: Honorable Senator Don Bennett  
Honorable Senator Frank Ferguson  
Honorable Senator Pappy Moss  
Honorable Senator Paul Fischer  
Honorable Senator Don Gilman  
Honorable Representative Milo Fritz  
Honorable Representative Hugh Malone  
bcc: ~~Honorable Senator Joe Hayes~~

# Alaska State Legislature

POUCH V  
JUNEAU, ALASKA 99811



P. O. BOX 9  
KENAI, ALASKA 99611

REPRESENTATIVE HUGH MALONE

## SELDOVIA EROSION CONTROL PROJECT:

\* While the preliminary report endorsed the gabion method of control, the final D.O.T. report endorsed the pile/bulkhead method.

The pile/bulkhead method is a vertical wall (piling, cement) allowing for greater use of space, while accommodating mooring.

INFORMATION OBTAINED FROM SKIP BARKER, D.O.T./P.F. #333-0616

(Anchorage - Central District)



consulting engineers

December 28, 1981

Mr. Carl Hille  
City Manager  
City of Seldovia  
P.O. Drawer B  
Seldovia, Alaska 99663

Dear Mr. Hille:

Subject: Seldovia Slope Protection

It is our pleasure to submit this report covering our preliminary engineering study of the shoreline erosion problem along Seldovia's small boat harbor. We present, herein, our design concepts for your review and comment and, in our opinion, have arranged them in order of greatest overall benefit to Seldovia.

We will be pleased to discuss this report in detail with you and other members of the community. Also, we will attend the City Council meeting of January 13, 1982 for the selection of the specific design alternate to be developed.

Very truly yours,

A handwritten signature in cursive script, appearing to read 'Donald K. Scarberry'.

Donald K. Scarberry, P.E.  
Director Project Management

DKS:lab

EVALUATION OF DESIGN ALTERNATIVES FOR  
BEACH EROSION CONTROL FOR THE  
SELDOVIA SMALL BOAT HARBOR

Prepared for the

CITY OF SELDOVIA  
SELDOVIA, ALASKA

Prepared by

KPFF CONSULTING ENGINEERS  
ANCHORAGE, ALASKA

and

NORTHERN TECHNICAL SERVICES  
ANCHORAGE, ALASKA

December, 1981

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## 1.0 SUMMARY

### 1.1 INTRODUCTION

On October 5, 1981, Mr. Carl Hille, on behalf of the Seldovia City Council, authorized KPFF Consulting Engineers to research and evaluate erosion along the Small Boat Harbor shoreline. Northern Technical Services (NORTEC) was subsequently contracted to provide assistance in various technical aspects of this project.

The scope of this work includes reviewing of data to ascertain oceanographic conditions (including winds, waves, tides and currents) relevant to the erosion problem; examining aerial photography and surveys to define historical beach erosion; and conducting a site reconnaissance to examine the erosion problem. From the results of these activities, various design alternatives were evaluated as solutions to the erosion problem.

### 1.2 OVERVIEW OF THE EROSION PROBLEM

In our study, we have determined that fill material along the northeastern shore of the Seldovia Small Boat Harbor has eroded along its entire length since the fill was placed in 1965. Maximum erosion up to 14 or 15 ft has occurred locally.

Coarser material contained in the fill (materials with diameters of approximately 1 inch or more) have for the most part remained behind as the shoreline retreated to form a steep rocky upper beach slope. Finer materials eroded from the beach have in part accumulated along the toe of this steeper upper beach and have resulted in restricted vessel utilization in portions of the eastern margin of the small boat harbor. Fines washed from the

bluff erosion may also have contributed materials to a shoal which is reported to be forming just outside the harbor entrance.

The primary cause of the beach erosion problem appears to be wave action both from the south and from the northwest. Erosion is particularly intensified when wave action occurs during the higher tides.

### 1.3 DESIGN ALTERNATIVES

Several design alternatives were considered for both reclaiming the eroded beach property and protection of this property from further erosion. These included a gabion structure, a bulkhead, and erosion control mats. Of these alternatives the gabion structure offers the most versatile alternative and in addition appears to be cost effective and can be constructed with a high utilization of local resources.

It is our opinion that the entire length of shoreline along the east and northeast side of the Seldovia Small Boat Harbor (approximately 1,600 ft) should be protected to maintain the value of the impacted property. Without protection, utilization of this area as sites for commercial structures would be further diminished. In addition, maintenance dredging would be required to remove the resulting sedimentation.

## 2.0 ENVIRONMENTAL SETTING

### 2.1 GENERAL

Seldovia is located at the mouth of Seldovia Bay on the southern shore of Kachemak Bay of Cook Inlet (see Figure 1). Seldovia Bay is a narrow protected inlet about 5 miles long and 0.7 miles wide. Mountains 2,000 to 3,000 ft high rise gradually from the east, south and west sides of the bay.

### 2.2 CLIMATE

Detailed climatic data are not available for Seldovia; however, some data are available for Homer located approximately 15 miles northeast of Seldovia on the north side of Kachemak Bay. Although these data are not entirely representative of conditions at Seldovia, they may provide an indication of conditions at the site. A summary of Homer climatic data is provided on Table 1.

Seldovia has a maritime climate which is characterized by cool summers and mild winters. Average monthly temperatures (for Homer) range from 21°F in January to 52°F in July. Below-freezing temperatures normally occur from October through March.

Because of the high mountains on three sides of Seldovia Bay, the area has slightly more precipitation than other areas further north on the Kenai Peninsula. Precipitation is typically less than 2 inches per month during the late winter through summer and increases in the late fall and early winter with a maximum of 3.4 inches occurring in November. Seldovia receives some snow in the winter; however, with the maritime influence, the accumulation of snow is not generally great.



Figure 1. Project location map.

Table 1. Summary of climatic data for Homer, Alaska  
(National Climatic Center, 1976).

<u>Month</u>	<u>Precipitation (inches)</u>	<u>Temperature (°F)</u>	<u>Wind Speed (mph)</u>	<u>Prevailing Direction</u>
January	1.70	21.4	7.7	NE
February	1.54	24.3	7.8	NE
March	1.22	27.6	7.0	NE
April	1.09	35.0	7.0	NE
May	0.91	42.3	7.3	SW
June	1.06	48.7	6.8	WSW
July	1.70	52.3	5.9	WSW
August	2.56	47.0	5.3	WSW
September	2.85	37.4	5.5	NE
October	3.38	28.2	6.4	NE
November	2.76	21.2	7.3	NE
December	2.29	21.4	6.8	NE
Year	23.06	36.5	6.7	NE

Mountains surrounding Seldovia Bay also shield the area against some winds. Those that have the most affect on the small boat harbor area either come from Kachemak Bay or from the head of Seldovia Bay. The southeasterly winds from lower Cook Inlet tend to bring precipitation, whereas northerly winds generally bring fair weather. Mean monthly wind speeds at Homer range from approximately 5 mph in July to near 8 mph in February and prevail from the west-southwest in the summer and from the northeast during the remainder of the year. Orographic effects are likely to channel winds more along a north-south axis at Seldovia.

## 2.3 OCEANOGRAPHY

### 2.3.1 General

Oceanographic factors contributing to the erosion problem at the Seldovia Small Boat Harbor include tides, waves and currents. Each are described in the following sections.

### 2.3.2 Tides

Tides at Seldovia are characterized by two unequal high and low waters occurring over a period of approximately one day. Mean and diurnal ranges from Seldovia are reported at 15.4 ft and 17.8 ft, respectively. Tidal data from Seldovia are summarized in Table 2.

Twelve years of predicted tides as presented in the Tide Tables (National Ocean Survey, 1970-1981) were examined in order to determine the normal extreme astronomical tides for the site. These data, as summarized on Table 3, indicate a mean annual maximum and minimum tidal levels at 22.8 and -5.7 ft (MLLW datum), respectively. Maximum and minimum predicted tides for this period (1970-1981) were 23.2 and -6.1 ft (MLLW datum), respectively.

