SB

91

SB 91 TITLE & SPONSOR SUMMARY 10:57 6/27/83 PAGE 1 OF 2

AMENDED TITLE:
AN ACT MAKING SPECIAL APPROPRIATIONS FOR PAYMENT AS GRANTS TO THE CITY OF BETHEL AND THE CITY OF GALENA FOR RIVERBANK STABILIZATION PROJECTS; AND PROVIDING FOR AN EFFECTIVE DATE

PRIME SPONSOR: SACKETT

GENERAL DOLLARS: $15,000,000 (APPROP)

OTHER DOLLARS: $0

CO-SPONSORS:

CURRENT STATUS: 3/02/83 IN (S) FINANCE

SB 91 SENATE ACTION 10:57 6/27/83 PAGE 2 OF 2

DATE	SEQ	PAGE	LEGISLATIVE ACTION
01/31/83	01	0100	FIRST READING -- COMMITTEE REPORTS
03/02/83	02	0296	TRAN -- DP04 FINANCE RULES
****	**	**	*** *** ***

M E M O R A N D U M

Date: February 25, 1983

Subject: Attached Back-up for SB 91

To: All Committee Members
Senate Transportation Committee

From: H. Pappy Moss, Chairman
Senate Transportation Committee

Please find attached back-up material submitted by the City of Bethel for SB 91.

We have requested a fiscal note from the Department of Community Affairs; however, it has not yet arrived.

Please bring the attached report to the committee meeting Tuesday since we have limited copies available.

Alaska State Legislature

SENATOR
H. PAPPY MOSS
P.O. BOX 182
DELTA JUNCTION, ALASKA 99737
(907) 895-4384

WHILE IN JUNEAU
POUCH V
JUNEAU, ALASKA
99811
(907) 465-4921

State Senate

MEMORANDUM

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COMMITTEE REPORT

SENATE

FURTHER: FINANCE

1/31/83

Date: March 1, 1983

Mr. President:

The Committee on TRANSPORTATION has had SENATE BILL NO. 91

Making special appropriations for payment as grants to the City of Bethel and the City of Galena for riverbank stabilization projects; eff. date.

under consideration and (a majority of the committee) (the committee) reports it back with the following recommendations:

[X] do pass [ ] do not pass

[ ] do pass with attached amendments(s)

[ ] replace with CS for _____ [ ] same title [ ] new title

and recommends _____

[ ] AND attaches a "Letter of Intent" [ ] New Fiscal Note

[ ] reports it back without recommendation

[ ] referred to the _____ Committee

MEMBERS SIGNING
DO PASS

Don Bergman
Bettye Fahrenkamp
Joe Josephson

MEMBERS HAVING
OTHER RECOMMENDATIONS:

R. Page Wilson
CHAIRMAN

S 60 (Rev. 12/78)

STATE OF ALASKA
PRELIMINARY STATEMENT OF FISCAL IMPACT

Bill No: SB 91 Date on Bill: January 31, 1983
Title: ...Special Appropriation..Bethel...Galena for Riverbank Stabilization Projects
Sponsor: Sackett
Requestor:

1. Estimated fiscal impacts on:

a. Expenditures:

(Thousands of Dollars)

			FY 83	FY 84	FY 85	FY 86	
Capital			15,000.0	Ø	Ø		
Operating			3.0	4.0	4.0		
Total			15,003.0	4.0	4.0		

b. Revenues:

Revenue			Ø	Ø	Ø		

2. Source of funds to offset fiscal impact of bill:

3. Assumptions:

4. Disclaimer:
This statement has not been reviewed by the OMB in the Office of the Governor.

Prepared By: Kenneth R Balls Phone: 465-2277
Division: Director, Division of Administrative Services Date: March 1, 1983

Approved by Commissioner: Bill Kendall Date: March 1, 1983
Department: Admin.

5. Distribution:
Original to Legislative Finance
Copy to Department
Copy to Sponsor
Copy to Requestor

2/8/83

7/0301-05/BDGSF1

POSITION PAPER
SB 91

Fiscal propriety demands that the State maintain project monitoring capability to ensure that the grant funds are spent for the project, and are managed according to Borough or Municipal fiscal procedures. Accordingly, a minimal State operating budget impact will be felt with the passage of each special appropriation under AS 37.05.315-37.05.319, such as this specific bill proposes. I should point out at this time that local governments have recognized their similar responsibilities when awarding grants to local social service providers, etc. Municipalities charge an administrative overhead fee of one to three point eight percent per grant. The Department of Administration requests that the specific grant appropriation language acknowledge a State agency overhead factor of up to .5% (one half of one percent) as Department of Administration operating costs for all special appropriations awarded under AS 37.05.315.

The Department questions the historical practice promoted under AS 37.05.315 and wonders if the Department of Community and Regional Affairs might be of better assistance to local governments through its Local Government Assistance program. Whereas the Department of Administration functions as a centralized control agency for all other Executive Branch agencies, the Department of Community and Regional Affairs is specifically charged with the responsibility of assisting local government in maximizing services to citizens.

Kenneth R Ryals March 1 1983
Director, Division of Administrative Services

Ron S Rudd 3/1/83
Commissioner
Department of Administration

1/0301-01/COMM

Alaska State Legislature

SENATOR
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MASTER PLAN AND REPORT

FOR

PORT DEVELOPMENT

AT

BETHEL, ALASKA

CONSISTING OF

GENERAL CARGO DOCK
PETROLEUM PRODUCTS DOCK
RIVERBANK STABILIZATION

PREPARED FOR

THE CITY OF BETHEL

BETHEL, ALASKA

PREPARED BY

HAROLD H. GALLIETT, JR.

CONSULTING ENGINEER

ANCHORAGE, ALASKA

GEORGE C. SILIDES

CONSULTING ENGINEER

FAIRBANKS, ALASKA

APRIL 1981

REVISED JANUARY 1983

TABLE OF CONTENTS

SELECTED BIBLIOGRAPHY

Comprehensive Study Report For A Medium Draft Port Facility, for the Alaska Division of Waters and Harbors and the City Of Bethel, November 1971

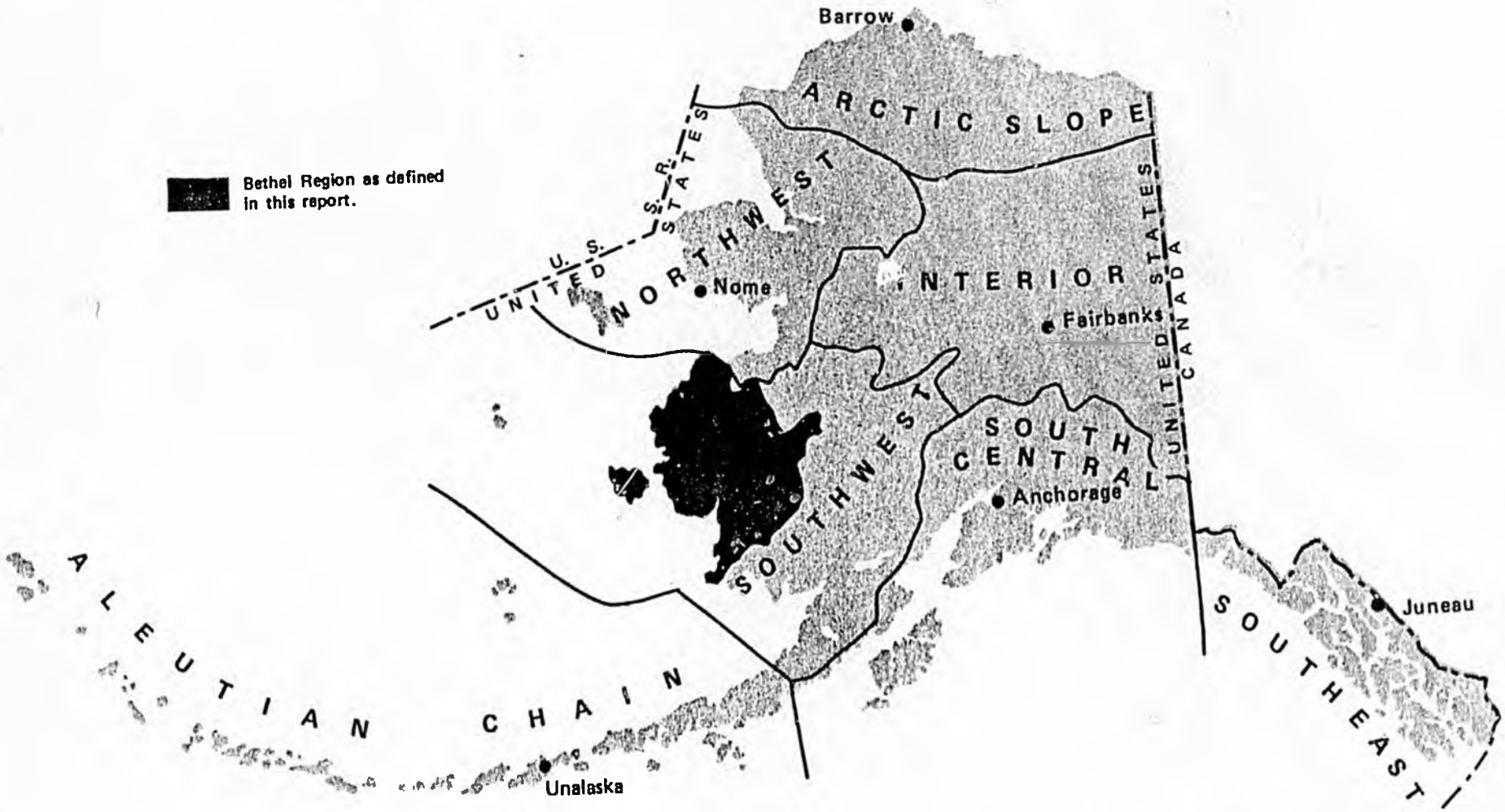
Cost/Benefit Report To The U.S. Army Corps Of Engineers Of A Permanent Erosion Control Project At Bethel, Alaska; by the Office Of Planning and Citizens Committee, Bethel, 1977 & 1978

Environmental Impact Statement And Feasibility Report, Bank Stabilization, Bethel, Alaska, by the U.S. Army Corps Of Engineers, Alaska District, April 1981

Western Alaska Area Transportation Study, Alaska Department Of Transportation And Public Facilities, 1982

Legislative Journals And Budget History, FY 1973 - FY 1983

PLATE 1



MAJOR ALASKA REGIONS

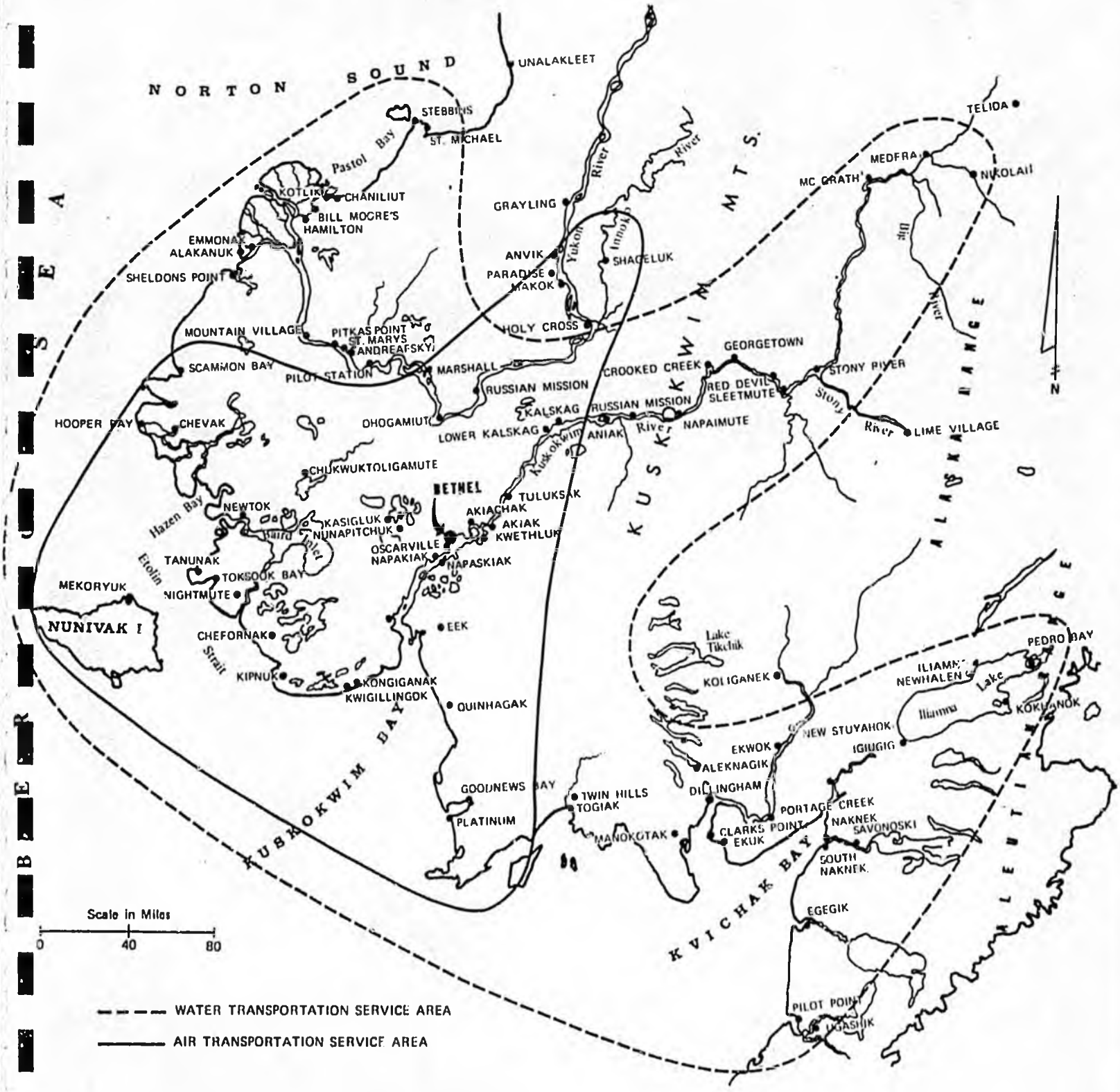

NORTON SOUND
BERING SEA
UNALAKLEET
STEBBINS
ST. MICHAEL
Pastol Bay
KOTLIK
CHANILIUT
BILL MOORE'S
HAMILTON
EMMONAK
ALAKANUK
SHELDONS POINT
MOUNTAIN VILLAGE
PITKAS POINT
ST. MARYS
ANDREAFSKY
SCAMMON BAY
PILOT STATION
MARSHALL
HOOPER BAY
CHEVAK
OHOGAMIUT
CHUKWUKTOLIGAMUTE
BETHEL
NEWTOK
Hazen Bay
KASIGLUK
NUNAPITCHUK
Baird Inlet
OSCARVILLE
NAPAKIAK
NAPASKIAK
TANUNAK
Etolin Strait
TOKSOOK BAY
NIGHTMUTE
MEKORYUK
NUNIVAK I
CHEFORNAK
EEK
KIPNUK
KONGIGANAK
KWIGILLINGOK
QUINHAGAK
KUSKOKWIM BAY
GOODNEWS BAY
PLATINUM
TWIN HILLS
TOGIAK
MANOKOTAK
GRAYLING
ANVIK
PARADISE
MAKOK
HOLY CROSS
SHAGELUK
Yukon River
Innoko River
RUSSIAN MISSION
KALSKAG
LOWER KALSKAG
ANIAK
Kuskokwim River
TULUKSAK
AKIACHAK
AKIAK
KWETHLUK
KUSKOKWIM MTS.
TELIDA
MEDFRA
NIKOLAI
MC GRATH
Big River
GEORGETOWN
CROOKED CREEK
RED DEVIL
SLEETMUTE
STONY RIVER
Stony River
LIME VILLAGE
NAPAIMUTE
ALASKA RANGE
Lake Tikchik
KOLIGANEK
NEW STUYAHOK
EKWOK
ALEKNAGIK
DILLINGHAM
CLARKS POINT
EKUK
PORTAGE CREEK
NAKNEK
SAVONOSKI
SOUTH NAKNEK
KVICHAK BAY
EGEGIK
PILOT POINT
UGASHIK
ILIAMNA
NEWHALEN
Lake Iliamna
PEDRO BAY
KOKHANOK
IGIUGIG
ALEUTIAN RANGE
Scale in Miles
0
40
80
WATER TRANSPORTATION SERVICE AREA
AIR TRANSPORTATION SERVICE AREA

PLATE 2

PLATE 3 - BETHEL 1981

SPECIAL SUMMARY FOR THE EXECUTIVE

PORT OF BETHEL DEVELOPMENT

The Port of Bethel, which accommodates large ocean going barges at all stages of the tide, is the most important port of entry into Western Alaska. The port is the receiving and transshipment center for more than 60 coastal and river communities in an area comprizing more than 100,000 square miles. Plates 1 and 2 of this Special Summary show the extent of Bethel's influence, and of the Region's dependence.

Because of its pre-eminent position as the Regional service center, Bethel has doubled its population within the past decade, and now ranks seventh in size among Alaska's cities. At the present time it appears to be Alaska's fastest growing city, in terms of rate of population increase.

Notwithstanding current expansion of facilities at the second most important Western Alaska ports, Dillingham and St.Marys, and the proposed, very expensive, port facility at Nome, Bethel will remain the best port in terms of versatility, initial construction costs, generation of income for its own maintenance, life cycle costs, creation of employment and the maximum number of people served.

In the future, it is anticipated that the Port of Bethel will also handle diverse shipments such as timber harvested along

the Yukon and Kuskokwim Rivers, and agricultural and refined petroleum products from the Interior. At that time, not only will the Port of Bethel increase its service area toward Bristol Bay and the Alaska Peninsula, but will establish ties to the Asian Pacific Rim.

The following data for the Port of Bethel is summarized from the Western Alaska Area Transportation Study (WAATS) for the Alaska Department of Transportation.

1979	General (Dry) cargo throughput	23,714 Tons
1985	Average throughput forecast	29,110 Tons
1990	" " "	34,518 Tons
1995	" " "	41,096 Tons
2000	" " "	45,725 Tons

1979 Bulk fuel throughput, 21 million gallons

1982 Bulk fuel throughput, 24 million gallons, which already equals the old forecast of 23.9 million gallons for the year 2000

The first usable general cargo dock and staging area to be built in Bethel was completed in 1974. The facility became inadequate in size by 1980. Photographs appended to this summary show the crowded condition, even in the winter.