The March 1964 earthquake reportedly caused a bottom subsidence of 3.7 ft of Seldovia (National Ocean Survey, 1977) and resulted in tidal flooding of most of the old Seldovia waterfront during high tides. The area along the northeast margin of the harbor, which is at an elevation slightly greater than +27 ft (MLLW datum), reportedly has not been flooded by tides since it was filled in following the earthquake.

### 2.3.3 Currents

Currents outside the harbor in Seldovia Bay have an estimated maximum velocity of 1 to 2 knots (National Ocean Survey, 1977). Published current data are not available for the Seldovia Small Boat Harbor; consequently, these data must be obtained from conversations of persons familiar with the area. Most individuals interviewed indicated that currents are negligible inside the small boat harbor but may reach 1 to 2 knots through the harbor entrance during either a flood or ebb tide.

Table 2. Summary of tidal data for Seldovia (U. S. Coast & Geodetic Survey, 1968).

Datum	Elevation (feet above MLLW)
Estimated Highest Water Level	23.0
Mean Higher High Water	17.8
Mean High Water	17.0
Mean Tide Level	9.3
Mean Low Water	1.6
Mean Lower Low Water	0.0
Estimated Lowest Water Level	-5.5

Table 3. Summary of maximum and minimum predicted tide levels for Seldovia (National Ocean Survey, 1970-1981).

Year	Maximum Height (ft, MLLW)	Minimum Height (ft, MLLW)
1970	23.0	-5.4
1971	23.2	-5.9
1972	22.7	-6.0
1973	21.8	-5.9
1974	22.7	-5.8
1975	23.2	-5.3
1976	23.1	-5.8
1977	NA	-5.7
1978	22.2	-5.8
1979	22.9	-5.6
1980	23.1	-5.5
1981	22.8	-6.1
Mean	22.8	-5.7

#### 2.3.4 Waves

Extreme wave heights were calculated from available wind data as there are no published wave data available for Seldovia Bay. Methodology for calculation of wave parameters was generally as indicated by the U. S. Army Coastal Engineering Research Center (1977). For these analyses, effective fetch were calculated for a point located at the entrance to the small boat harbor. Calculations for significant wave heights and periods were conducted assuming a wind speed of 40 mph (fastest mile reported at Homer) and assuming a constant water depth of 50 ft (at high tide). Maximum wave heights were calculated as 2.07 times the significant wave height.

Results of these analyses, as presented on Table 4, indicate that the potential for highest waves is greatest from the north or northwest. Waves from the northeast, east and southeast were considered to be negligible as the area is generally sheltered in these directions. Although there may be some intensification of wave heights near the harbor entrance, wave heights within

Table 4. Predicted extreme wave conditions for the Seldovia Small Boat Harbor entrance.

<u>Direction</u>	<u>Effective Fetch (mi)</u>	<u>Significant Wave Height** (ft)</u>	<u>Maximum Wave Height (ft)</u>	<u>Wave Period (sec)</u>
N	6.7	4.0	8.3	4.0
NE	*	*	*	*
E	*	*	*	*
SE	*	*	*	*
S	0.5	1.5	3.1	2.3
SW	0.9	1.8	3.7	2.6
W	0.9	1.8	3.7	2.5
NW	9.1	4.5	9.3	4.2

\*Area is sheltered from waves generated from these directions.

\*\*Average of the highest 1/3 waves.

the harbor should be slightly lower than the values as indicated on Table 4 as a result of wave refraction and diffraction.

Conversations with local residents indicate maximum waves inside the harbor generally come from either the northwest or southeast and may be 2 to 4 ft in height. Waves from the northwest in particular appear to have longer periods (possibly as much as 5 seconds). Waves from the south may pass over two shoal areas south of the harbor during periods of high tides and produce wave activity within the harbor.

## 2.4 EROSION ANALYSIS

### 2.4.1 General Processes

Based on engineering calculations as presented in the preceding sections and on observations during the site reconnaissance, erosion of the shoreline along the northeast side of the small boat harbor appears to be primarily a result of wave action, particularly during periods of high tide. Fill material along portions of the shore which is eroding appears to consist of excavated and/or shot rock and includes materials ranging from clay sized particles to rock of 2 ft or more in diameter. As this shoreline is eroded, finer materials are washed to the toe of the slope and larger rock is for the most part left in place (see Figure 2). Examination of materials remaining on the upper slope indicate that the rock armor is typically 3 to 6 inches in diameter with occasional rock 2 to 3 ft in diameter. Finer material at the toe of the eroded slope consists primarily of sands and gravels with some clay and silt. Some of these finer materials in the lower slope appear to have been reworked by waves and currents and have been redeposited elsewhere within the boat harbor.



a. Rock present on beach above an elevation of approximately + 6 ft. MLLW.

b. View of beach from the northeast corner of the small boat harbor. Materials on the lower portions of the slope consist primarily of silts, sands and gravels.

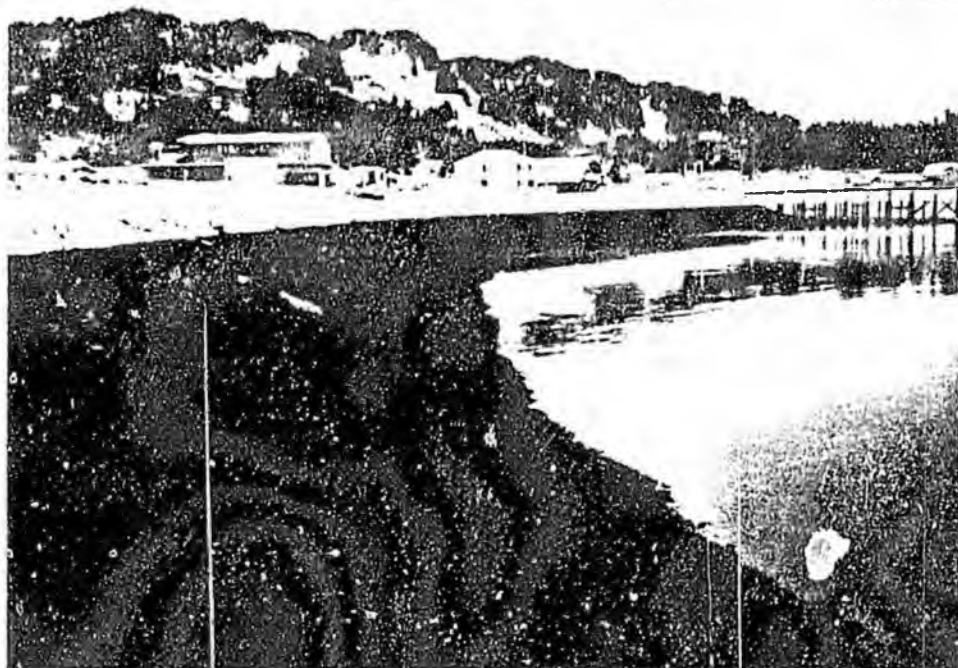


Figure 2. Photographs of the existing shoreline along the northeast side of the Seldovia Small Boat Harbor.

#### 2.4.2 Shoreline Erosion

Shoreline erosion which has occurred since placement of the fill material in 1965 is evidenced in reviewing aerial photography and survey data. This is discussed in the following sections.

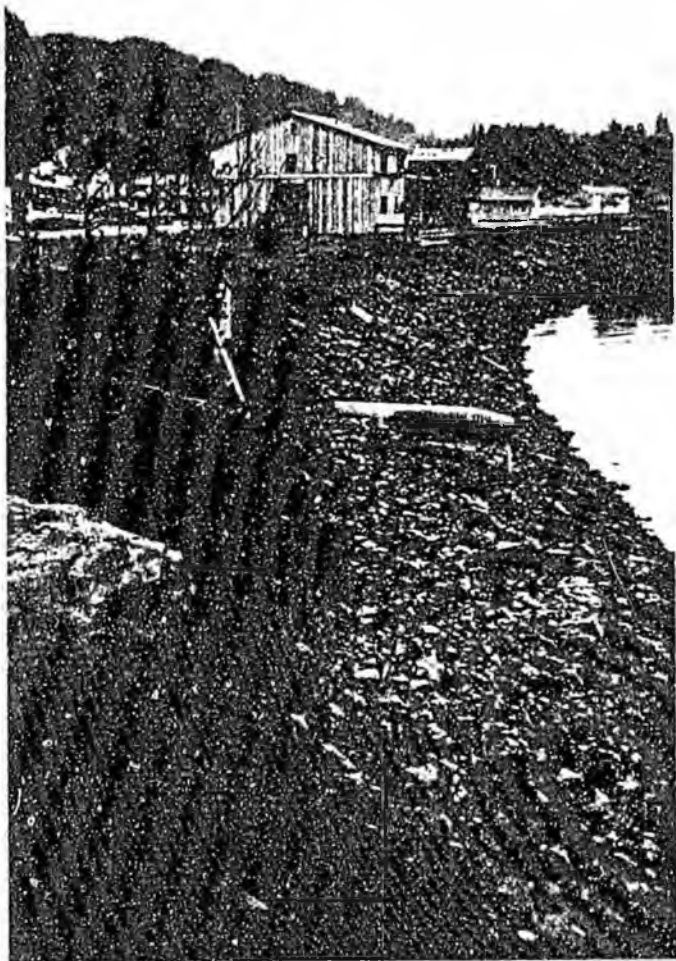
##### 2.4.2.1 Photographic Analysis

Aerial photographs of the small boat harbor were obtained for various dates, as indicated in Table 5, and used to determine gross erosion within various portions of the harbor. The April 22, 1965 photography as indicated on Table 5 was not used in the analysis since it was taken before actual placement of the fill.

Analysis of the aerial photography for the period 1970 to 1981 indicated that shoreline erosion has occurred along the entire northeast margin of the small boat harbor but is most pronounced in three zones. These included:

- Zone 1 - A 400 foot stretch of shoreline extending southward from approximately the north side of the "Linwood Bar" to "The Shop",
- Zone 2 - An area 50 to 75 ft on either side of the approach to the small boat harbor floats, and
- Zone 3 - An area extending from approximately 50 ft north to 100 ft south of the old approach to the small boat harbor.

Indications are that since 1970 up to 10 or 11 ft of shoreline erosion has occurred in both Zones 1 and 3 while 5 to 6 ft has occurred at Zone 2. Figure 3 depicts general conditions at Zones 1 and 3.



a. View of eroded shoreline at Zone 1.

b. View of eroded shoreline at Zone 3.



Figure 3. Photograph of the eroded shoreline in the Seldovia Small Boat Harbor.

Table 5. Summary of aerial photographs available for evaluation of erosion at the Seldovia Small Boat Harbor.

<u>Date of Photography</u>	<u>Scale Used</u>
April 22, 1965	1" = 200'
September 2, 1970	1" = 200'
May 15, 1974	1" = 200'
June 23, 1976	1" = 200'
July 10, 1977	1" = 200'
July 29, 1978	1" = 200'
May 26, 1981	1" = 250'

#### 2.4.2.2 Survey Data

Survey data used for this analysis included results of recent bathymetric and topographic surveys and measurements obtained during the site reconnaissance.

From the site reconnaissance it was determined that culverts at various intervals along the shore of the small boat harbor were nearly flush with the ground surface at the time of placement of the fill in 1965. Consequently, the length of exposed culvert should be indicative of the total amount of bank erosion.

Examination of survey data, particularly results of "Condition Surveys" by the U. S. Army Corps of Engineers, indicate confusing results. These data indicate increases in water depths in areas where sedimentation is most likely. These differences are believed to be attributed to inaccuracies in the horizontal and vertical control used for the surveys.

Examination of all available data suggests that sedimentation from the bluff erosion has occurred primarily in the intertidal area between approximately - 2 ft and + 6 ft (MLLW datum) in the region immediately seaward of the shoreline.

#### 2.4.2.3 Summary of Shoreline Erosion

The amount of shoreline erosion which has occurred to date is depicted on Figure 4 (on the 1978 aerial photograph). These observations and measurements indicate the general shoreline erosion ranged from 3 to 14 feet since 1965. For purposes of comparison, aerial photography for 1965 and 1970 are provided in the Appendix to this report.

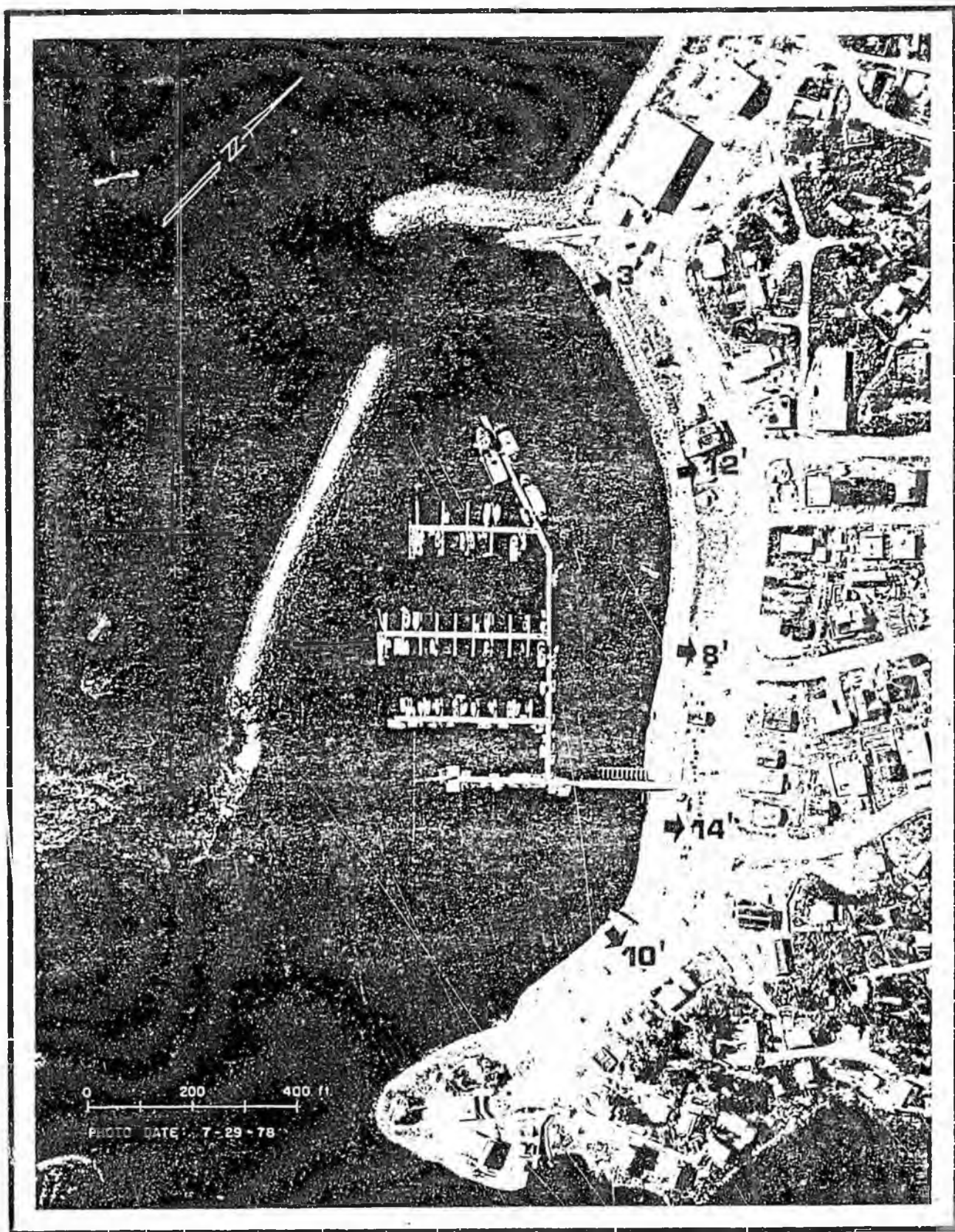


Figure 4. Summary of erosion in the Seldovia Small Boat Harbor for the period 1965 to 1981.