In order to accommodate the forecasted increase in dry cargo, WAATS recommends that the present dock face be lengthened from 200 linear feet to 400 linear feet, and that the staging /warehouse area be increased from the present 3.5 acres to 9.2 acres.

The consequences of not enlarging and improving docking and staging area facilities in pace with expected cargo increases will result in, a) Unavailability of consumer goods to Bethel and to the Bethel Service Area and, b) A much higher cost for those goods which are delivered.

In 1980, to properly plan and to present plans for adequately meeting the responsibilities placed upon it as the Regional Center, Bethel began a Master Plan for Port of Bethel Development, essentially consisting of three parts;

1. General Cargo Dock and Staging Area expansion, improvement and protection.
2. Construction of a Petroleum Products Dock, to protect the Region's main bulk fuel storage facility, and to facilitate the receipt and transshipment of fuel oil and motor fuel.
3. Construct Riverbank Stabilization And Protective Works (commonly referred to as the Bethel "Sea Wall"), to create a marginal pier and to arrest the loss of riverbank to the erosion that is seriously threatening the physical and economic safety of the community and, as a consequence, the economics of the Region.

With State financial assistance, a part of the Master Plan has been implemented, as follows:

1. The Brown's Slough portion of the Cargo Dock was expanded in 1982 to serve as a work area for the coastal and river barges engaged in transshiping. See 1st and 2nd photos, Appendix.
2. Property acquisition for the Cargo Dock, Warehouse and Staging Area expansion and improvement is underway. Purchase of the necessary property will exhaust the remainder of the funds appropriated in FY 1982 for Cargo Dock expansion. Construction Plans, Documents and Specifications are complete. Further construction is in abeyance, awaiting funding.
3. The new Petroleum Products Dock is currently under construction during the winter months. See 3rd, 4th and 5th photos, Appendix.
4. River surveys and test pile programs have been completed, and conceptual plans for the Riverbank Stabilization Works and Marginal Pier have been prepared. They are the fold-outs at the back of this report.
5. Construction Plans, Documents and Specifications for approximately 6% of the proposed "Sea Wall" are in the process of completion. Proposals for material supply are being negotiated. Obligation of funds for this minor portion of the necessary work has exhausted all State assistance funds appropriated to date.

U.S. Army Corps of Engineers Plates D-3.1 through D-3.8, inserted in the Appendix show the Historic Rate Of Erosion that can

be expected if no adequate riverbank stabilization measures are taken. The estimated loss of land and improvements, discounted in value to reflect 1982 dollars, is calculated by the Corps, as follows:

Loss Between 1980 to 1990	$ 10,850,000
Loss Between 1990 to 2000	$ 16,447,000
Loss Between 2000 to 2020	$ 9,876,000
Total Loss In 1982 $$$	$ 37,173,000

The losses include the bulk fuel plant, the city dock and the the hospital, and show the loss in dollar value of the improvements only. The causation and effects of human misery is not calculable. By any rational criteria, it is not acceptable.

Riverbank erosion abatement measures currently in force at Bethel are shown on the 6th - 11th photos. These photos show the serious, intense efforts undertaken by the community as an interim measure. Results are marginal, at best, and definitely temporary.

There appears little to say about the conditions shown by the photos that they do not say for themselves except that, considering even only a portion of the foregoing, any Administrative and/or Legislative failure to provide assistance is unreasonable, in view of the massive proposed appropriations by the larger urban communities. "Enhancing" the quality of life in urban Alaska is worthwhile --- providing the basics for survival in rural Alaska is still a necessity that cannot be ignored. In this instance, without an early undertaking of a sustained program of riverbank stabilization, much of the industrial section of the waterfront

and parts of the residential section will continue to be lost. In that most likely occurrence, the existing cargo dock, and the bulk fuel tank farm and new petroleum products dock will also be hazarded.

It is easily seen that the benefits to Southwest Alaska from Bethel Port improvements and bank stabilization exceed the cost of facility construction, and that funding for the Bethel port development/riverbank stabilization program is in keeping with both Administrative and Legislative fiscal policy of development.

It is requested that the Legislature appropriate and grant to the City of Bethel the necessary funds to implement the program of construction, as per the Budget shown on the following two pages, and that the Administration sponsor and fully support the appropriated grant.

A closing word regarding rumors of Federal participation in Bethel Riverbank protection. Without going into great detail for the reasons, we feel that, at best, the earliest any Federal participation can be hoped for would be in calendar year 1986, something we would give odds against its happenning. Furthermore, the proposed Federal plan now under consideration involves the placement of large stone rip-rap. Even if that rip-rap were to become available from some place far from Bethel, it would be a substitution of stone rubble for junked vehicles, effectively denying bank use and river access. To a society river oriented out of necessity, such compounding of the problem makes little sense or useful acceptability.

PROPOSED BUDGET FY 1984- FY 1987

PORT OF BETHEL DEVELOPMENT

Bank Stabilization & Marginal Pier

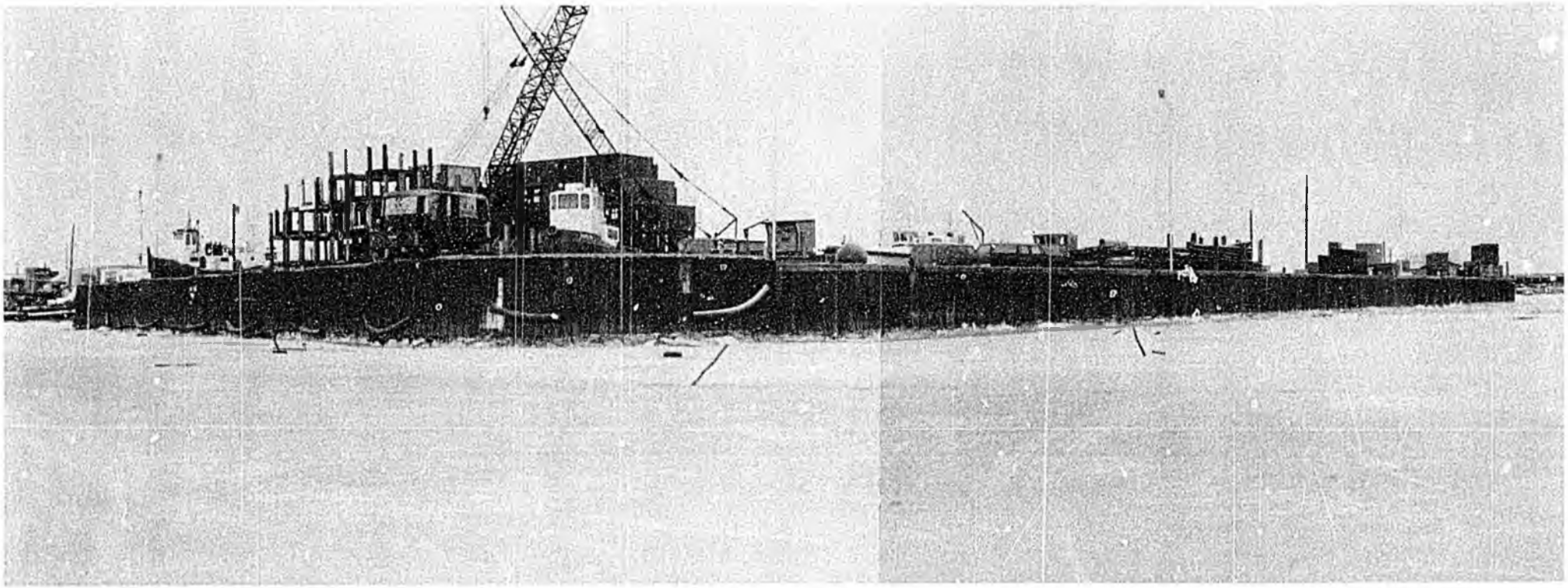
Cargo Dock Improvement & Expansion

Budget Estimate (In Thousands)

Year(s)	Item	$ 1983	$ Future
FY 1984 Spring & Summer 83	2,000 Linear Feet Of Pipe Pile Bulkhead From Cargo Dock To Main Street	3,290	3,290
FY 1984 Summer'83	500 Linear Feet Of Pipe Pile Bulkhead Petroleum Products Dock Protection	0,822	0,822
FY 1984 Fall 1983 to Summer 1984	1,600 Linear Feet Of Pipe Pile Bulkhead From Main Street To Mission Road, Plus	3,232 (2,632)	3,476 (2,830)
	Concrete Boat Access Ramp	(0,600)	(0,646)
FY 1985 Fall 1984 to Summer 1985	Cargo Dock Expansion And Improvements	2,412	2,788
	Warehousing	1,000	1,156
FY 1985 Fall 1984 to Summer 1985	1,000 Linear Feet Of Pipe Pile Bulkhead From Lousetown Slough To Brown's Slough And	2,262 (1,645)	2,614 (1,901)
	750 Linear Feet Of H Pile & Timber Bulkhead To Bridge	(0,617)	(0,713)

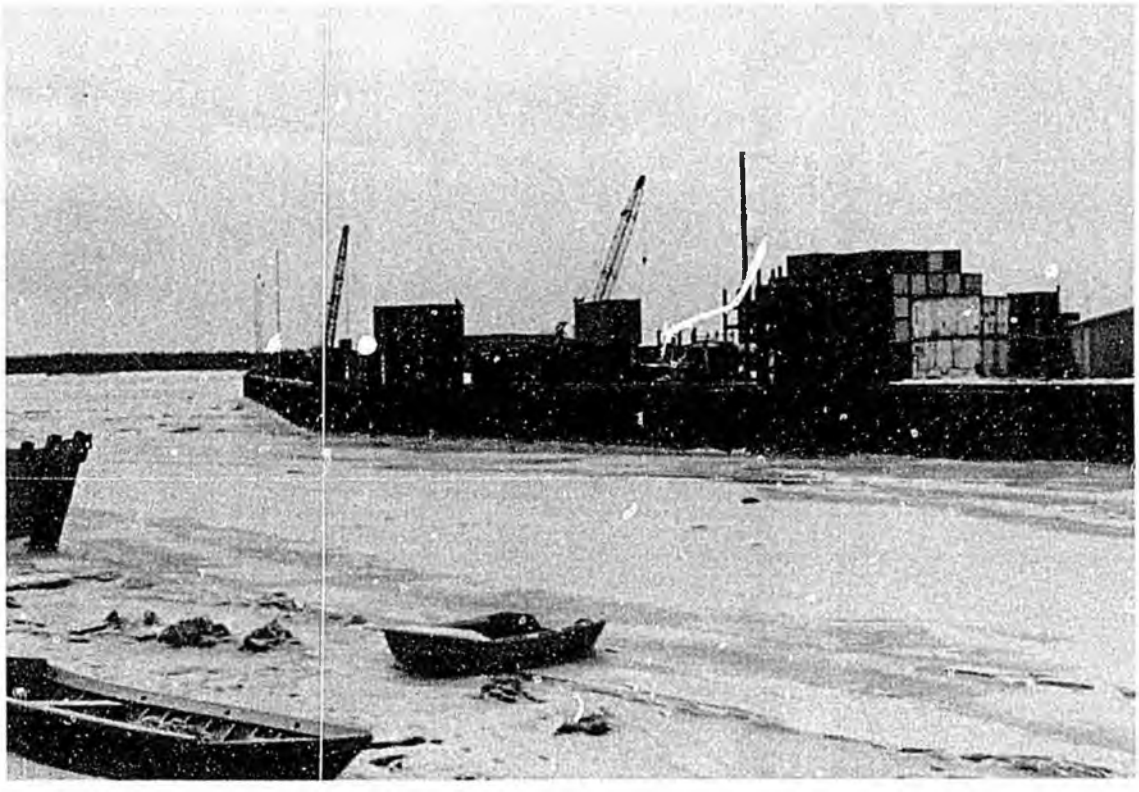
(Continued On Next Page)

Year(s)	Item	$ 1983	$ Future
FY 1986 Fall 1985 to Summer 1986	1,800 Linear Feet Of Pipe Pile Bulkhead From Mission Road To PHS	2,960	3,420
FY 1987 Fall 1986 to Fall 1987	Completion Of Pipe Pile Bulkhead, Floating Breakwater, Ramps, & Other Modifications -- 2,500 Linear Feet	4,112 0,600	5,109 0,745
	TOTAL	$20,690	$23,420



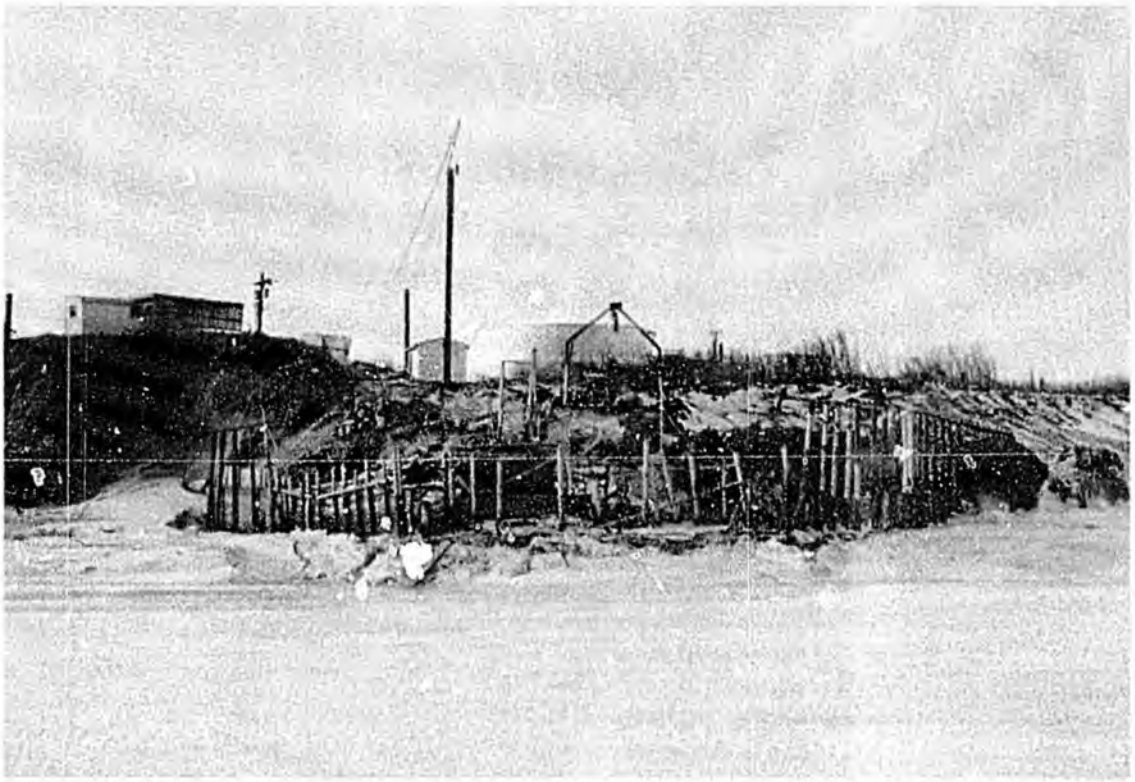
Present Cargo Dock And Staging Area

Circular steel cell dock at left was built in 1974 to accommodate ocean going barges from Seattle serving the Region through Bethel. The structure to the right was completed in 1982. Right foreground is a steel pipe pile and steel sheet pile pier to permit loading of river and coastal transshipment vessels simultaneously with the unloading of larger barges at the main dock. Right background is a steel H-pile and timber bulkhead to enlarge and protect the staging area.



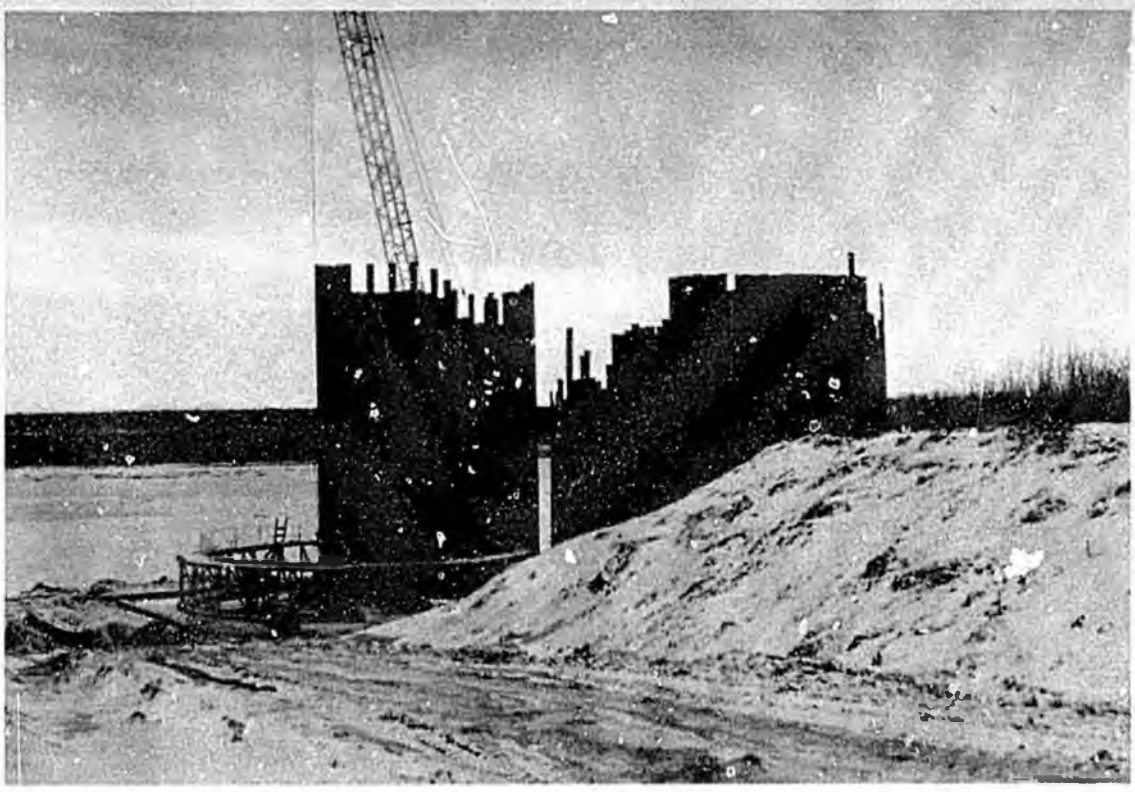
View of Staging Area from across Brown's Slough

Foreground is H-pile and timber bulkhead, left rear is pipe pile and steel piling pier. Note crowded conditions in staging area even during winter months.