### 3.0 DESIGN ALTERNATIVES

#### 3.1 GENERAL

Criteria used in selection and evaluation of various designs alternatives include:

- (1) Effectiveness in controlling shoreline erosion,
- (2) Reclamation of land eroded to date,
- (3) Cost efficiency,
- (4) Operational safety,
- (5) Aesthetics, and
- (6) Low maintenance requirements.

Based on these criteria, three design alternatives are presented herein: a gabion structure, a bulkhead (wood, concrete or steel), and an erosion control mat. The actual design which is selected may include a single design alternative or may in fact combine various design features in order to optimize utilization of the shoreline area.

A number of additional design alternatives were also considered but were eliminated during preliminary review. Sandbagging was omitted because of its susceptibility to vandalism, high maintenance costs, and aesthetics. Sheet piling was not considered economically feasible because of the presence of near surface bedrock at various locations along the shoreline. High vertical walls set at elevations above MLLW were also dropped from consideration for safety reasons (presents long drop to exposed rocky surface). Although riprapping may be a possibility, suitable material sites for competent, large sized material have not been identified.

Cost estimates for the various design alternatives presented herein are preliminary and are for comparative purposes only. Detailed costs need to be developed as part of the design effort.

\*

### 3.2 GABION STRUCTURE

This alternative includes placement of a gabion structure at an elevation of 5 to 10 ft above MLLW. The structure, as indicated on Figure 5, would extend in a stepped fashion to the top of the existing bluff level of 27 to 28 ft above MLLW. With fill placed behind (shoreward) of the gabions, the shoreline would be extended 15 to 20 feet from its present location.

{ Gabions are rectangular baskets made of heavily galvanized steel wire mesh having openings of 3 to 5 inches. Each gabion is subdivided into cells of equal size by diaphragms. At the construction site they are unfolded and assembled by lacing the edges together and the diaphragms to the sides. Individual gabion units are then laced to each other and filled with 4 to 8 inch stone. The lids are then closed and laced to the top edge of the individual gabions.

The gabion design offers numerous benefits. Construction of this structure can be accomplished using local manpower, equipment and materials. Only the gabion baskets and filter cloth need to be obtained outside Seldovia. Stepped features in the gabion structure should provide a relative degree of safety by limiting vertical faces to approximately 3 feet. The designs could be modified slightly to provide stairway access to the beach.

Costs for the gabion structure as generally depicted on Figure 5 is estimated to be approximately 3.5 million dollars.

### 3.3 BULKHEAD STRUCTURE

The bulkhead alternative as indicated on Figures 6 and 7 includes placement of a piling system to support timber, steel or concrete sheeting. Pile anchors would be required to support

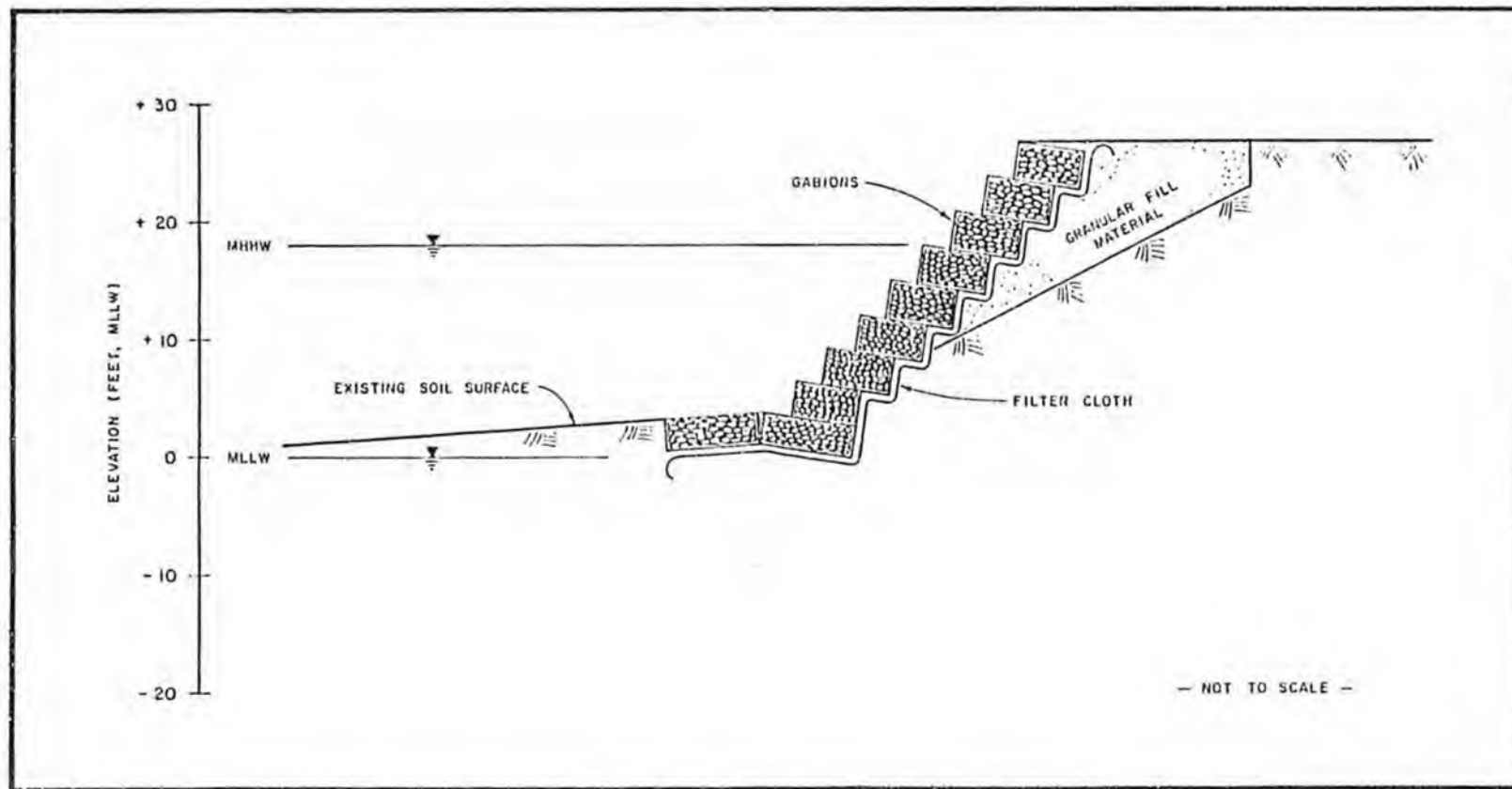


Figure 5. Gabion structure design alternative.