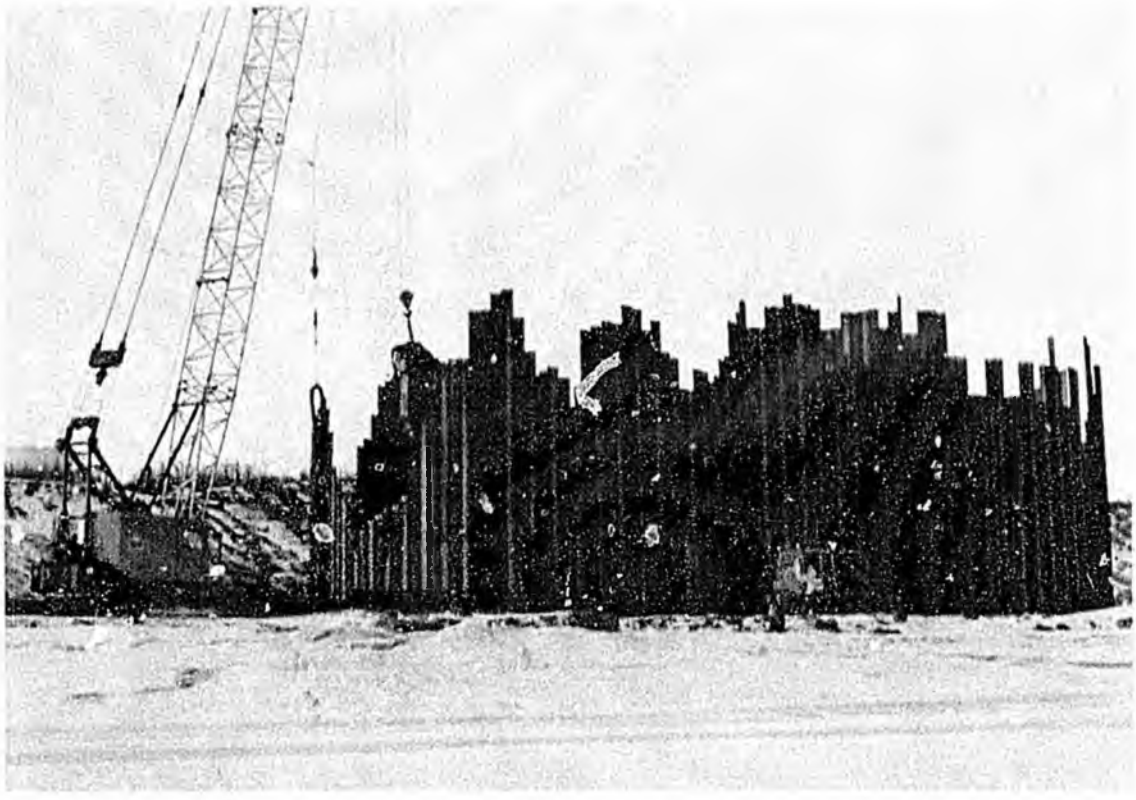


Present Petroleum Products Dock

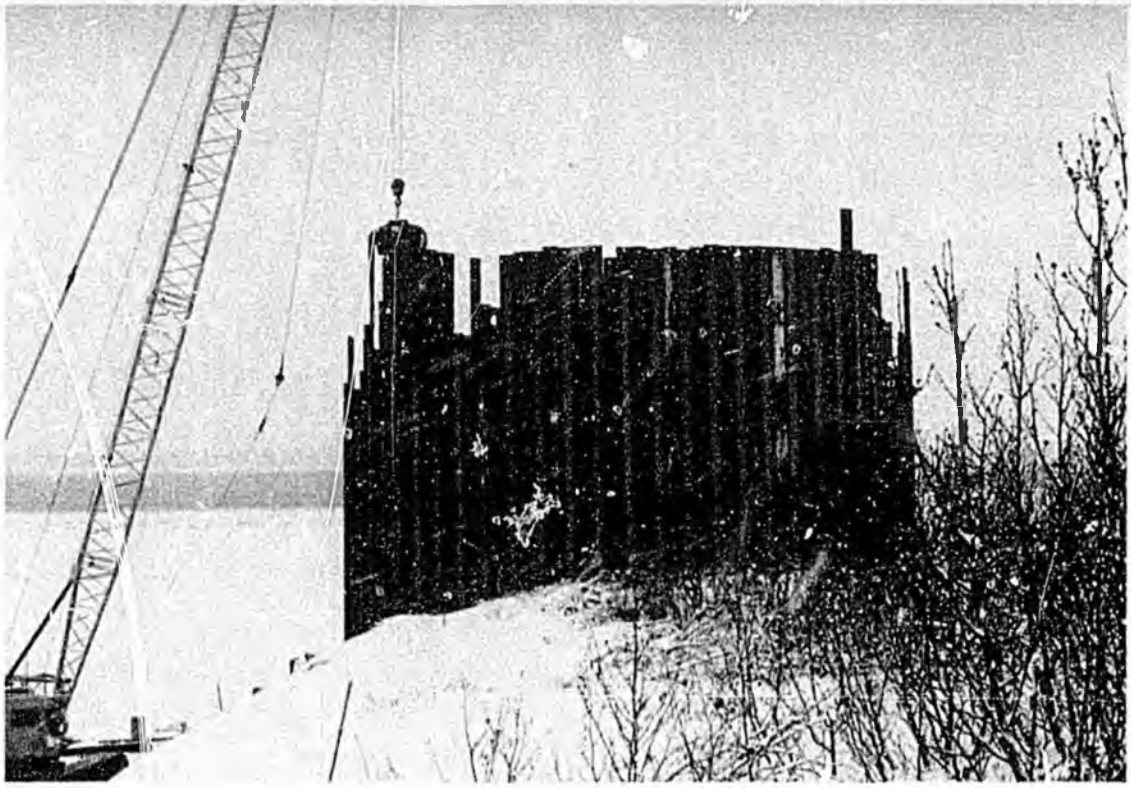
During the shipping season a small barge is fastened to the dock to permit tie-up of ocean going bulk fuel carriers. This is the fuel receiving and distribution point for the entire Region. Currently, about 24 million gallons are handled annually.



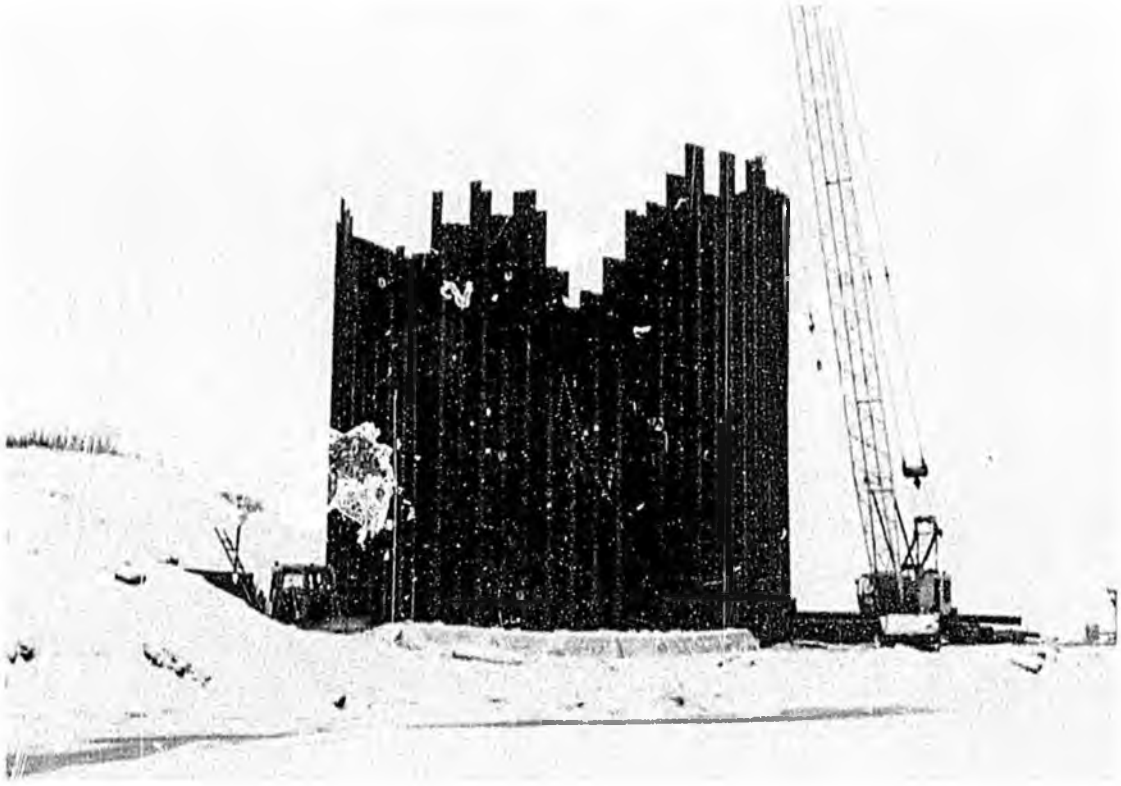
Rear view of the two steel sheet pile cells of the new Petroleum Products Dock under construction during the winter months of 1982 - 1983.



Front view of new Petroleum Products Dock under construction (Jan. 1983), showing various stages of driven steel piles. When completed, the dock will be similar to the General Cargo Dock.



One of two circular steel pile cells designed to form the new Petroleum Products Dock as viewed from rear.



Same cell as above viewed from river. Under construction during winter 1982 - 1983.

City business section of waterfront as seen from river. View is upstream toward cargo dock. Buildings in left foreground are part of ELM Fisheries. Note attempts to prevent loss of riverbank through the use of junked vehicles and other debris.

City business section, looking downstream from vicinity of ELM Fisheries.

Close up view at attempt to arrest loss of riverbank at ELM Fisheries.

City business area riverfront between ELM Fisheries and First National Bank of Anchorage. Looking Downstream.

Closer view of riverbank erosion abatement measures currently in force at Industrial/Business section between ELM Fisheries and Cargo Dock. Looking upstream. See previous photos.

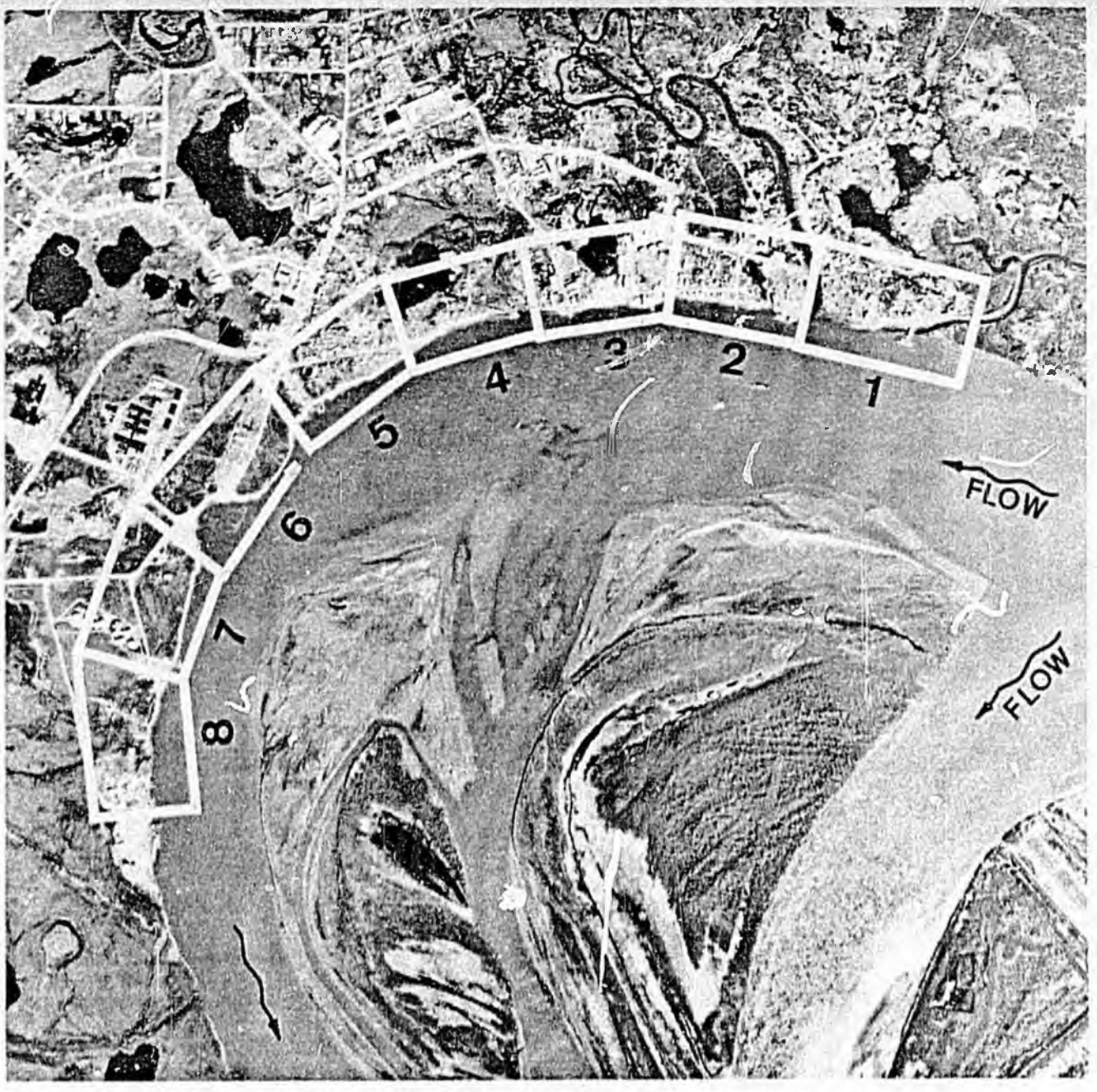
Same as above, closer to Cargo Dock.

City business area waterfront between First National Bank and Main Street. Looking downstream toward Mission Road area.

Mission Road area looking downstream. The road is now gone and buildings are at edge of riverbank. Note attempts to arrest loss of bank by using junked vehicles and other debris in same manner as at business section of the city.

Mission Road area, looking downstream. Road has disappeared and houses are now at edge of riverbank.

Mission Road area, looking upstream.



EROSION PLATES ARE NUMBERED 3.1 THROUGH 3.8 BEGINNING UPSTREAM.

BETHEL, ALASKA
BETHEL BANK STABILIZATION

HISTORIC
EROSION RATE

ALASKA DISTRICT, CORPS OF ENGINEERS

PREPARED BY_____ DATE _____

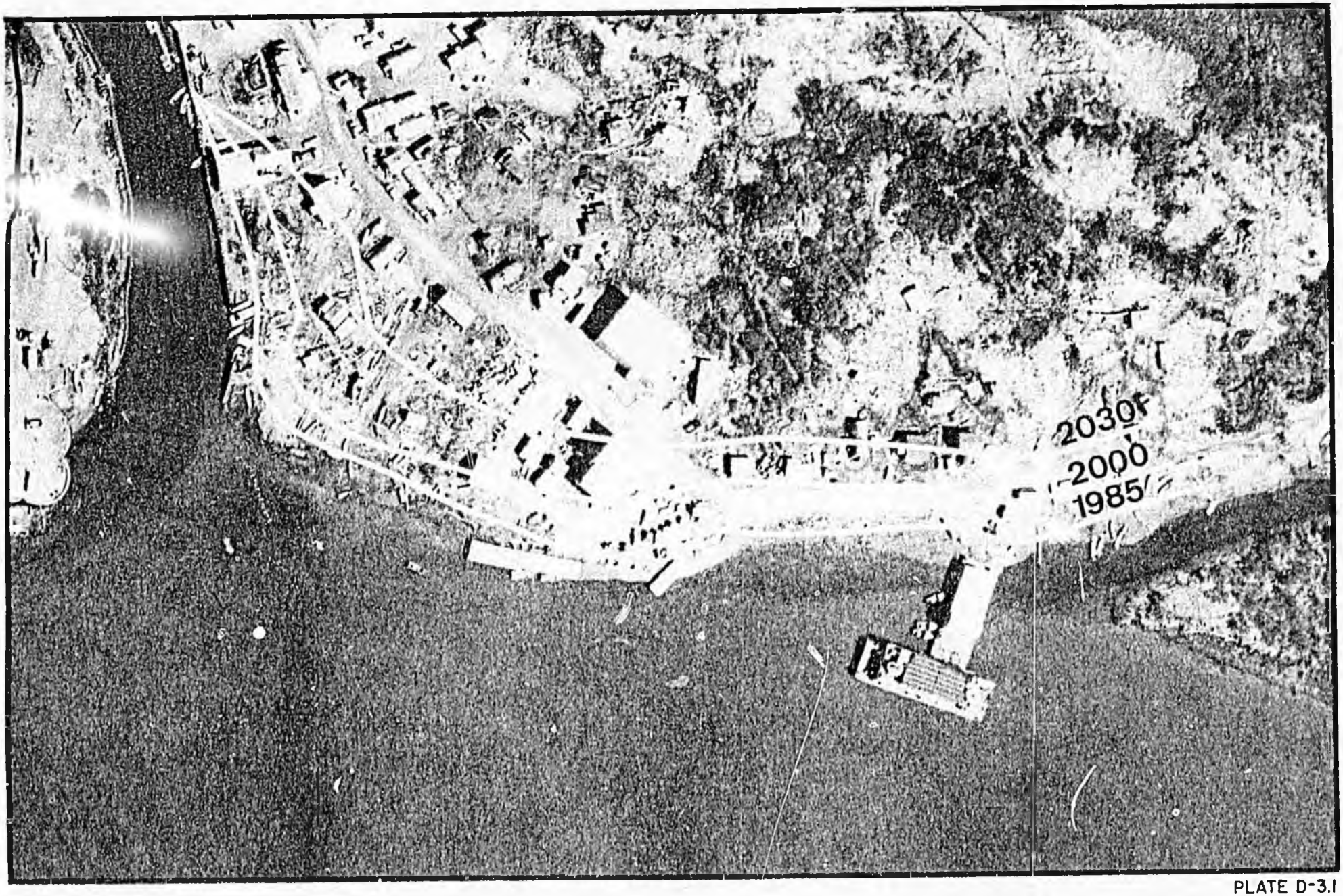


PLATE D-3.1

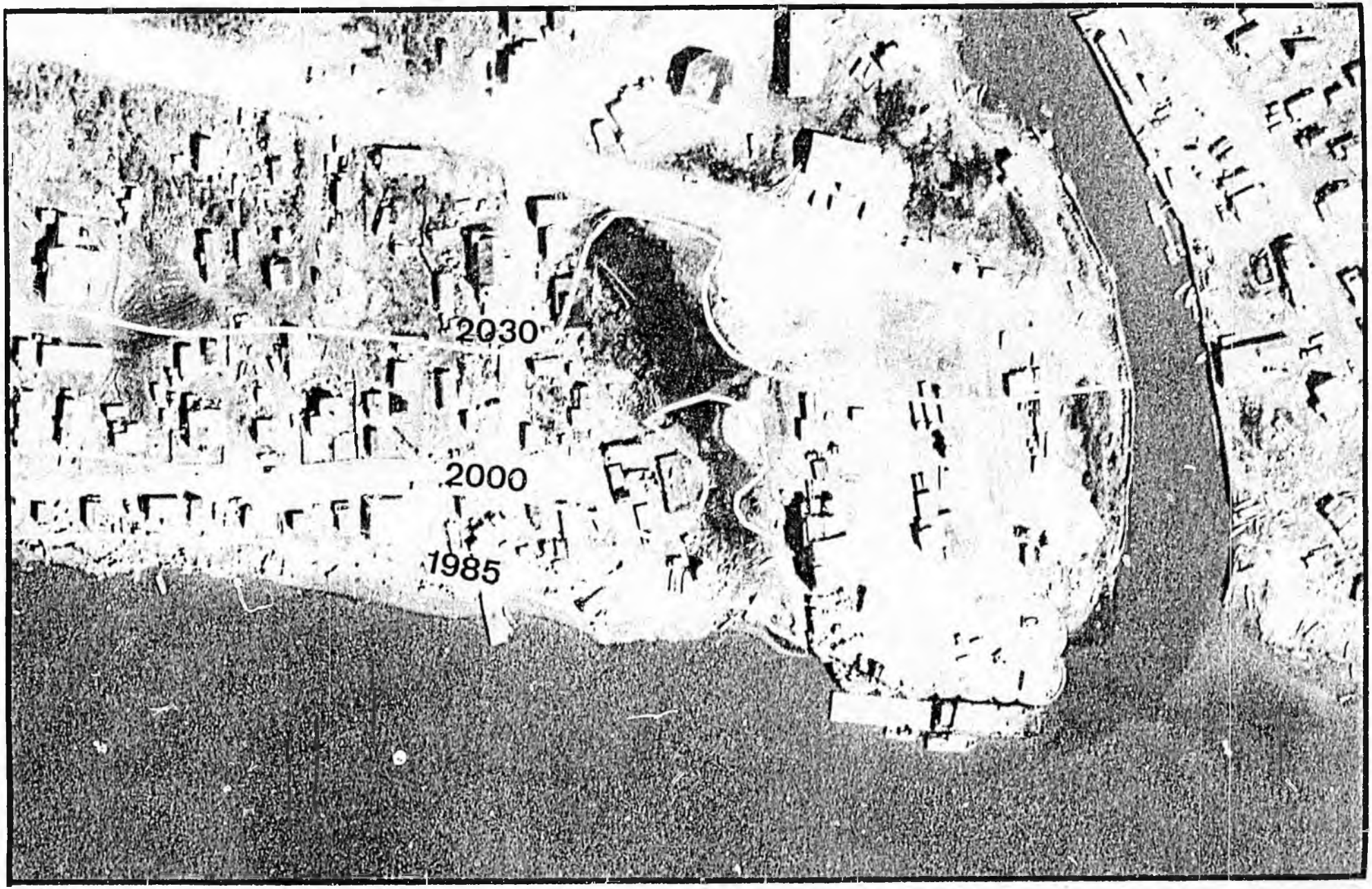
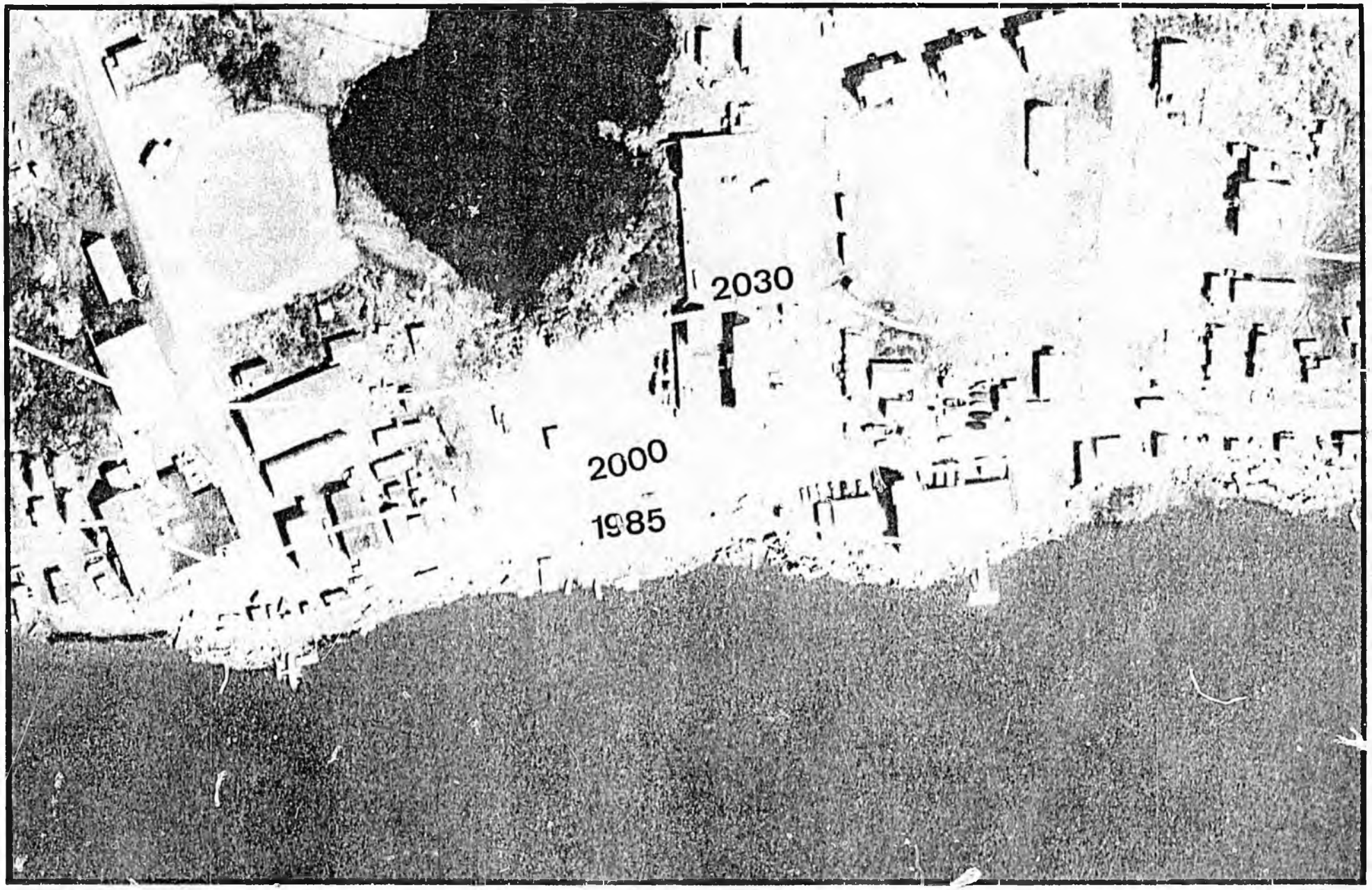


PLATE D-3.2



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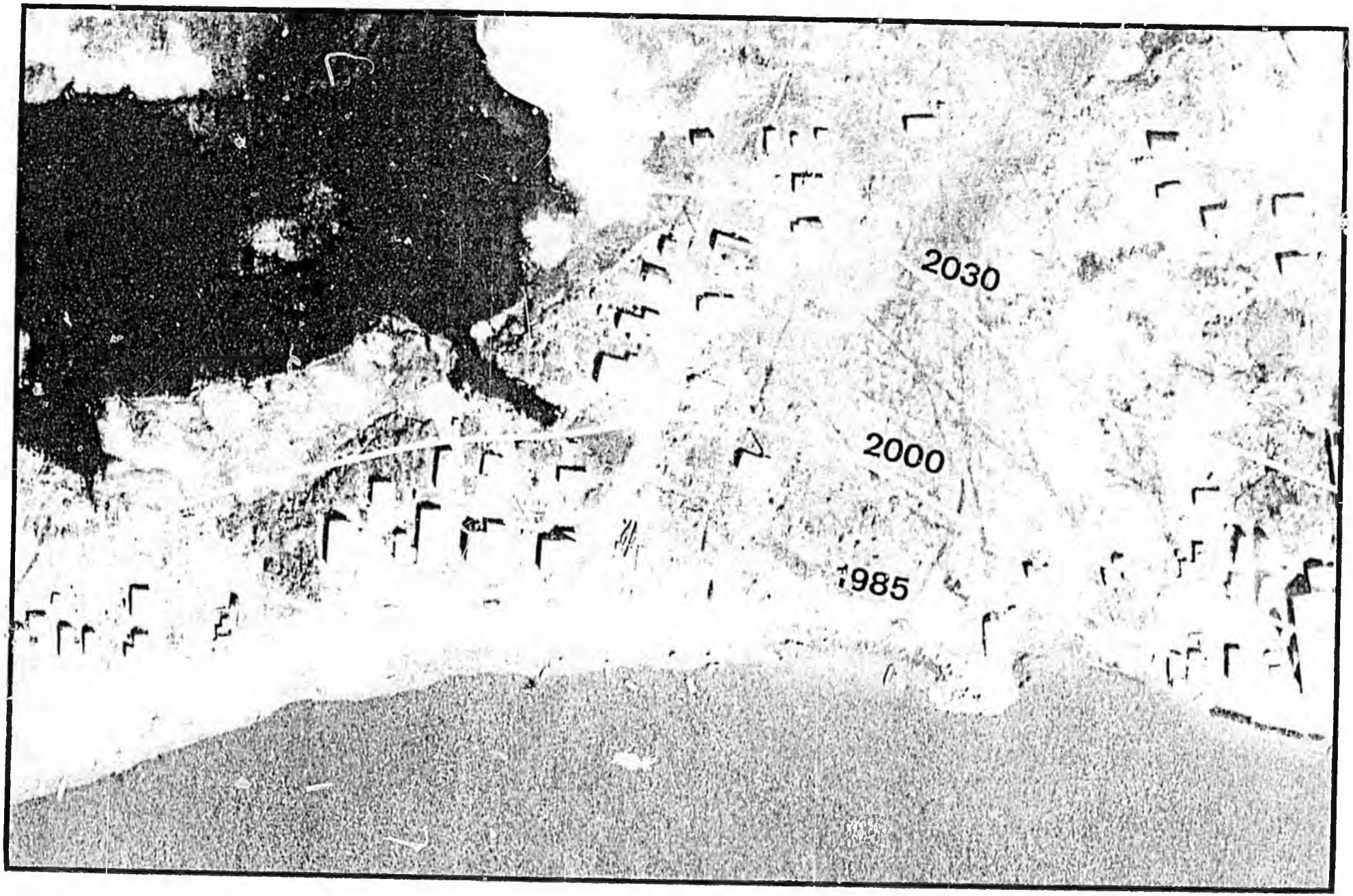