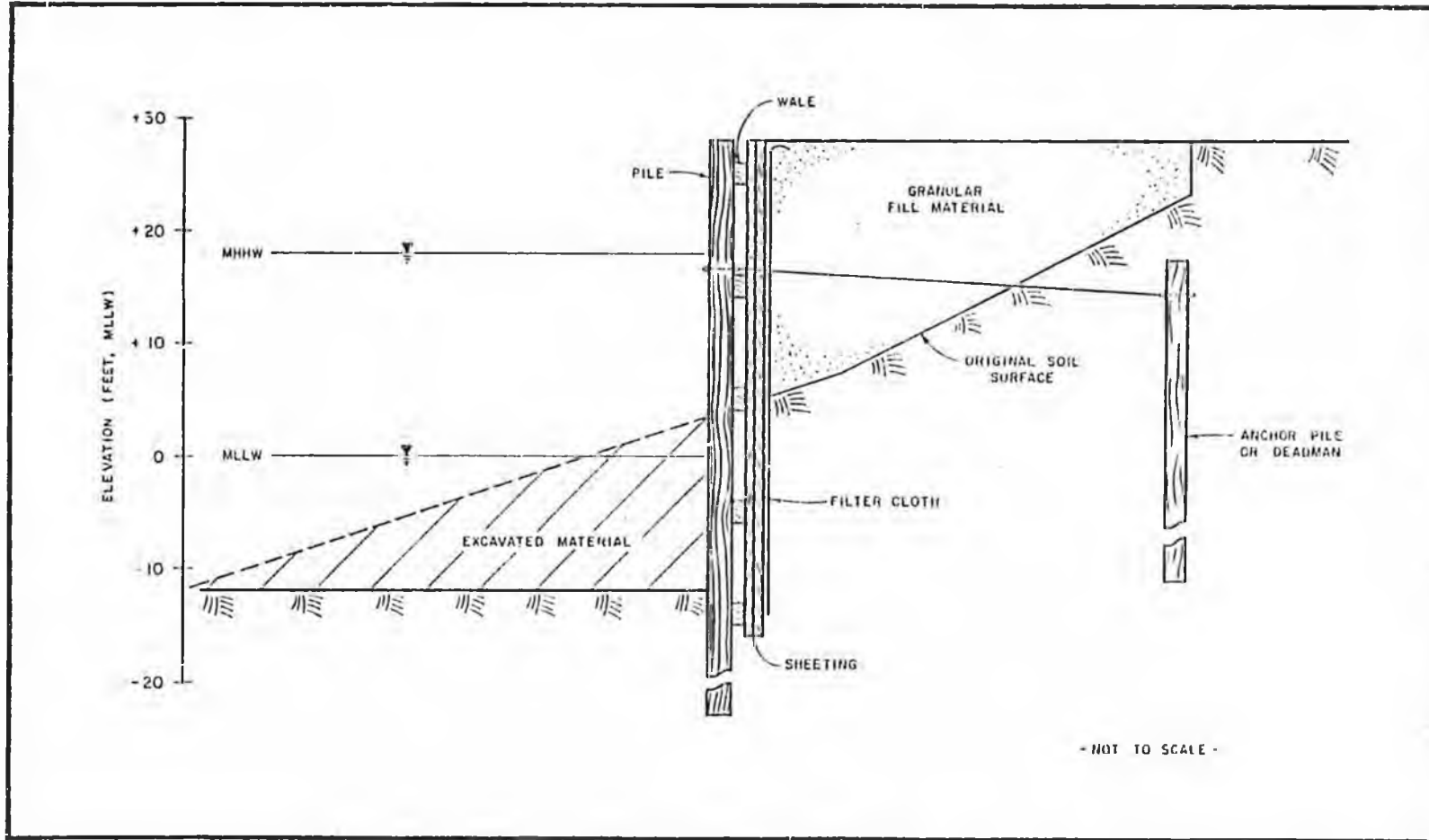


Figure 6. Wood bulkhead design alternative.

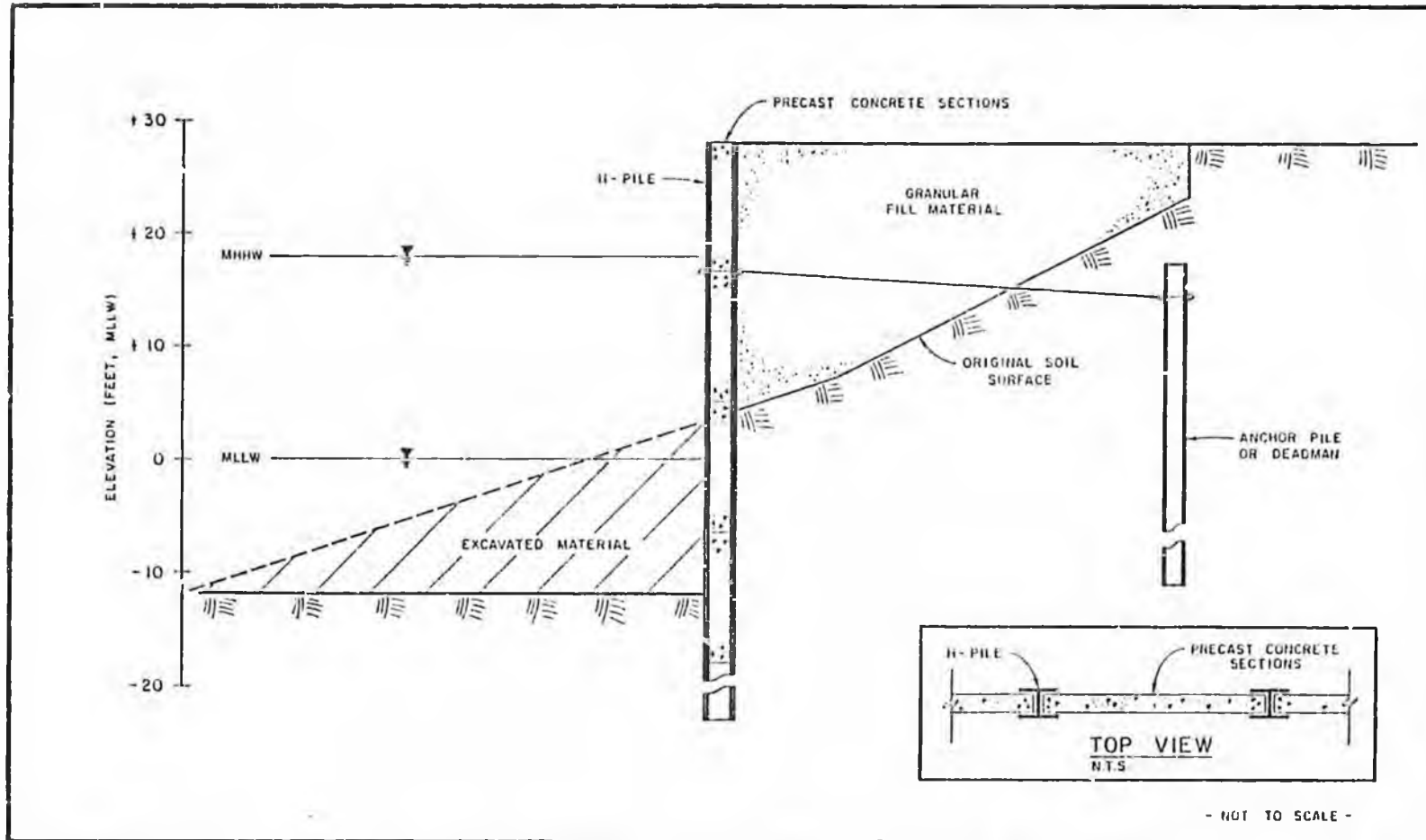


Figure 7. Steel and concrete bulkhead design alternative.

lateral loads from the gravel fill. Excavation seaward of the face of the bulkhead would allow use of the bulkhead structure as a dock.

Advantages to this design is that it extends the shoreline 30 to 40 ft past the existing shoreline as well as provides additional dock space for the area. Disadvantages are that it may provide a safety hazard and that it may promote activities (such as cargo handling) which may distract from existing commercial activities (hotel and bar) along the waterfront. In addition most materials and equipment for this alternative would not be available locally.

Costs for wood bulkhead, as indicated on Figure 6, are estimated to be on the order of 5.5 million dollars.

Steel piling and steel or concrete sheeting, as indicated on Figure 7, might also be used in this alternative and its costs would be roughly 3.75 million dollars (steel) or 4 million dollars (concrete).

### 3.4 EROSION CONTROL MATS

The erosion control mat alternative, as depicted on Figure 8, includes placement of filter cloth and prefabricated concrete mats over the face of the beach from the elevation of 2 feet below MLLW to the top of the bluff which is at 27 to 28 ft above MLLW.