PLATE D-34

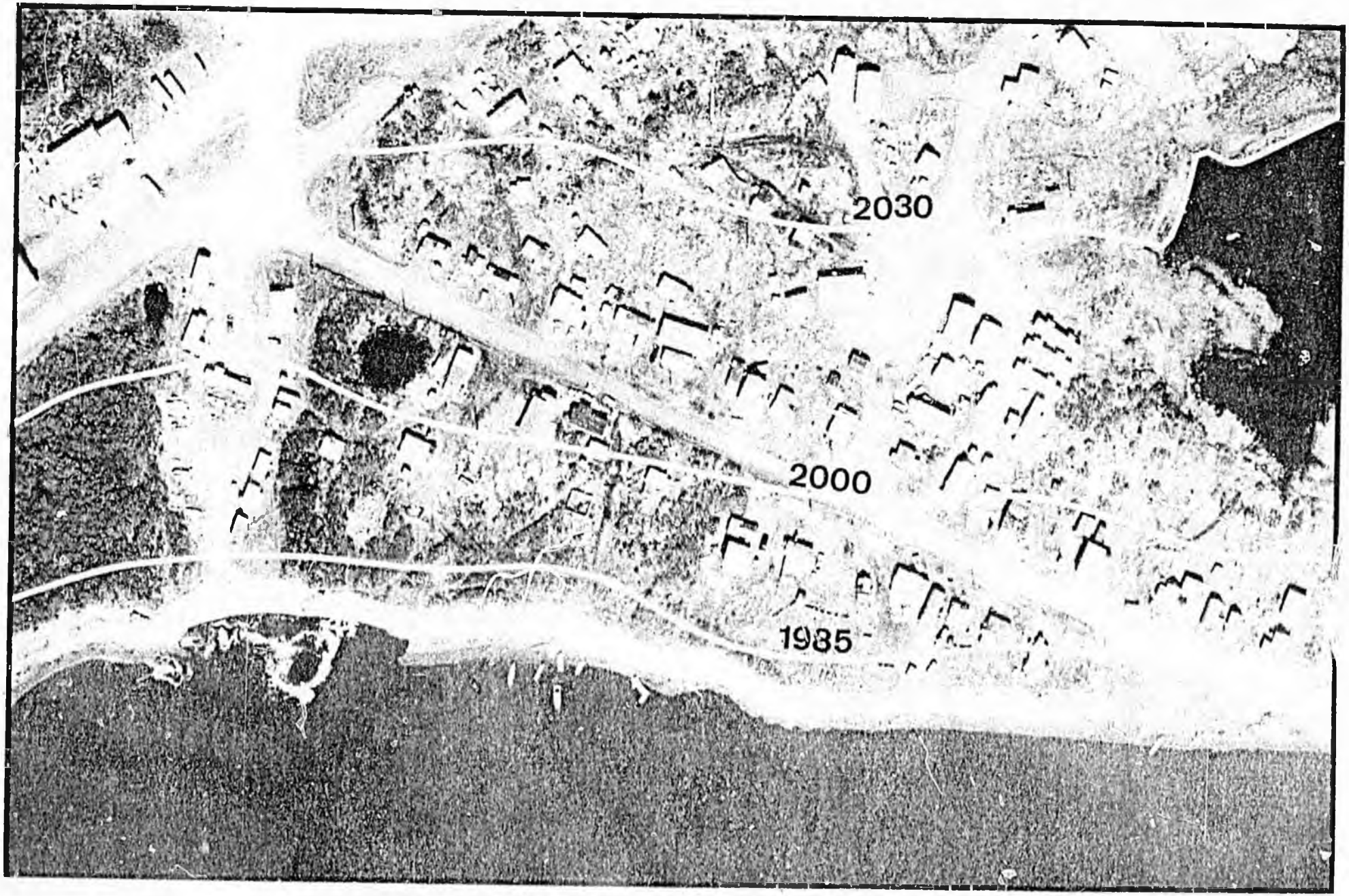


PLATE D-3.5

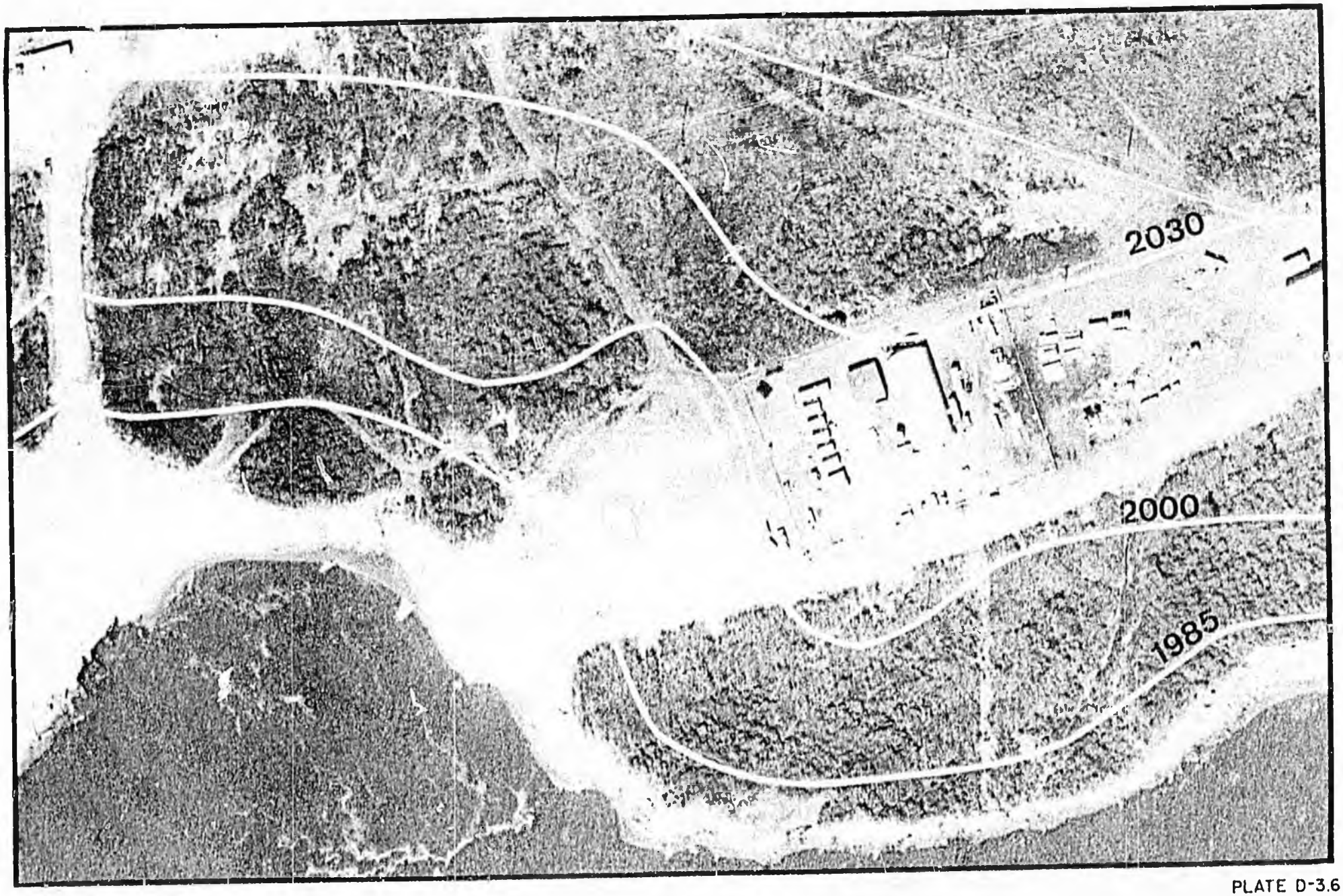


PLATE D-3.6

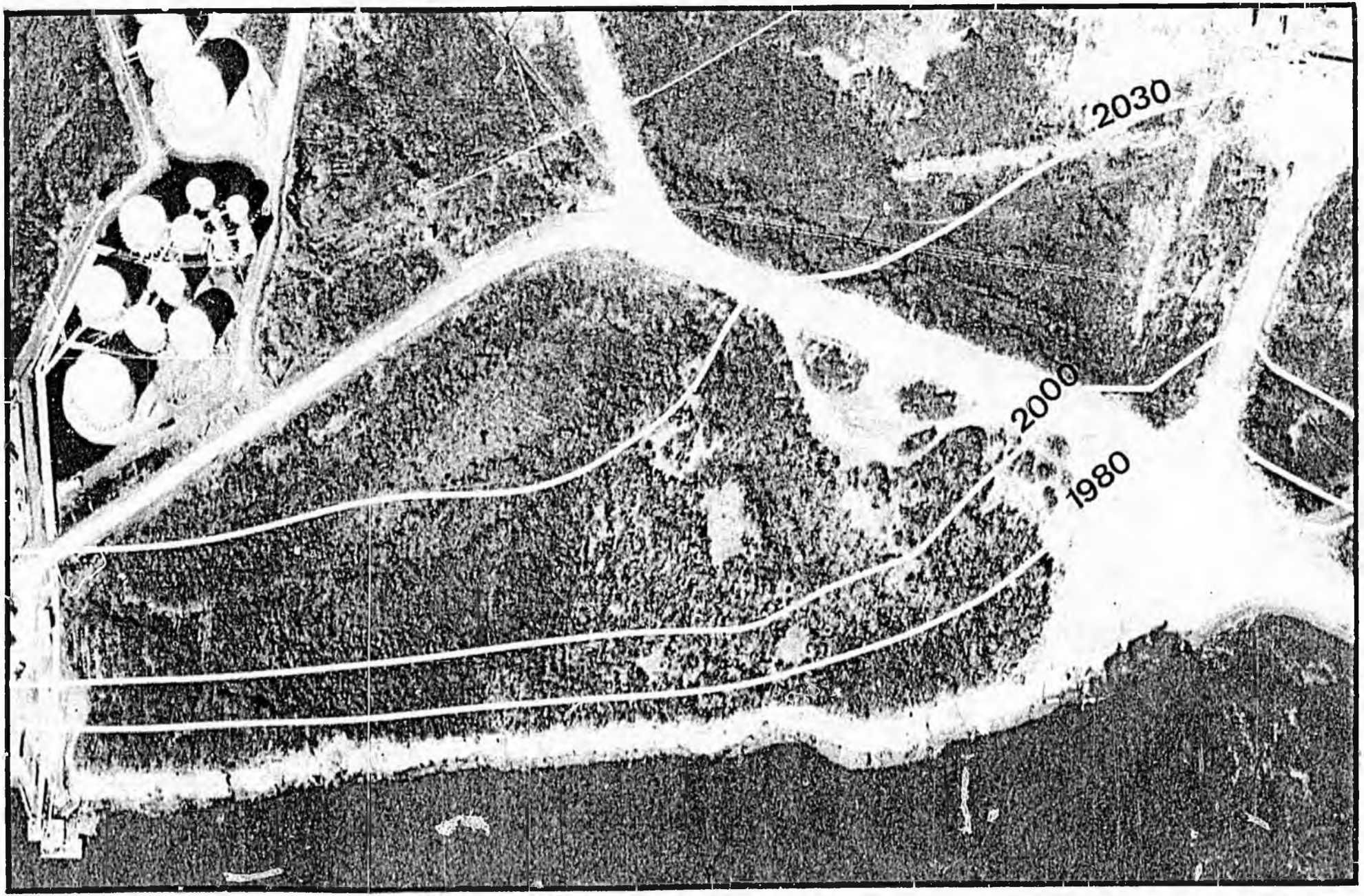


PLATE D-3.7

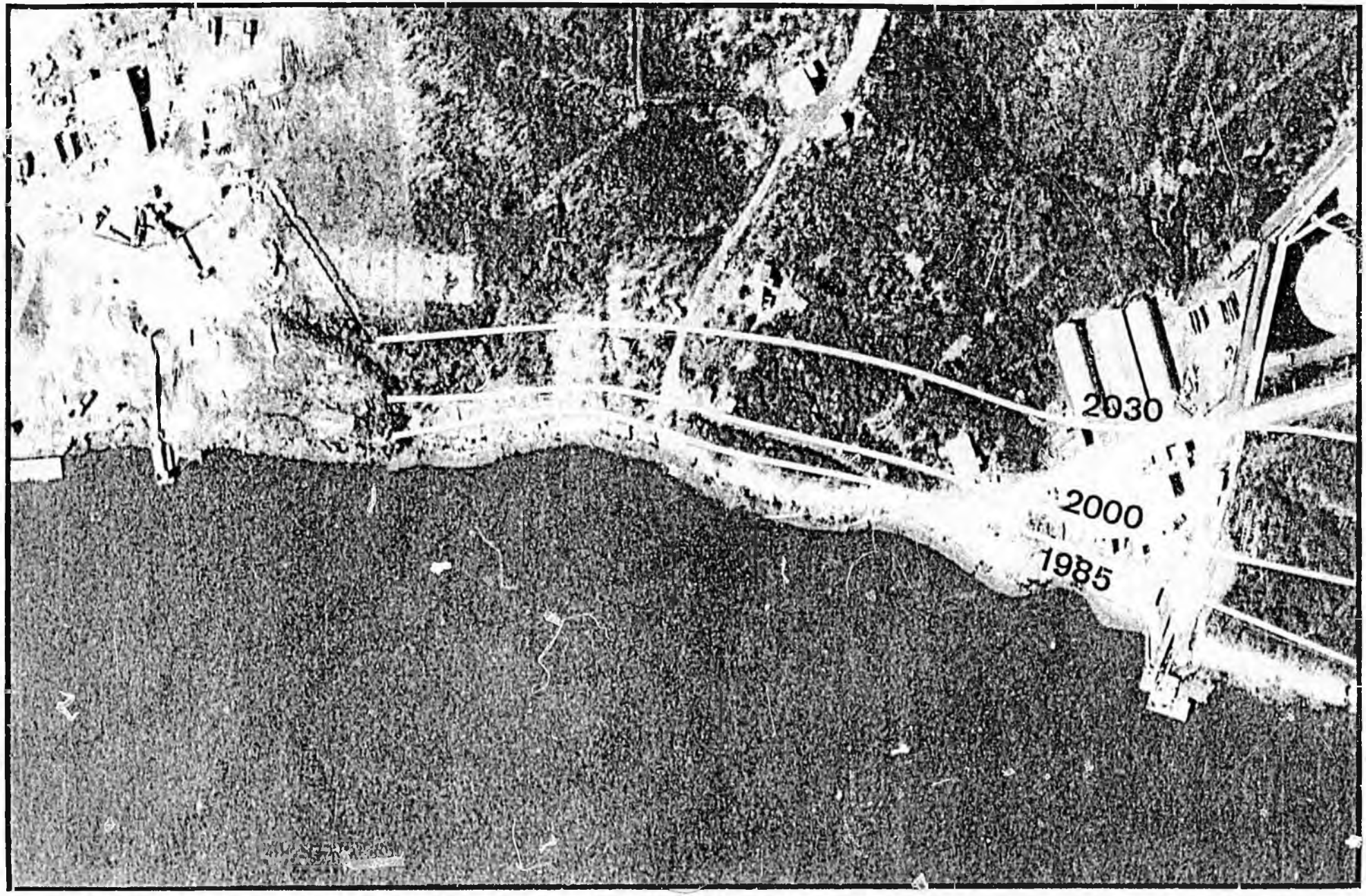


PLATE D-3.8

CITY OF BETHEL

BETHEL, ALASKA

"DEEP SEA PORT AND TRANSPORTATION CENTER OF THE KUSKOKWIM"

JOHN P. GUINN
MAYOR

LYMAN F. HOFFMAN
CITY MANAGER

ASSISTED BY

STATE OF ALASKA

PORT OF BETHEL DEVELOPMENT

CONSISTING OF

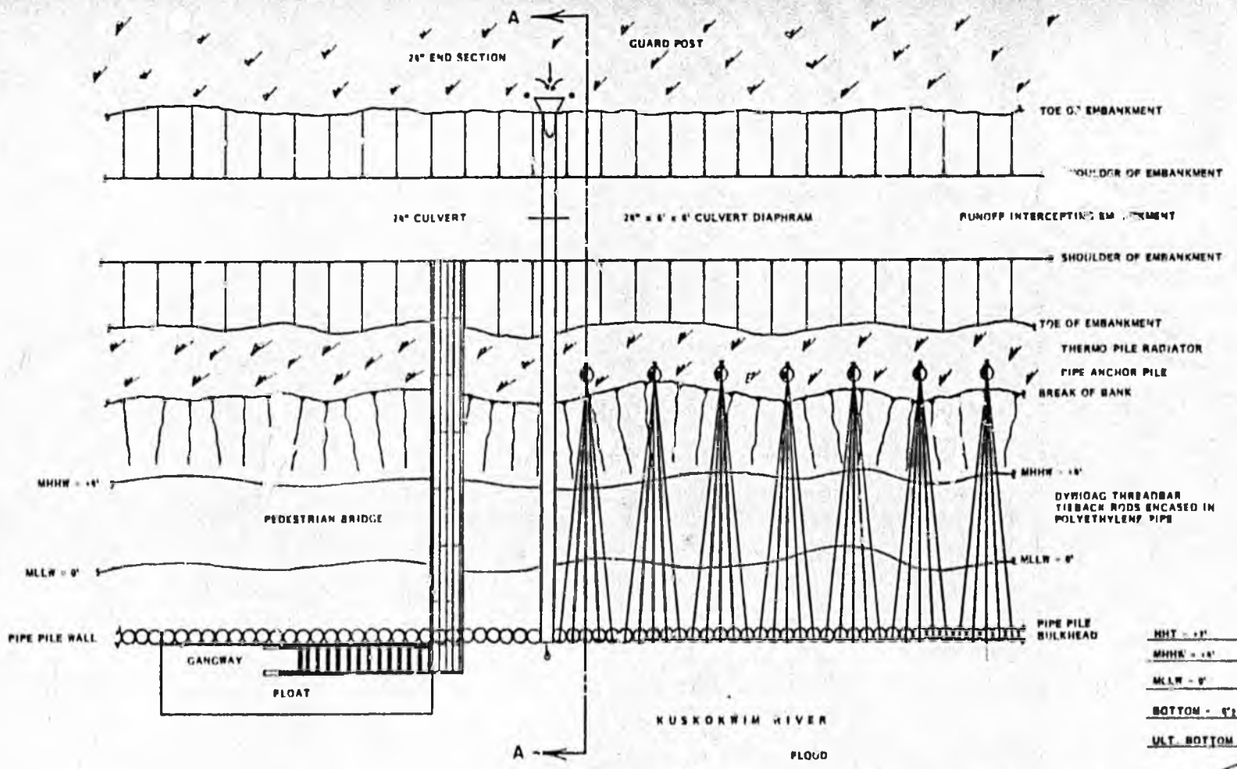
GENERAL CARGO DOCKS AND STAGING AREAS, PETROLEUM DOCK AND BULK FUEL STORAGE PROTECTION WAREHOUSE AND INDUSTRIAL AREA DEVELOPMENT, RIVERBANK STABILIZATION AND PROTECTION CONSTRUCTION PHASING, LAND USE ZONING, PROPERTY AQUISITION

PREPARED BY

GEORGE C. SILIDES
REGISTERED CIVIL ENGINEER
FAIRBANKS, ALASKA

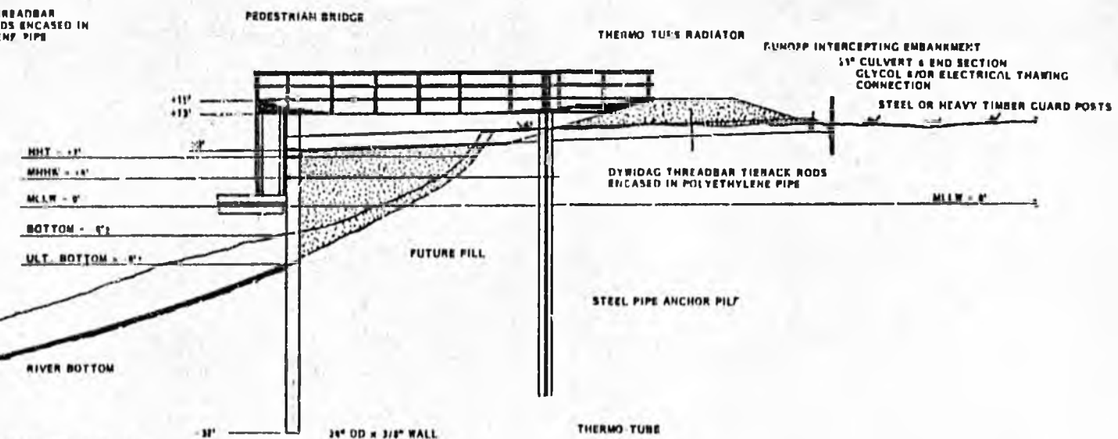
HAROLD H. GALLIETT, JR.
REGISTERED CIVIL ENGINEER
ANCHORAGE, ALASKA

A JOINT VENTURE



COMPOSITE PLAN
SCALE 1" = 10'

PHASE	DESCRIPTION
1	PIPE PILE WALL
2	RUNOFF INTERCEPTING EMBANKMENT & CULVERTS
3	CONCRETE BOTTOM PROTECTION MAT
4	TIEBACKS & ANCHOR PILES
5	FILL, GRADING & LANDSCAPING
MISC	FLOATS, GANGWAYS, CATWALKS



SECTION A-A
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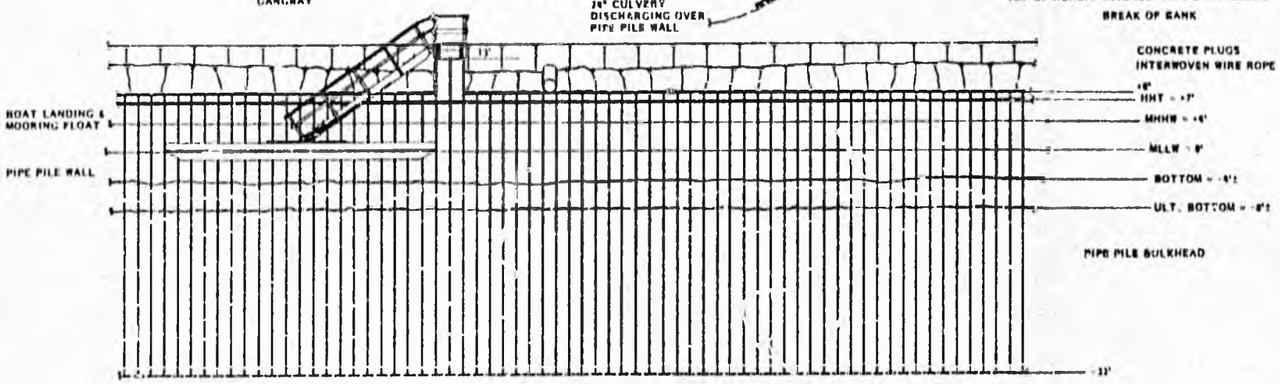


ELEVATION
SCALE 1" = 10'

NO.	DATE	CHANGE	MARK

REVISIONS

CITY OF BETHEL
BETHEL, ALASKA

RIVER BANK EROSION PROTECTION
PORT OF BETHEL DEVELOPMENT

CONCEPTUAL PLAN

GALLIETT & SILIDES
A JOINT VENTURE
ENGINEERS & SURVEYORS
ANCHORAGE & FAIRBANKS
ALASKA

SCALE 1" = 10'
DATE 8 JULY 1982
SHEET 1 OF 1

NO.	DATE	CHANGE	MARK
		REVISIONS	

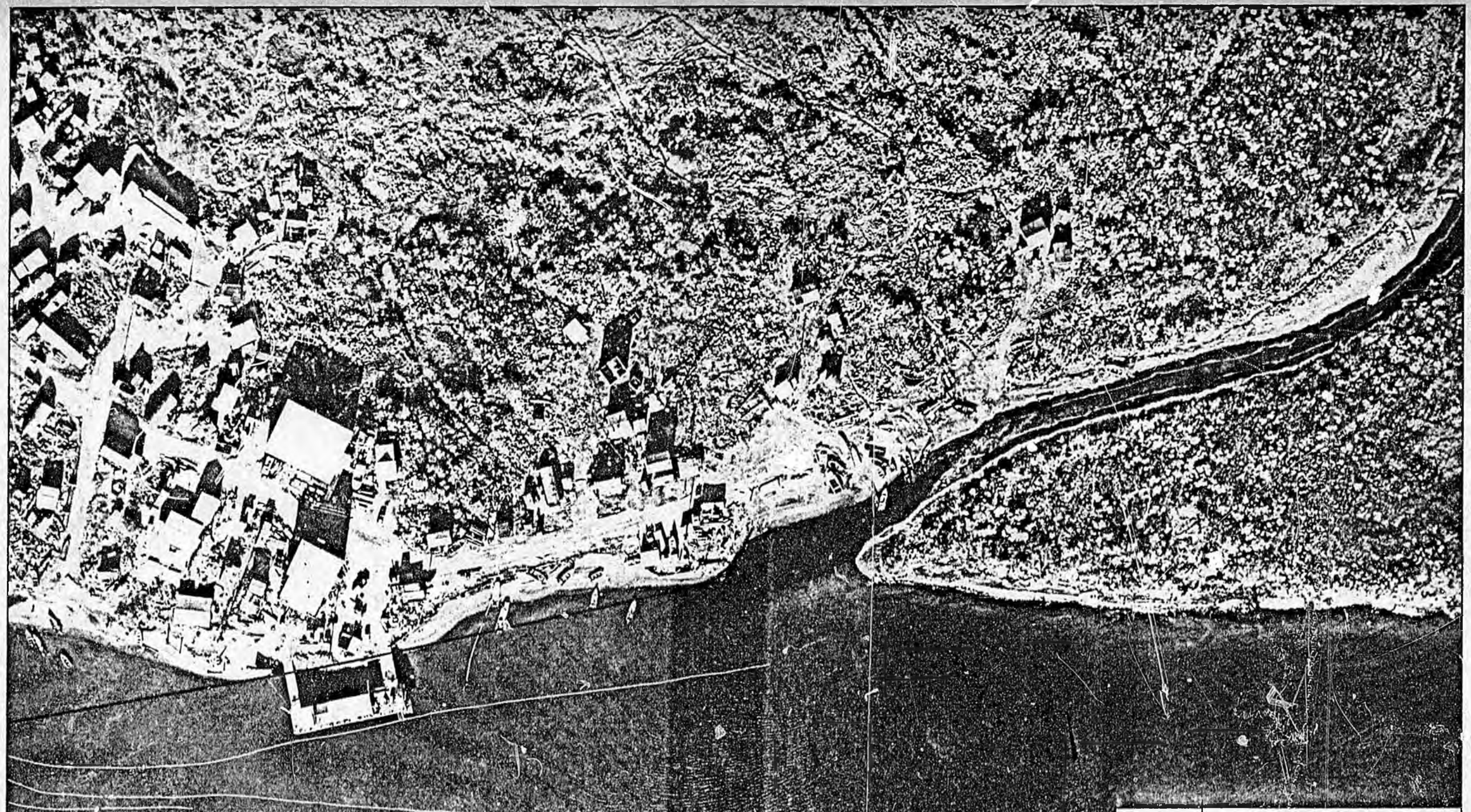
CITY OF BETHEL
BETHEL, ALASKA

RIVER BANK EROSION PROTECTION
PORT OF BETHEL DEVELOPMENT

MASTER PLAN

GALLIETT & SILIDES
A JOINT VENTURE
ENGINEERS & SURVEYORS
ANCHORAGE & FAIRBANKS
ALASKA

SCALE 1" =
DATE of PHOTO 10-11-82
SHEET 1 OF 1



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CITY OF BETHEL
BETHEL, ALASKA

RIVER BANK EROSION PROTECTION
PORT OF BETHEL DEVELOPMENT

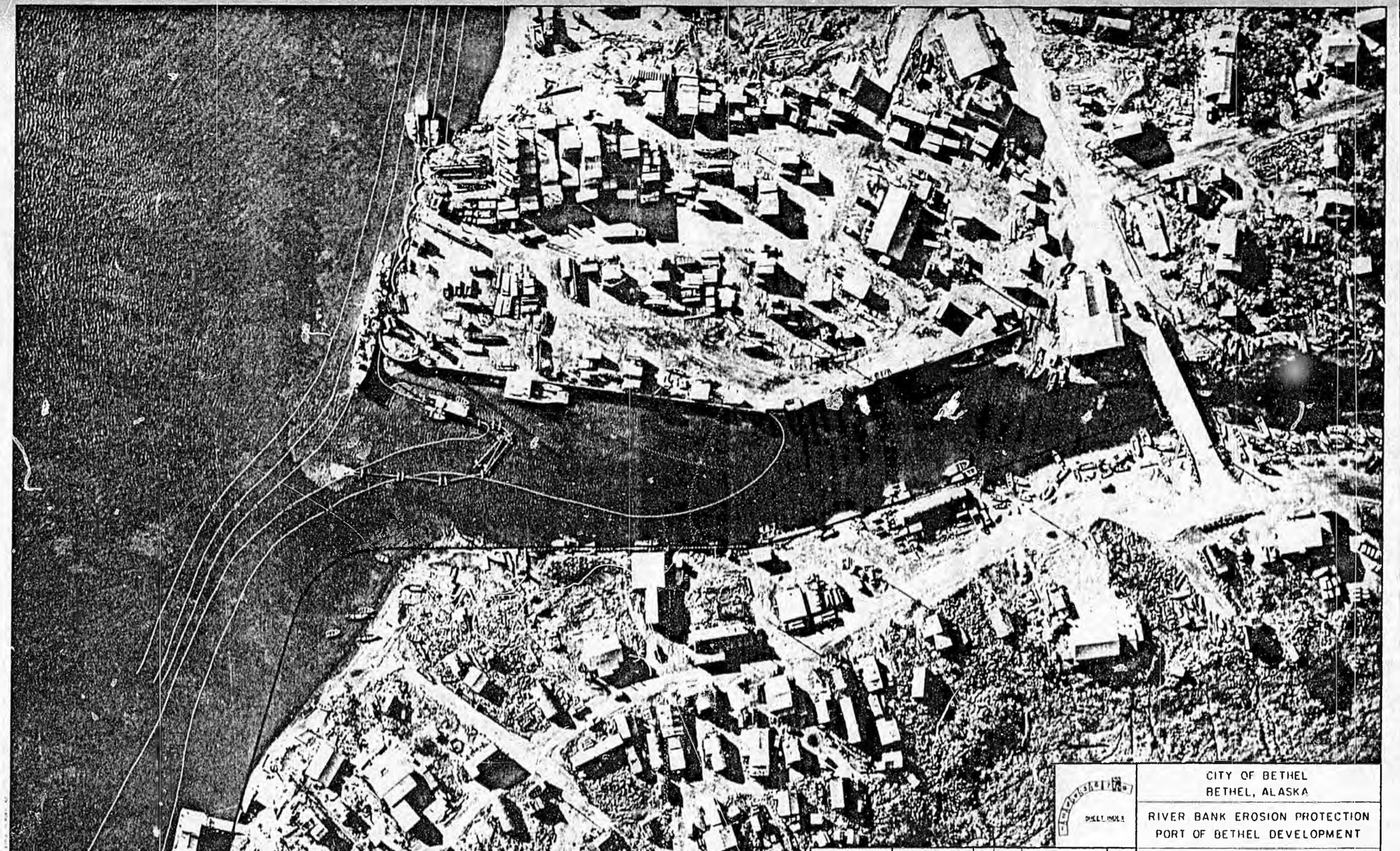
MASTER PLAN

NO	DATE	CHANGE	MARK

REVISIONS

GALLIETT & SILIDES
A JOINT VENTURE
ENGINEERS & SURVEYORS
ANCHORAGE & FAIRBANKS
ALASKA

SCALE 1" = 50'
DATE of PHOTO, 10-11-82
SHEET 9 OF 9



CITY OF BETHEL
BETHEL, ALASKA

RIVER BANK EROSION PROTECTION
PORT OF BETHEL DEVELOPMENT

MASTER PLAN

NO	DATE	CHANGE	MARK
		REVISIONS	

GALLIETT & SILIDES
A JOINT VENTURE
ENGINEERS & SURVEYORS
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ALASKA

SCALE 1" = 50'
DATE of PHOTO 10-11-82
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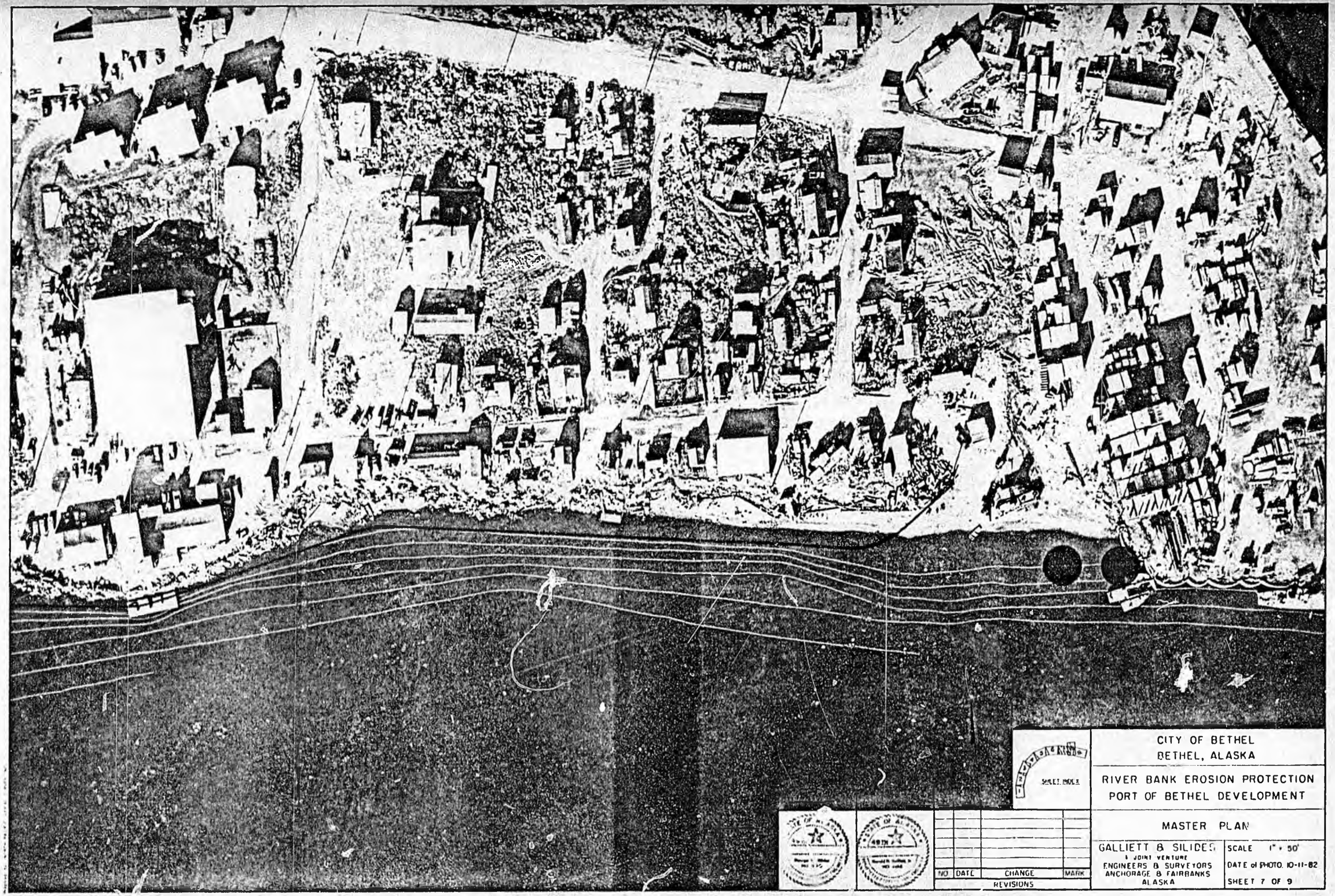

CITY OF BETHEL
BETHEL, ALASKA

RIVER BANK EROSION PROTECTION
PORT OF BETHEL DEVELOPMENT

MASTER PLAN

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		REVISIONS	

GALLIETT & SILIDES
A JOINT VENTURE
ENGINEERS & SURVEYORS
ANCHORAGE & FAIRBANKS
ALASKA

SCALE 1" = 50'
DATE of PHOTO. 10-11-82
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CITY OF BETHEL
BETHEL, ALASKA

RIVER BANK EROSION PROTECTION
PORT OF BETHEL DEVELOPMENT

MASTER PLAN

GALLIETT & SILIDES
A JOINT VENTURE
ENGINEERS & SURVEYORS
ANCHORAGE & FAIRBANKS
ALASKA

SCALE 1" = 50'

DATE of PHOTO 10-11-82

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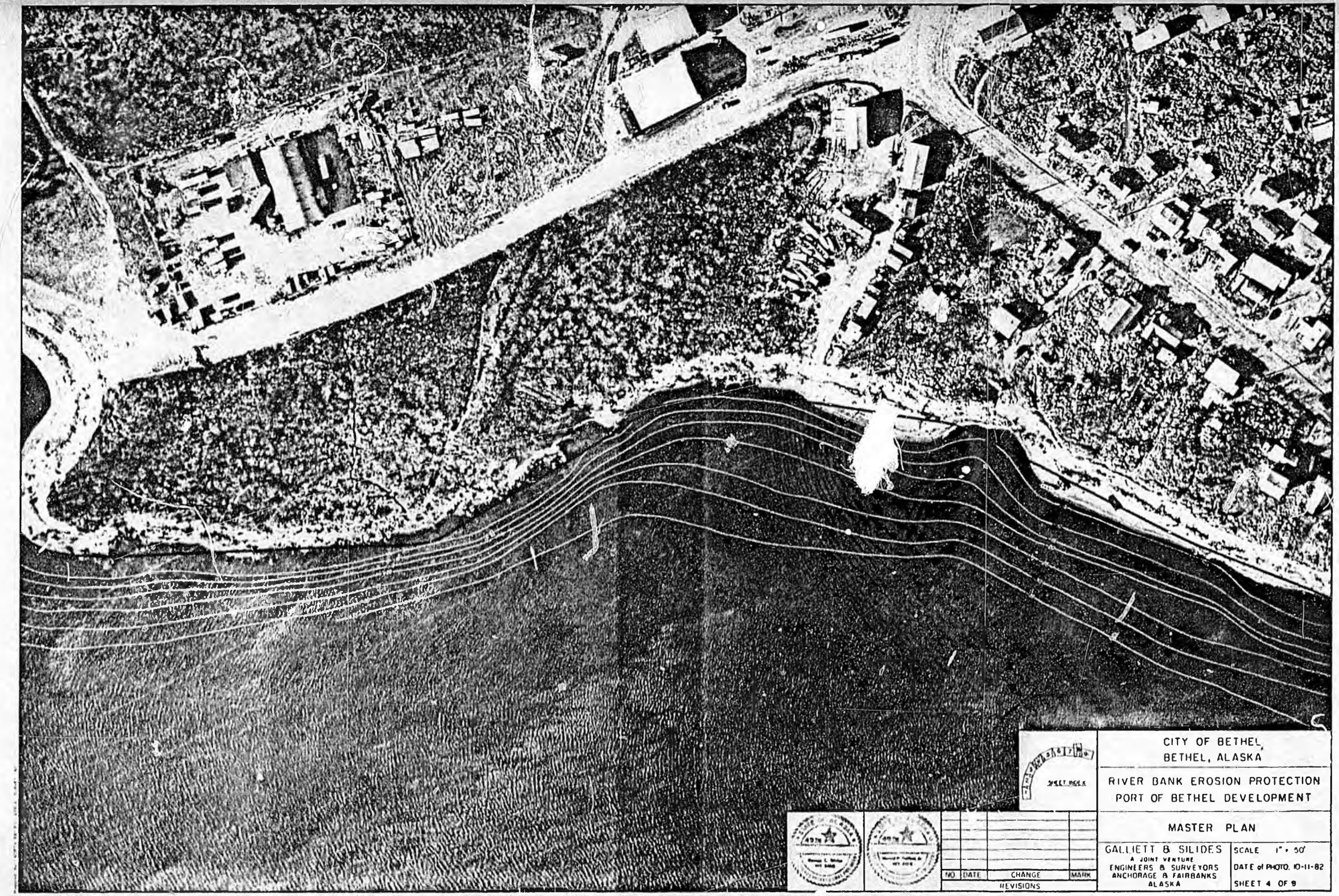
NO.	DATE	CHANGE	MARK

REVISIONS

		CITY OF BETHEL BETHEL, ALASKA	
		RIVER BANK EROSION PROTECTION PORT OF BETHEL DEVELOPMENT	
		MASTER PLAN	
		GALLIETT & SILIDES A JOINT VENTURE ENGINEERS & SURVEYORS ANCHORAGE & FAIRBANKS ALASKA	SCALE 1" = 50' DATE of PHOTO 10-11-82 SHEET 5 OF 9

NO.	DATE	CHANGE	MADE
REVISIONS			



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CITY OF BETHEL,
BETHEL, ALASKA

RIVER BANK EROSION PROTECTION
PORT OF BETHEL DEVELOPMENT

MASTER PLAN

GALLIETT & SILIDES
A JOINT VENTURE
ENGINEERS & SURVEYORS
ANCHORAGE & FAIRBANKS
ALASKA

SCALE 1" = 50'
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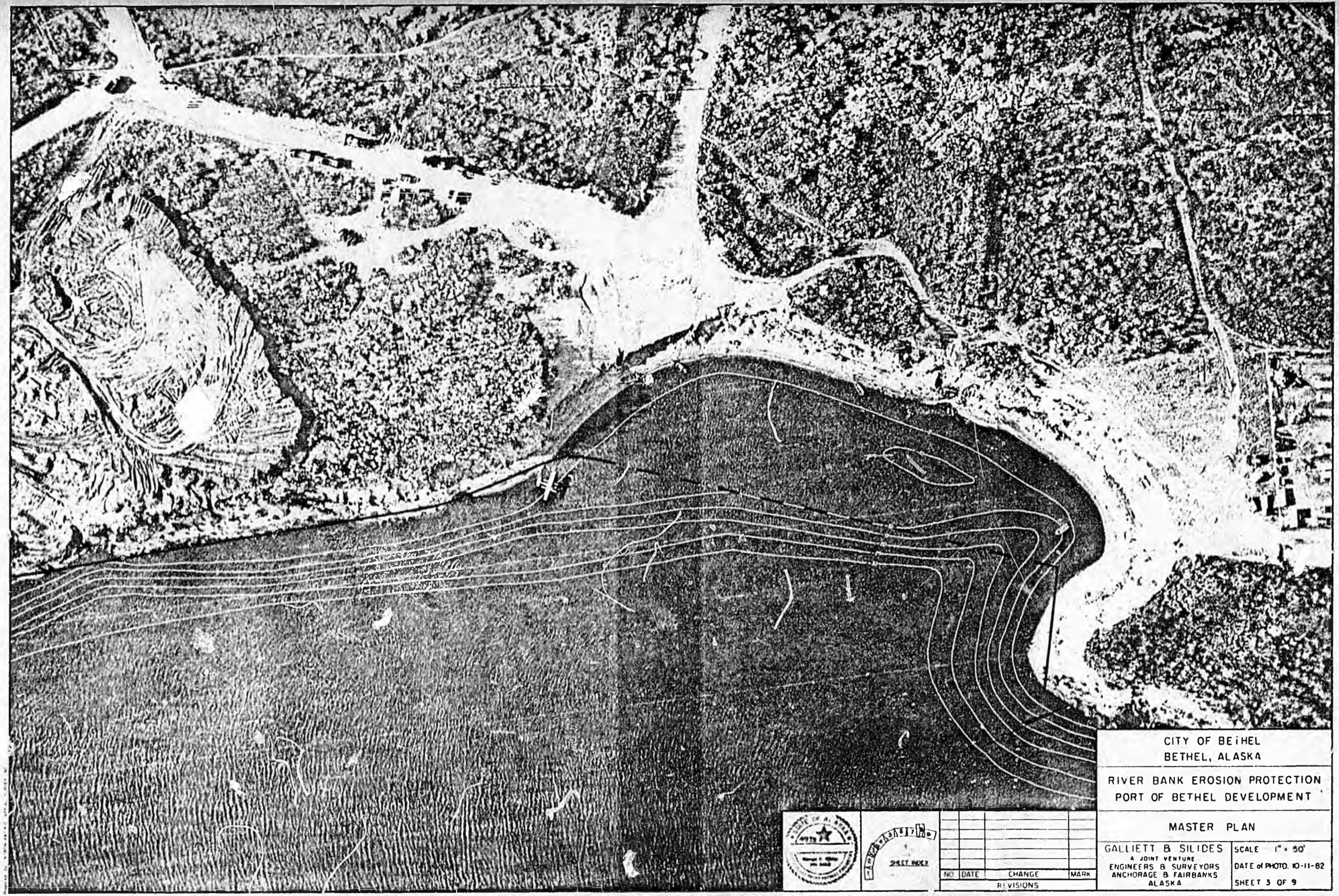
SHEET 4 OF 9