Advantages to this alternative are that the installation may be accomplished rapidly, and the finished product provides easy access across the beach. The primary disadvantage is that the installation is generally limited to a maximum of 2:1 slopes which limits the amount of eroded shoreline which may be reclaimed. Although some local labor and equipment may be used, the erosion control mats would need to be hauled from Anchorage.

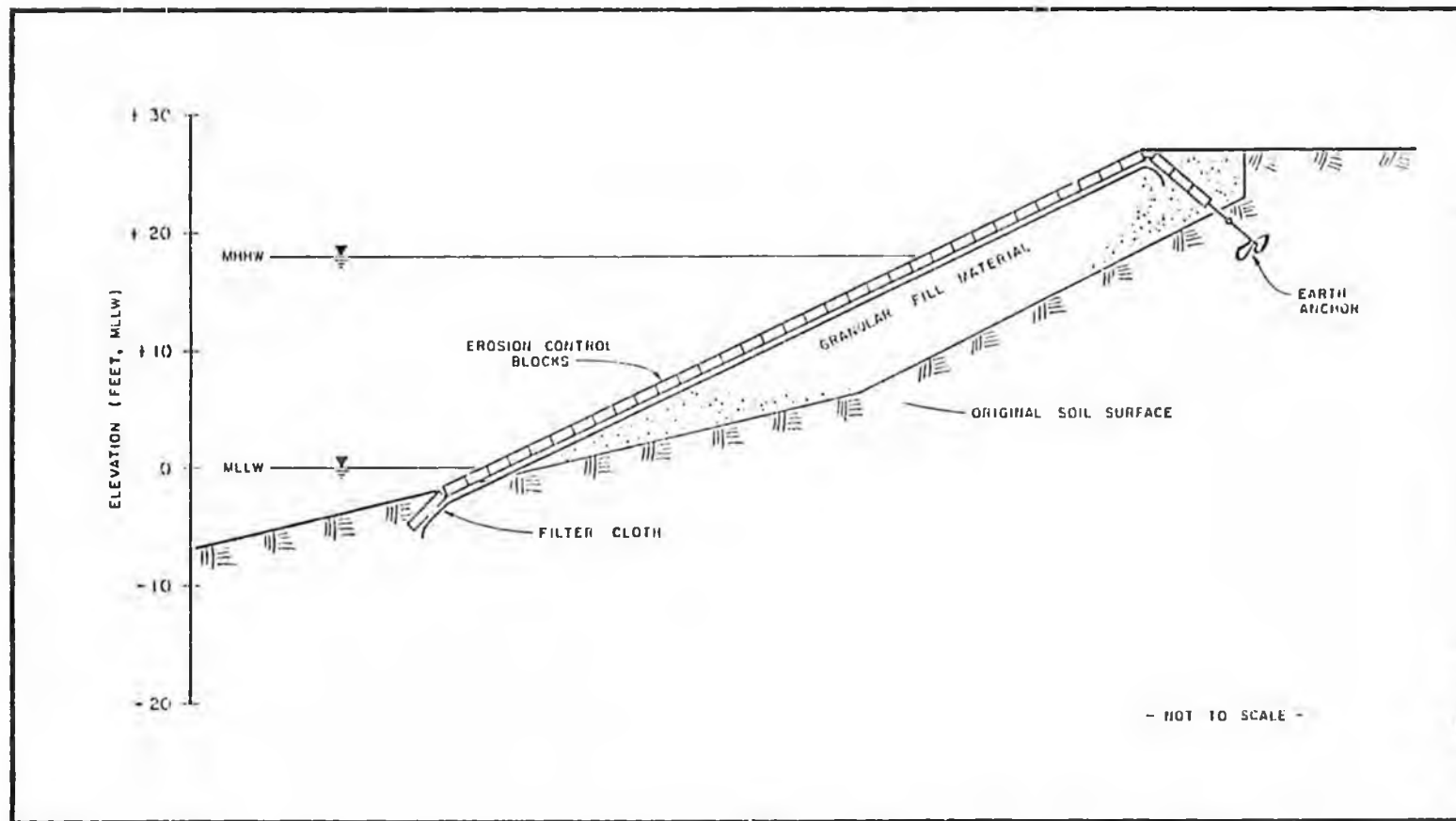


Figure 8. Erosion control mat design alternative.

Costs for this alternative are estimated to be on the order of 3.75 million dollars.

### 3.5 LOCAL RESOURCES

#### 3.5.1 Manpower and Equipment

There are presently two construction companies based in the Seldovia area. Equipment available locally include 10 to 12 cy dump trucks, several backhoes, several dozers, a 2 1/2 cy front-end loader, and a small boom truck.

Manpower availability is seasonal depending primarily on the fishing industry. Based on conversations with local residents, at least 5 to 10 persons may be available at any one time for construction activities.

#### 3.5.2 Material Sources

##### 3.5.2.1 General

Four potential sources are available to provide aggregate, rock and fill materials for various design alternatives for beach protection. These sources as indicated on Figure 9 are described in the following sections.

##### 3.5.2.2 Material Site A

Material Site A is located approximately 1.2 road miles north of the Seldovia small boat harbor and reportedly has potential sources for approximately 500,000 yd<sup>3</sup> of rock and/or fill material (Jon Johnson, Personal Communication). The site consists of a hill which has been stripped of most trees and is partially excavated. Several feet of overburden overlay an undetermined thickness of highly fractured and weathered rock with underlying competent bedrock. Examination of rock samples

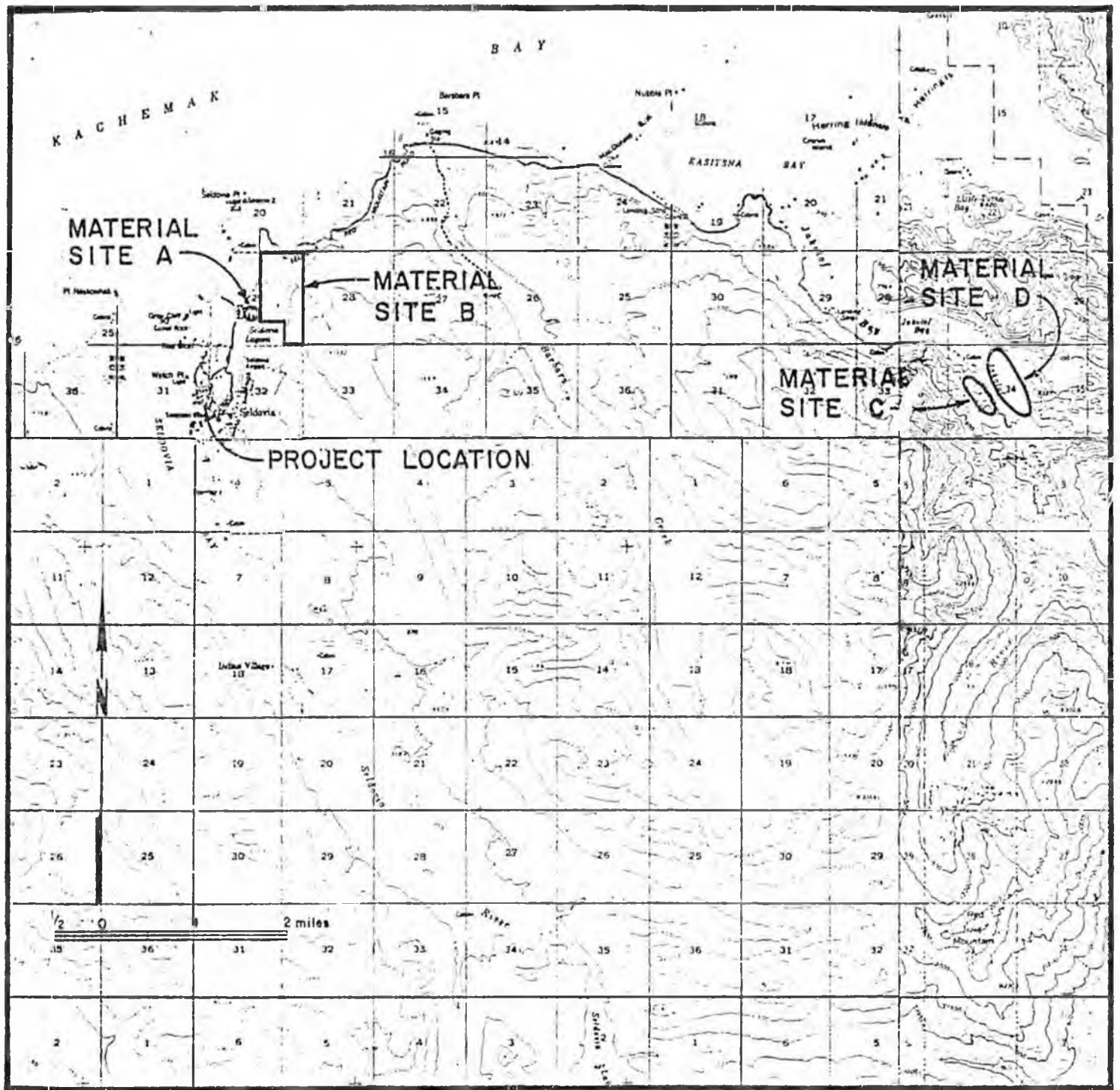


Figure 9. Location map for potential material sites.

from an adjacent hill which has been leveled suggest bedrock is an undifferentiated highly metamorphosed rock (possibly graywacke or greenstone).

Material Site A is owned by Jon Johnson who operates a construction company in Seldovia.

#### 3.5.2.3 Material Site B

Material Site B is located approximately 2 road miles north of the small boat harbor and is a potential source for an undetermined volume of gravel, rock and fill material. The site is owned by the Seldovia Native Association and encompasses approximately 280 acres. Although the site has not been extensively used to date, the owners are presently considering opening a gravel pit at the site (Fred Elvsaas, Personal Communications).

#### 3.5.2.4 Material Site C

Material Site C is located approximately 12 road miles west of Seldovia near the head of Jakolof Bay and is a potential source of rock. Two test borings have been conducted by the Corps of Engineers at the site to assess its suitability for riprap. Based on these test borings, the rock was found to be a dark grey, fine grained graywacke/chert. The rock was reported to be severely sheared and fractured. Much of the rock was also reportedly silicified and resembled a silty chert. Although the rock was reportedly to be of poor to very poor quality for riprap, it might be suitable for fill material.

Land within and adjacent to Material Site C is currently owned by the Seldovia Native Association.

#### 3.5.2.5 Material Site D

Gravel is reported to be available at Material Site C located on the east side of Jakolof Creek some 13 road miles east of the projected site. Although some gravel has reportedly been removed from this area for road construction, quantities and quality of these materials are unknown. It is also reported that a temporary bridge would be needed to cross Jakolof Creek and gain access to the site.

#### 4.0 REFERENCES

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Northern Technical Services, 1981. Geotechnical investigation for the Seldovia boat harbor expansion. Prepared for the City of Seldovia.

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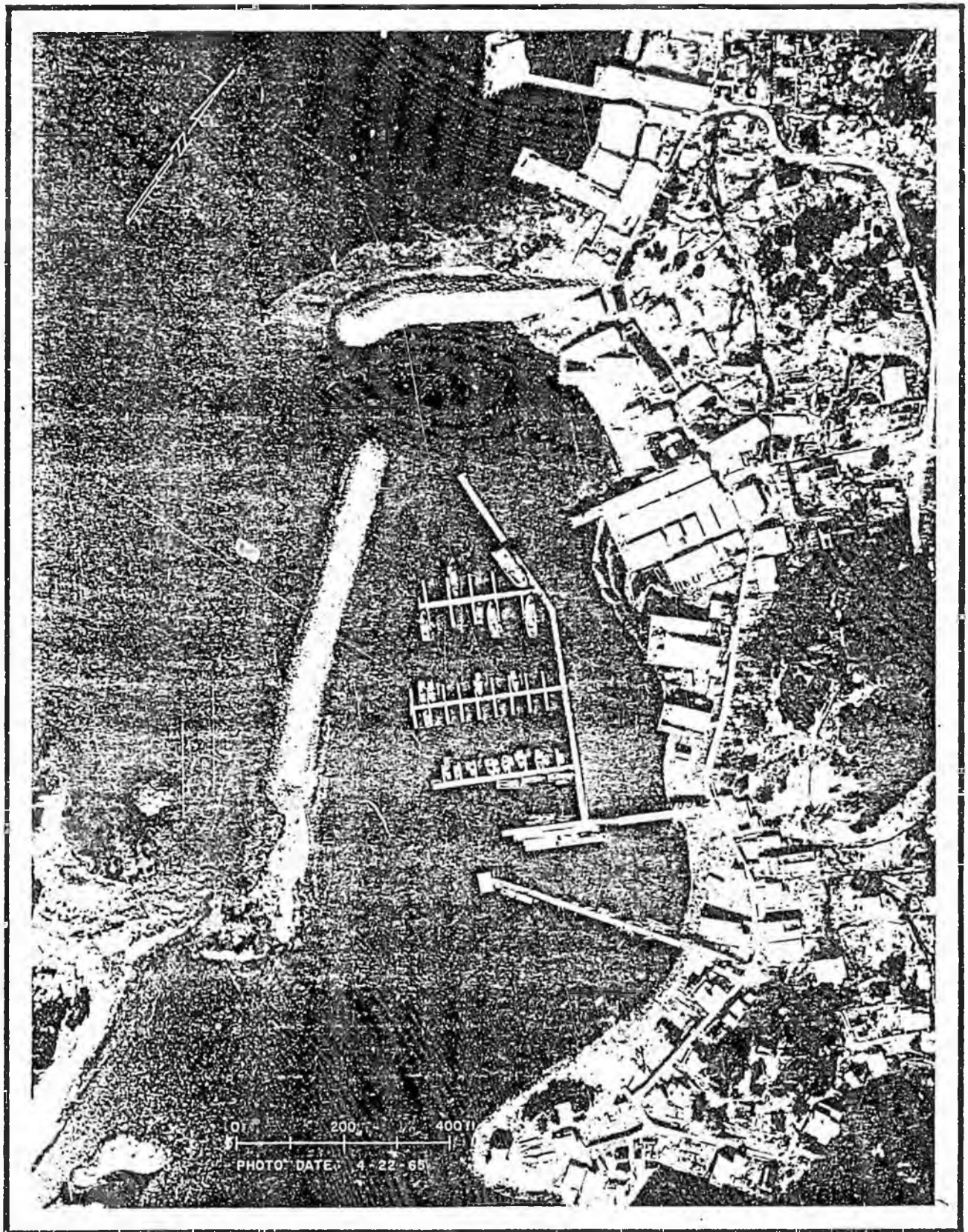
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(U.S.) National Climatic Center, 1976. Local climatological data: Homer, Alaska. National Oceanic and Atmospheric Admin., Envir. Data Service., 4 p.