CITY OF BETHEL
BETHEL, ALASKA

RIVER BANK EROSION PROTECTION
PORT OF BETHEL DEVELOPMENT

MASTER PLAN

GALLIETT & SILICES
A JOINT VENTURE
ENGINEERS & SURVEYORS
ANCHORAGE & FAIRBANKS
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SCALE 1" = 50'
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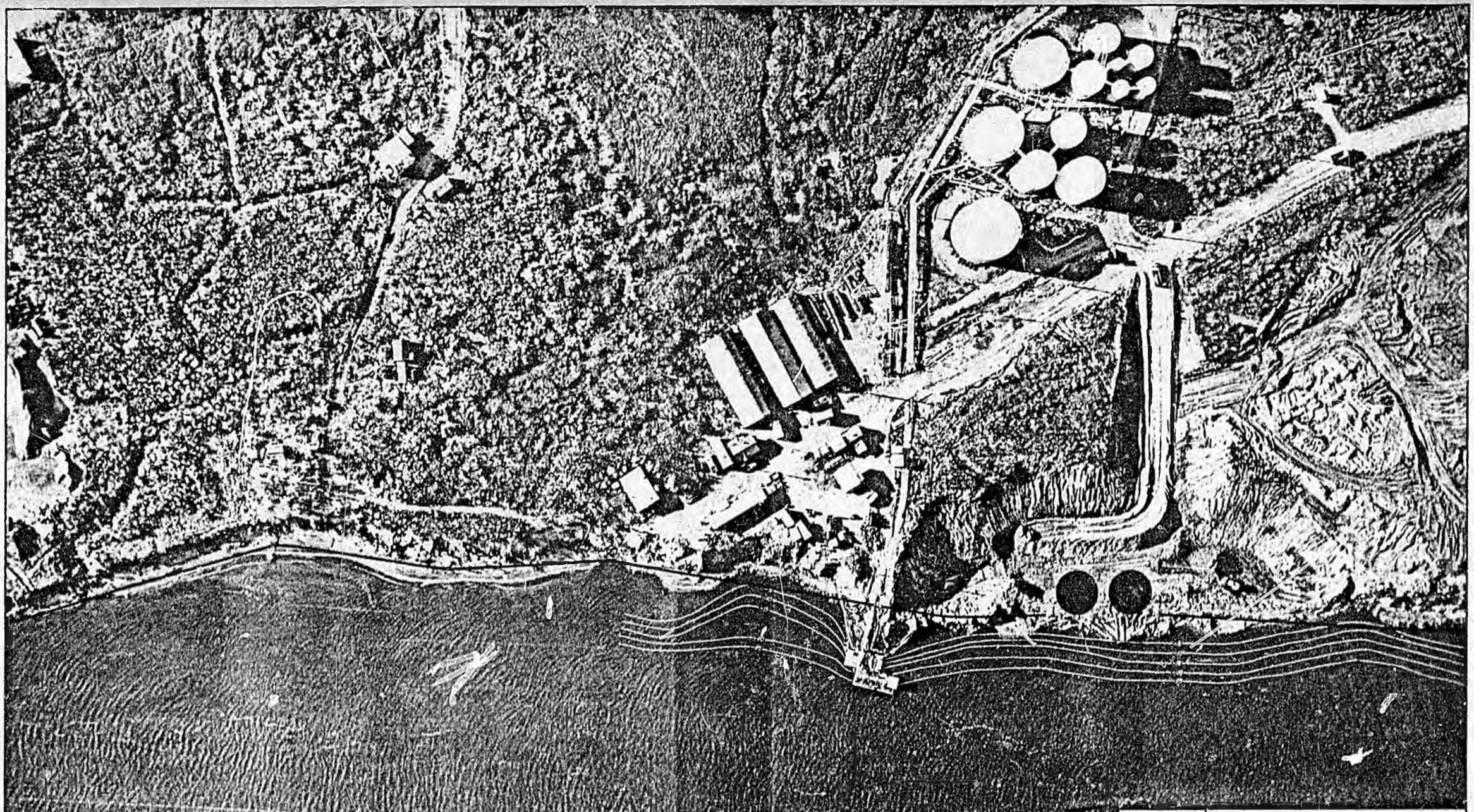

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CITY OF BETHEL
BETHEL, ALASKA

RIVER BANK EROSION PROTECTION
PORT OF BETHEL DEVELOPMENT

MASTER PLAN

GALLIETT & SILIDES
A JOINT VENTURE
ENGINEERS & SURVEYORS
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ALASKA

SCALE 1" = 50'
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SHEET 2 OF 9

NO.	DATE	CHANGE	MARK

REVISIONS

Galena

SOLUTION TO YUKON RIVER BANK EROSION PROBLEM GALENA, ALASKA

PREPARED
BY

ARCTIC FOUNDATIONS
&
SHANNON & WILSON, INC.
ANCHORAGE, ALASKA

SOLUTION TO YUKON RIVER

BANK EROSION PROBLEM

GALENA, ALASKA

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FIG.

SOLUTION TO YUKON RIVER
BANK EROSION PROBLEM
GALENA, ALASKA

1. STATEMENT OF PROBLEM

The erosion conditions at Galena have been studied thoroughly by the Corps of Engineers since about 1952. From these studies, a number of remedial measures have been carried out to slow the erosion process, particularly along the bank in front of the airfield. The results of this work and the causes of erosion are summarized and well documented in a recent study conducted by Ott Water Engineers (Ott Water Engineers 1981). In summary, the unprotected river bank upstream of the existing shore protection is eroding inland at an average estimated rate of about 10 to 30 feet per year. At these rates, it is only a matter of time before the erosion process starts damaging adjacent nearby facilities including the air strip, the new town site, the road separating the two and the existing shore protection system. Immediate remedial treatment is needed, as erosion has reached the point where further delays will jeopardize the stability of the existing protective system and greatly increase the costs of any futher corrective measures.

2. MECHANISM OF EROSION

Knowledge of three basic characteristics unique to the site is required before the erosion mechanism and the various methods of treatment can be understood and assessed. These include the following:

1) the river configuration relative to the existing facilities
2) the soil type and climatic conditions
3) the seasonal river flow characteristics

As shown in Fig. 1, the airfield and new town site are situated on the outside banks of the natural river bend where erosion is encouraged. Conversely materials are being deposited on the inside edge of the bend creating a sand bar and island in this area. Left to nature this river would continue to erode and the main channel would shift to the north displacing or eroding away the land currently covered by the air strip and new town site. The installation of sheet piles, riprap and the coffer

dam structures adjacent to the air strip has stopped erosion in this area. However, upstream of the protective structures, erosion continues and the bank is slowly developing a much more critical local curvature generally encouraging higher water velocities and accelerated erosion in this area.

Based on surface exposures along the bank, the eroding soils are largely silts and fine sands. Outside of the bank area the soil at depth is frozen, has visible ice lenses, and is therefore classified as permafrost. Regional maps show it to be continuous permafrost. These materials in a frozen state are highly resistant to erosion, however, thawed they are generally considered to be highly erosive. In the Galena area, the freezing index is roughly twice the thawing index and the mean annual temperature is about 25 degrees. This indicates a generally cold frozen environment during most of the year.

Finally, the Yukon River is characteristically at a low elevation during the winter or cold months of the year and rises during breakup to a higher summer level.

During the winter period, the river freezes over and so do the bank soils above the low water line. As breakup begins in late May, the river level rises above the low winter water level and causes, through increased flow, much of the annual bank erosion. The unfrozen bank soils below the low water line are particularly susceptible to rapid erosion during this short time period. The bank soils above the low water line are beginning to thaw during breakoup so erosion is somewhat limited in this zone.

During the summer months, the river level and flow stabilize but the water warms. This warming leads to deeper thawing and slow regression of bank slopes, melting of ice lenses within underlying permafrost and additional slope deterioration. This mechanism occurs mainly in the water fluctuation zone. Local undercutting and steepening of the slopes in this are readily apparent during this period. Historically, it is thought that erosion below the low water line is much less during this summer period than during breakup.

During fall, wind from storms create waves which also encourage some localized slope undercutting near the high water line. Finally as the river recedes, the oversteepened thawed banks are subjected to sudden drawdown conditions. This further

encourages some slope raveling. Fortunately, with a dropping water level, the water velocities are reduced. and some suspended solids deposited gradually on the eroded slope to replace some of the eroded materials.

Ice movement has been determined to not be a major erosional mechanism.

3. APPROACH TO THE PROBLEM

A number of conventional erosion control measures installed along the airstrip have included sheet piles, riprap, soil filled fuel barrels and large coffer dams filled with soil and kept frozen with thermopiles. While all methods have worked with varying degrees of success, they have been very expensive to install or construct and equally as expensive to maintain or repair. There costs are well documented in Ott water Engineers (1981) and Corps of Engineers (1959 - 1969).

Since bank erosion is fast approaching critical structures in this area, decisions must be made and corrective measures implemented immediately. Otherwise, future changes may make repairs prohibitive from a cost standpoint. Erosion control measures should focus on protecting the initial soil slopes from erosion while at the same time forcing the main river channel and high flows to shift to the south or further away from the new town site. One innovative way of doing this is by installing a series of widely spaced long steel rib elements (or groynes) along the eroding bank face as shown schematically in Fig. 2. The groynes, acting as a ribshapped system, are designed to control erosion in 3 ways:

- the groynes act as passive thermoprobes maintaining hard frozen strips of ground and colder water or extra ice along the shoreline. The frozen ground by its hardness resists erosion while the colder water reduces thawing and bank deterioration.

- the groynes reduce local water velocities along the bank encouraging deposition rather than erosion. The groynes are designed with a porous metal screen. Applying principals of snow fence design, this screen encourages sand sediment accumulation at and between the grones.

- the groynes encourage sediment accumulation near the bottom of the river channel (thalweg) encouraging shifting of the main channel away from the eroding bank. If the main channel flow is forced away, water velocities along the eroding bank and erosion tendencies are reduced.

A schematic diagram illustrating the principal features of the groynes is presented in Fig. 3.

4. PRINCIPALS OF THE SYSTEM

The main function of the groyne system, shown in Figs 2 and 3, is to form a series of hard erosion resistant steel strips along the bank which stop the erosion process. As mentioned previously, high water velocities and bank thawing during and following breakup are believed to be the major factors leading to bank erosion. As the bank soils are thawed, they become softened, wet and highly erosive and are carried away under the normal high river flows that occur during this time period. If erosion can be stopped during these times, the problem, in our opinion, can be solved. This system is designed to do this and focus directly on resisting the cause that is maintained by freezing an erosion resistant bank structure while also slowing water velocities and encouraging deposition.

The insulation pad in Fig. 3 is present only below the low water level. During breakup, it keeps the soil mass around the lower thermoprobes frozen providing a larger frozen soil/groyne structure for anchorage to the river bottom. The anticipated freezing front in this area during breakup is shown schematically on Fig. 4.

As the river level rises and the water warms, thawing increases and the freeze bonding of the groyne and frozen soil mass is reduced, however, erosion and anchorage requirements under these conditions are much less. At this time and when the river level is dropping, the metal screens on the groyne encourage solids to drop out of suspension covering the bank slopes generally as shown in Fig. 4. As sediment accumulates, groyne anchorage is improved.

Below the low waterline, deposition of sediments is a continual process during the first year until an equilibrium condition is reached (see Fig. 4B). This covering of the lower slope with sediment, anchors the lower end of the grones, insulates the ground and encourages the permafrost front to rise. This rise in the freezing front generally increases the overall stability of the lower slope.

It also leads to a flatter overall slope which will also cause reduced erosion above the low water line. Further, it forces the main channel bottom (or Thalweg) away from the eroding bank

The thermoprobes freeze or supercool the surrounding sediment locally and help to hold or anchor the groyne in place most of the year. They also encourage accumulation of a larger ice and/or frozen hard ground mass in which to resist and reduce thawing.

Freezing in the ground and accumulating sediments between the high and low water line (Fig. 4A) also helps protect the probes, insulate the underlying frozen ground and reduces the depth of thawing. As the river recedes, the accumulated sediments help protect the slopes while the thermoprobes speed up the freeze back.

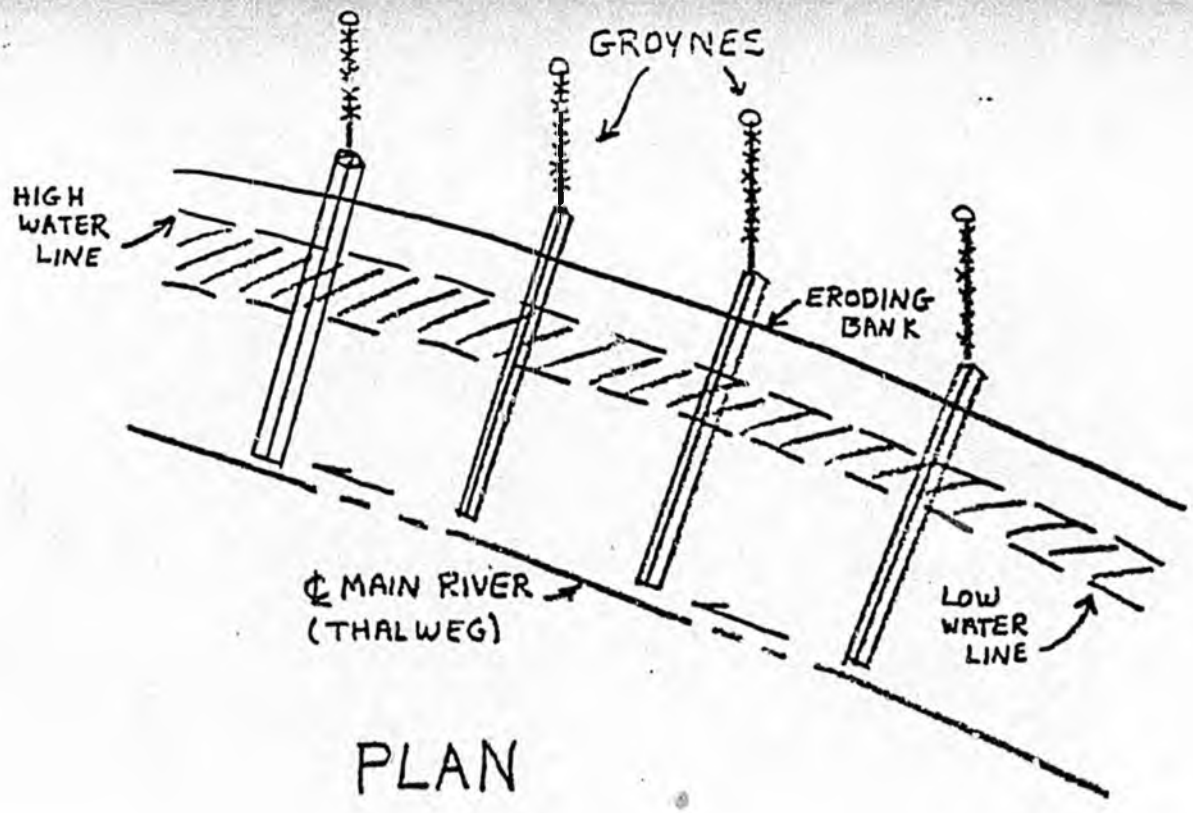
5. RECOMMENDED TEST SECTION

Because remedial treatment must be undertaken soon, the above system could be designed based on present theory and partially installed this winter. However, as indicated in Ott Water Engineers (1981), many design parameters are not well defined and therefore, an overdesigned, more costly system would likely result. As an intermediate step, we recommend that a test section consisting of one or two full scale groynes, be designed and installed in a critical erosion area early this winter. The benefits of the test section would be realized before the next critical period of major erosion (breakup next May or June). We would also recommend that the test section be instrumented and monitored prior to, during and after breakup next year. This would allow us time to evaluate the test section and optimize the groyne dimensions and spacings for the larger scale slope treatment.

It is apparent that in normal slope treatment, a single groyne is not as effective by itself because a single groyne focuses on treating a given local area and only slightly improves erosion conditions further downslope. As succeeding groynes are placed, the area downslope is gradually improved such that it may be possible to increase the spacing between groynes in these areas. Such information

would not be obtained by testing a single groyne. A single groyne, however, would allow assessment of times of freezing and thawing relative to breakup conditions, sediment deposition and drifting characteristics and general system effectiveness. Two groynes in a test section with different triangular dimensions would allow us to evaluate the above characteristics as well as look at groyne size and spacing dimensions more closely, group deposition effects and different type fencing screens.

We are in a position to design, install and monitor such a test section and would be pleased to discuss or present to you detailed procedures and our estimated costs for such a program. Shannon & Wilson, Inc. would consult with and assist Arctic Foundations in the design of the individual groynes and instrumentation program as well as help interpret the data obtained from the instrumentation. Arctic Foundations would work with Shannon & Wilson on the design, as well as fabricate, install and with local assistance, monitor the system.