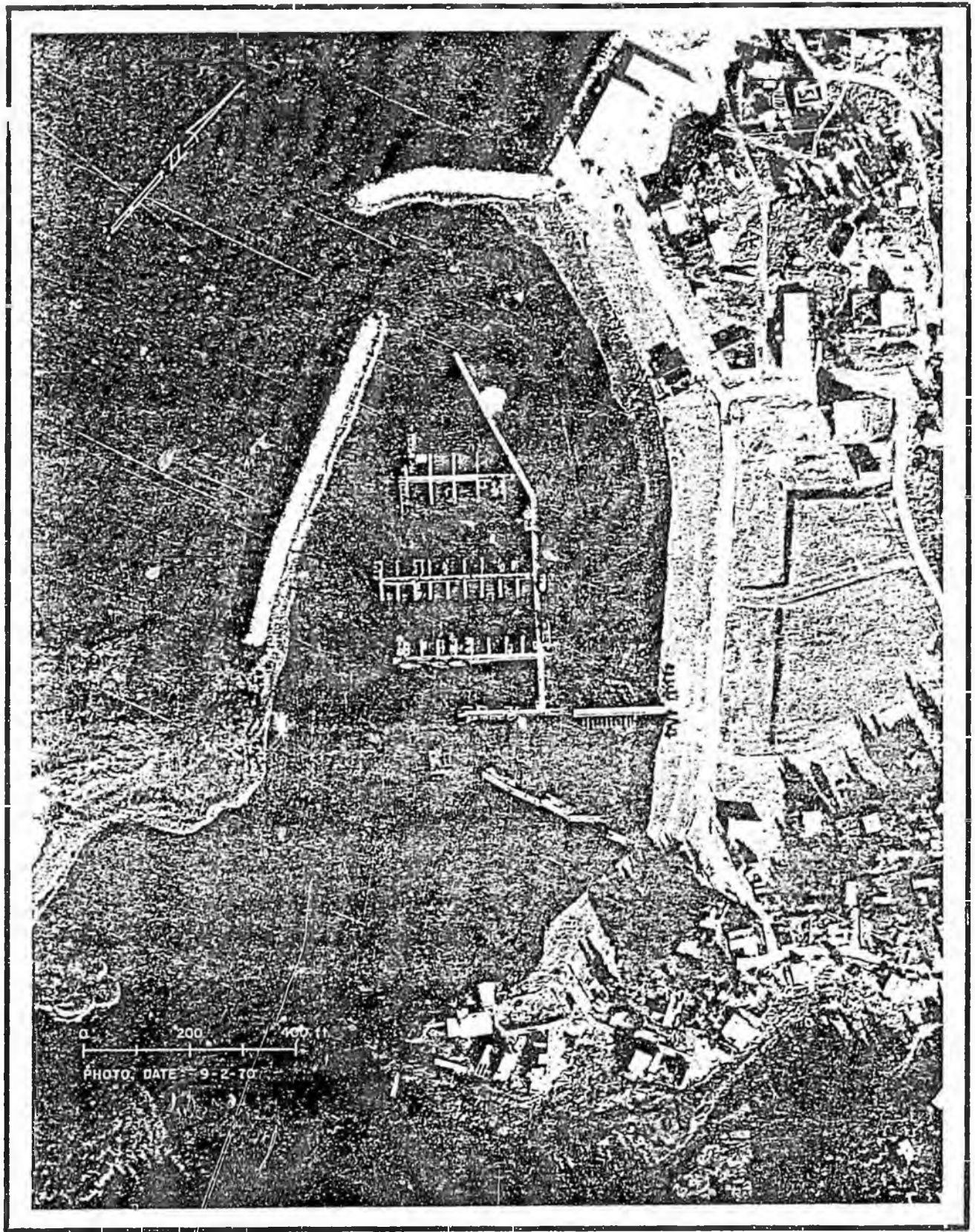
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APPENDIX  
SUPPLEMENTAL AERIAL PHOTOGRAPHY



SELDOVIA SMALL BOAT HARBOR - 4-22-65



SELDOVIA SMALL BOAT HARBOR - 9-2-70

Offered: 2/9/84  
Referred: Rules

Original sponsors: Sackett, Bennett,  
Ferguson and Moss

Funding Information  
General Fund \$13,761,700  
Other Funds - 0 -  
\$13,761,700

1 IN THE SENATE BY THE FINANCE COMMITTEE  
2 CS FOR SENATE BILL NO. 364 (Finance)  
3 IN THE LEGISLATURE OF THE STATE OF ALASKA  
4 THIRTEENTH LEGISLATURE - SECOND SESSION  
5 A BILL  
6 For an Act entitled: "An Act making special appropriations to certain  
7 communities and municipalities for erosion control  
8 projects; and providing for an effective date."  
9 BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF ALASKA:  
10 \* Section 1. The sum of \$13,761,700 is appropriated from the general  
11 fund for payment as grants for erosion control projects to the following  
12 communities and municipalities and in the following amounts:  
13 Kotlik \$1,008,500  
14 Togiak 2,192,100  
15 Port Heiden 340,000  
16 Bethel 5,000,000  
17 Egegik 594,400  
18 Akiak 494,700  
19 Nunapitchuk 326,700  
20 Napakiak 100,000  
21 Shishmaref 1,400,000  
22 Delta Junction 950,000  
23 Deering 400,000  
24 Noatak 6,000  
25 Circle 240,000 (planning, design and  
26 engineering)  
27 Noorvik 63,000  
28 Angoon 246,300  
29 \* Sec. 2. The sum of \$400,000 is appropriated from the general fund for

1 payment as a grant to the Matanuska-Susitna Borough for stabilization of  
2 the old railroad dike at the confluence of the Matanuska River and King  
3 River.

4 \* Sec. 3. The appropriations made by sec. 1 of this Act shall be dis-  
5 bursed in accordance with AS 37.05.315 and 37.05.317. The appropriation  
6 made by sec. 2 of this Act shall be disbursed in accordance with  
7 AS 37.05.315.

8 \* Sec. 4. This Act takes effect immediately in accordance with AS 01.-  
9 10.070(c).

Introduced: 1/20/84  
Referred: Transportation and  
Finance

Funding Information  
General Fund \$30,105,300  
Other Funds - 0 -  
\$30,105,300

BY SACKETT, BENNETT,  
FERGUSON AND MOSS

1 IN THE SENATE

2 SENATE BILL NO. 364

3 IN THE LEGISLATURE OF THE STATE OF ALASKA

4 THIRTEENTH LEGISLATURE - SECOND SESSION

5 A BILL

6 For an Act entitled: "An Act making special appropriations to the Depart-  
7 ment of Transportation and Public Facilities and to  
8 certain communities and municipalities for erosion  
9 control projects and feasibility studies; and provid-  
10 ing for an effective date."

11 BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF ALASKA:

12 \* Section 1. The sum of \$275,000 is appropriated from the general fund  
13 for payment as grants for feasibility studies of erosion control projects  
14 to the following communities and municipalities and in the following  
15 amounts:

16	Naknek	\$100,000
17	Nenana	100,000
18	Juneau	75,000

19 \* Sec. 2. The sum of \$29,785,300 is appropriated from the general fund  
20 for payment as grants for erosion control projects to the following  
21 communities and municipalities and in the following amounts:

22	Kotlik	\$1,008,500
23	Tuntutuliak	570,900
24	Clark's Point	3,295,200
25	Kipnuk	431,200
26	Togiak	2,192,100
27	Port Heiden	340,000
28	Bethel	7,800,000
29	Aniak	1,445,300

1	Egegik	594,400
2	Akiak	494,700
3	Nunapitchuk	326,700
4	Napakiak	100,000
5	Shishmaref	1,400,000
6	Galena	5,000,000
7	Delta Junction	96,000
8	Deering	400,000
9	Noatak	6,000
10	Circle	2,000,000
11	Noorvik	63,000
12	Koyukuk	400,000
13	Huslia	345,000
14	Angoon	246,300
15	Yakutat	1,230,000

16 \* Sec. 3. The sum of \$45,000 is appropriated from the general fund to  
 17 the Department of Transportation and Public Facilities for costs related to  
 18 erosion control projects and feasibility studies, including travel ex-  
 19 penses, for which grants are made under secs. 1 and 2 of this Act.

20 \* Sec. 4. The appropriations made by secs. 1 and 2 of this Act shall be  
 21 disbursed in accordance with AS 37.05.315 and 37.05.317.

22 \* Sec. 5. This Act takes effect immediately in accordance with AS 01.-  
 23 10.070(c).