PLAN

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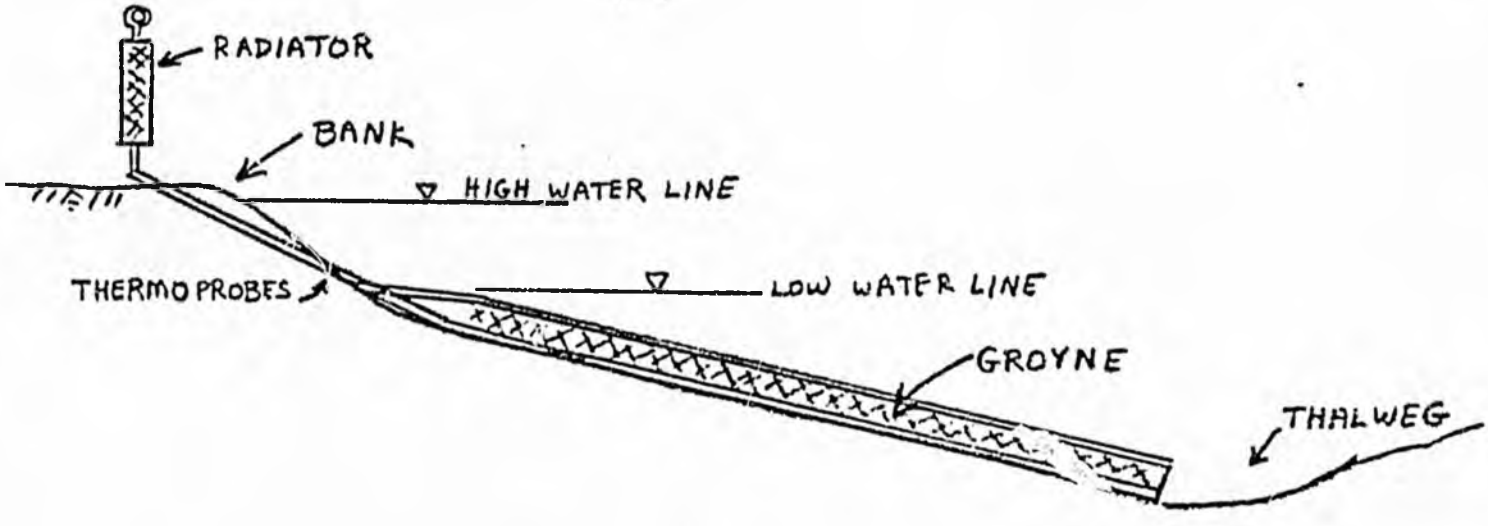

PROFILE

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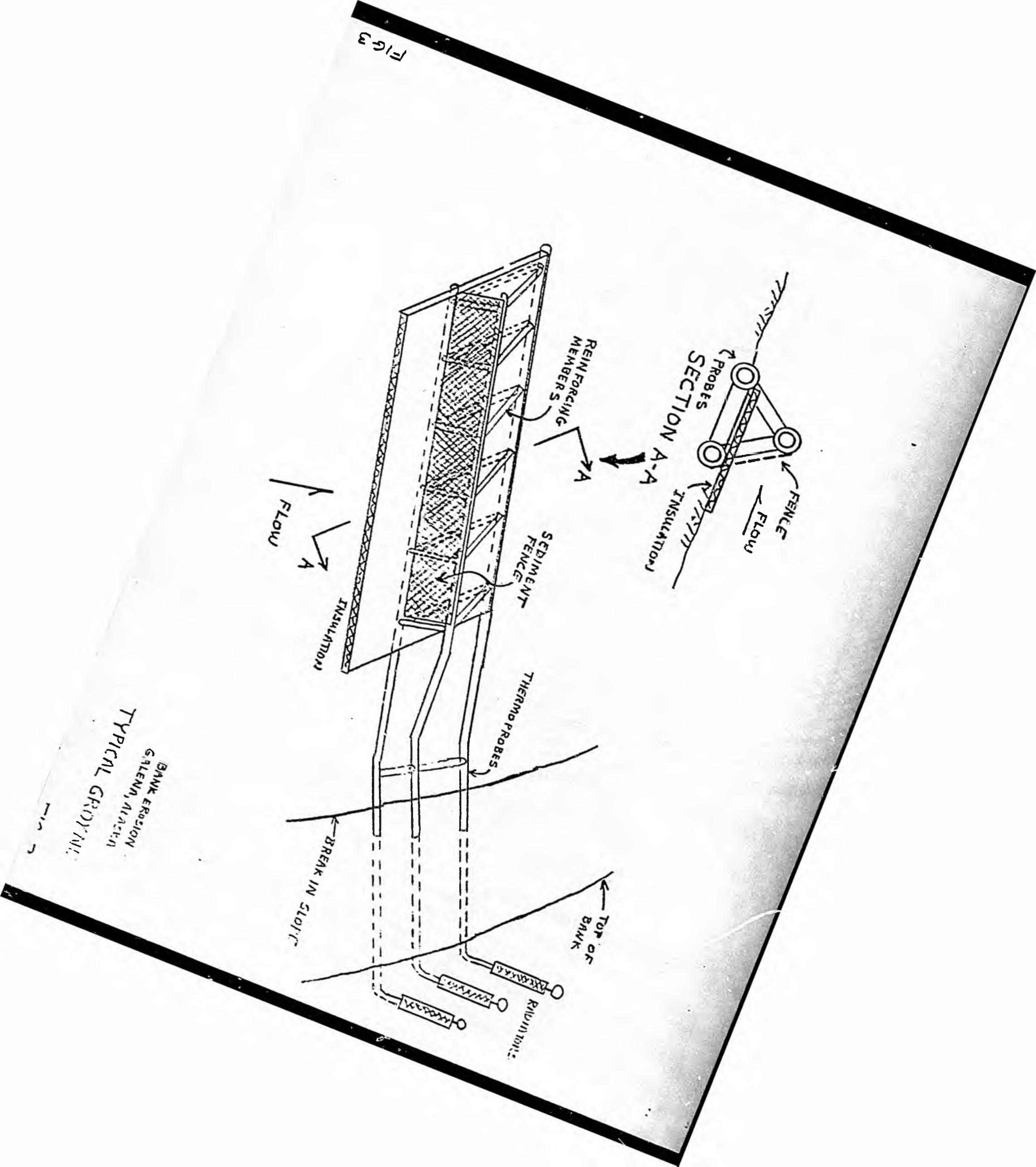
BANK EROSION
GALENA, ALASKA

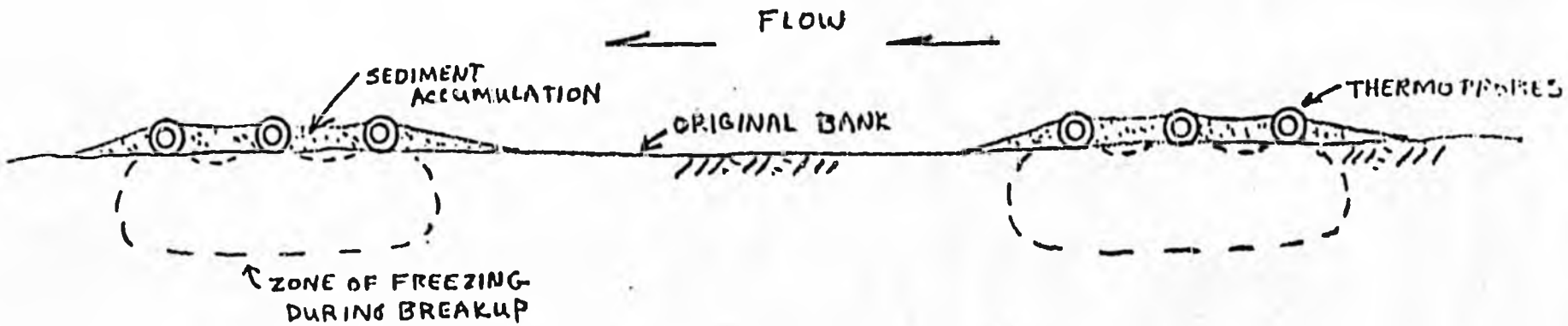
SCHEMATIC DIAGRAM OF GROYNE SYSTEM

FIG. 2

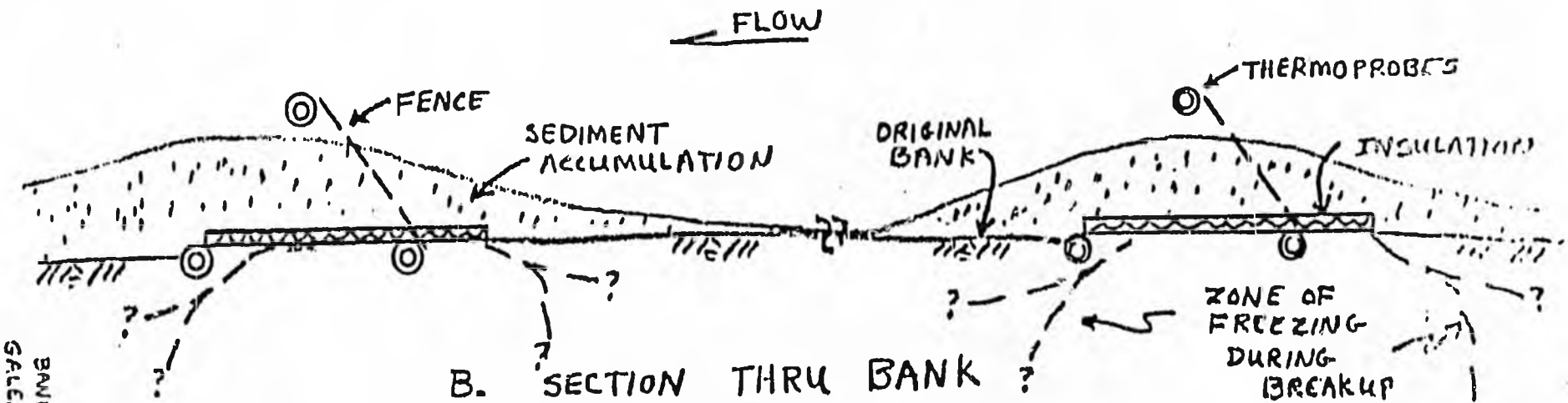
FIG 3



BANK EROSION
GALENA, ALASKA
TYPICAL GRADING



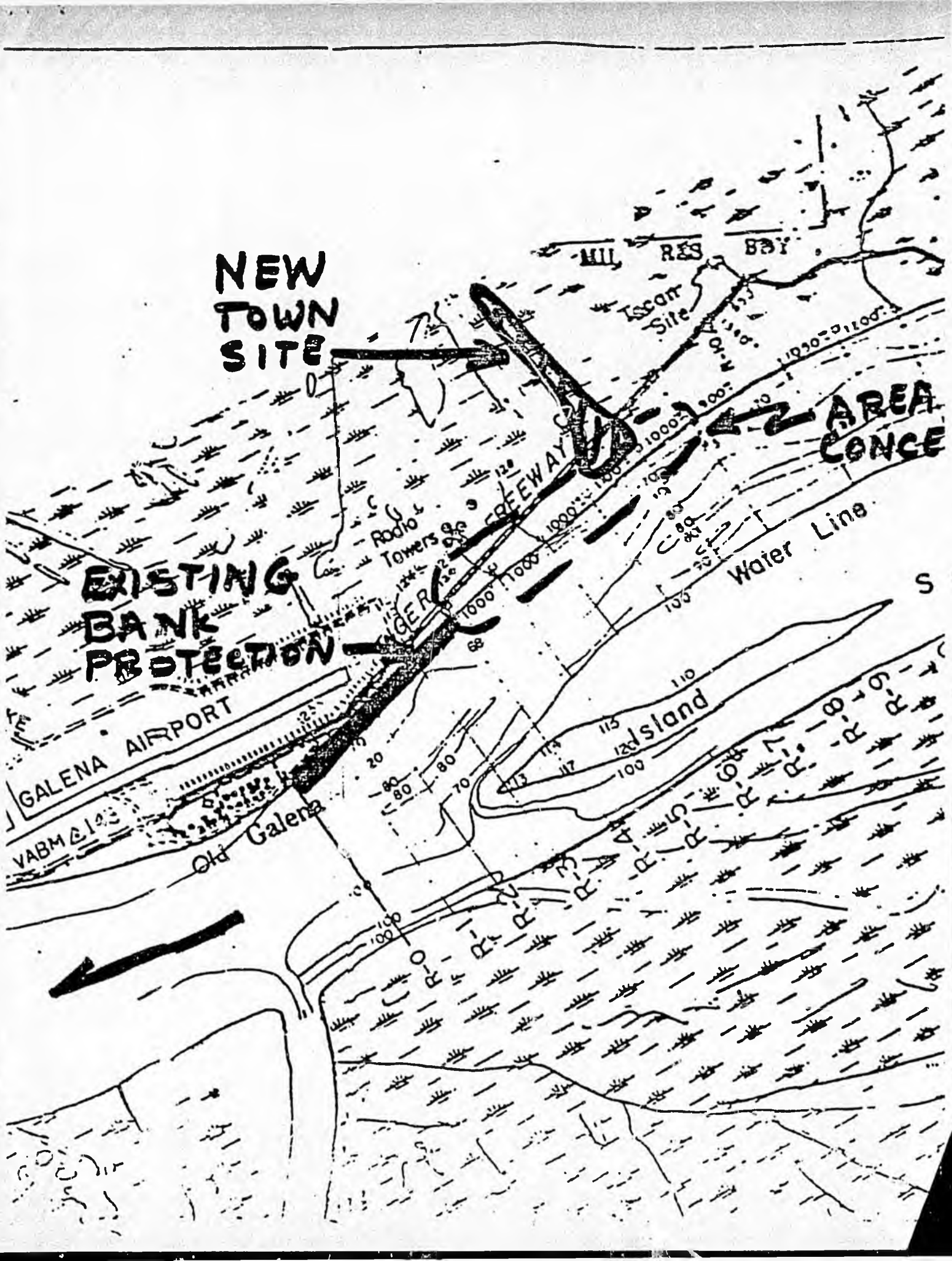
A. SECTION THRU BANK WITHIN WATER FLUCTUATION ZONE

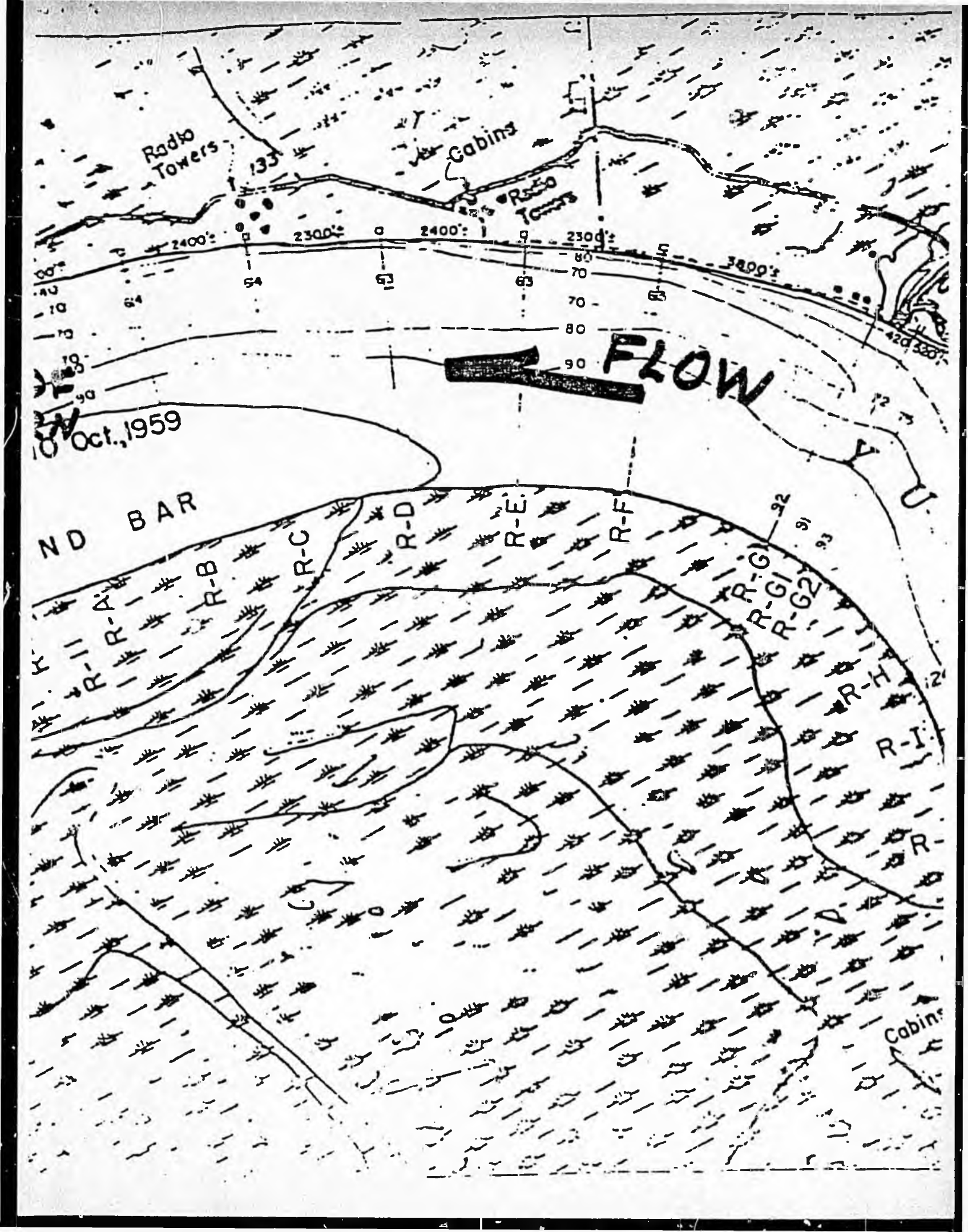


B. SECTION THRU BANK ? BELOW LOW WATER LEVEL

BANK EROSION
GALENA, ALASKA
SCHEMATIC DIAGRAM
SHOWING EFFECTS
OF C[illegible]OYNE

FIG 11


NEW TOWN SITE
EXISTING BANK PROTECTION
AREA CONCE
Water Line
GALENA AIRPORT
Old Galena
Island
Radio Towers
Iscam Site
HILL RES
BAY
FREEWAY


Radio Towers
Cabins
Radio Towers
2400'±
2300'±
2400'±
2300'±
3800'±
FLOW
Oct., 1959
ND BAR
R-A
R-B
R-C
R-D
R-E
R-F
R-G1
R-G2
R-H
R-I
Cabins