APPENDIX C
GEOTECHNICAL REVIEW

US Army Corps of Engineers
Alaska District
Soils and Geology Section

GEOTECHNICAL REVIEW

Port Lions Breakwater
Port Lions, Alaska

October 2003

GEOTECHNICAL REVIEW
PORT LIONS BREAKWATER
PORT LIONS, ALASKA

October 2003

1. Introduction

The purpose of this geotechnical summary is to identify surface and subsurface conditions of the project site, to address geotechnical concerns, and to determine if additional exploration is required. The 1985 Port Lions Small Boat Harbor Geotechnical Investigation, exploration logs from 1977 and 1985, and 1973 test pile exploration logs were used for this review. These documents are attached.

2. Project Location and Description

The project site is located in Settler Cove at Port Lions, Alaska. The project consists of designing and constructing a new breakwater just south of the existing breakwater. The proposed alignment is composed of three segments totaling approximately 1400 feet. The segments are arranged end to end forming a crescent shape enclosing the south end of the existing boat harbor.

3. Field Exploration Data

The subsurface data were acquired during three explorations in the area of the existing Small Boat Harbor project. Subsurface explorations for three test piles were conducted by Larmon Construction Company on 5 and 16 June 1973 and ranged in depth from six to eight feet. Auger and jet probe explorations were conducted by the U.S. Army Corps of Engineers (USACE) from 13 through 16 December 1977 that ranged in depth from one to 12.5 feet. The Corps also conducted more jet probe explorations from 16 through 26 April 1985 that ranged in depth from 1.5 to 5.5 feet. These borings and probes have been designated: 1973 test piles, PH-8 through PH-10; 1977 jet probes, PH-1 through PH-7; 1977 auger holes, AH-6 through AH-9; and 1985 jet probes, PH-11 through PH-23. The test pile, jet probe, and auger hole locations are shown on the Exploration Location Map (Figure 1).

The test piles were 16-inch pipe piles reportedly driven with a floating pile driver with a 5000-pound hammer and sampled with a sand pump bailer. The jet probes were advanced by jetting seawater down A-rod and

sampled with a standard two-inch outside diameter split spoon. A 140-pound hammer falling 30 inches was used to drive the sampler. The auger borings were drilled with a Mobile mini drill with three-inch diameter auger flights. No samples were taken from these auger holes; the holes were logged from the cuttings only.

The 1985 jet probe locations were established by transit and stadia using control points on the existing breakwater. Bottom elevations were established using tide tables. Only northings and eastings are available for the earlier jet probes, test piles and auger holes.

4. Laboratory Testing and Soil Classification

A testing program was employed for the 1973 and 1977; however, the results on the exploration logs are the only information available from that testing. The Geotechnical Investigation conducted in April 1985 validated the exploration logs and their content. For the 1985 geotechnical investigation, a testing program was established to determine the average properties of each stratum. Tests were performed to determine grain size distributions and the soil classification. The field logs were revised and supplemented based on the results of that testing program. These final exploration logs were interpreted from the field logs and results of the laboratory tests. The stratification lines represent the approximate boundary between soil types; the transitions may be gradual.

5. Site Conditions

Surface:

The shoreline topography slopes upward from the water's edge at an approximate 20 percent grade. The exploration logs indicate the harbor bottom ranges approximately from elevation -0.5 to –22.0 feet mean lower low water (MLLW). Dredging occurred in some boring locations during harbor construction. The tidal fluctuation at Port Lions ranges from elevation 11.5 to –2.6 feet MLLW based on U.S. Coast and Geodetic Survey records.

Shore Subsurface:

The 1977 auger test borings conducted onshore indicate the surficial soils are 1.5 to three feet thick and overlie bedrock. The boring logs indicate these soils to classify as peat, organic silt, and well-graded sand (PT, OL, SW).

Offshore Subsurface:

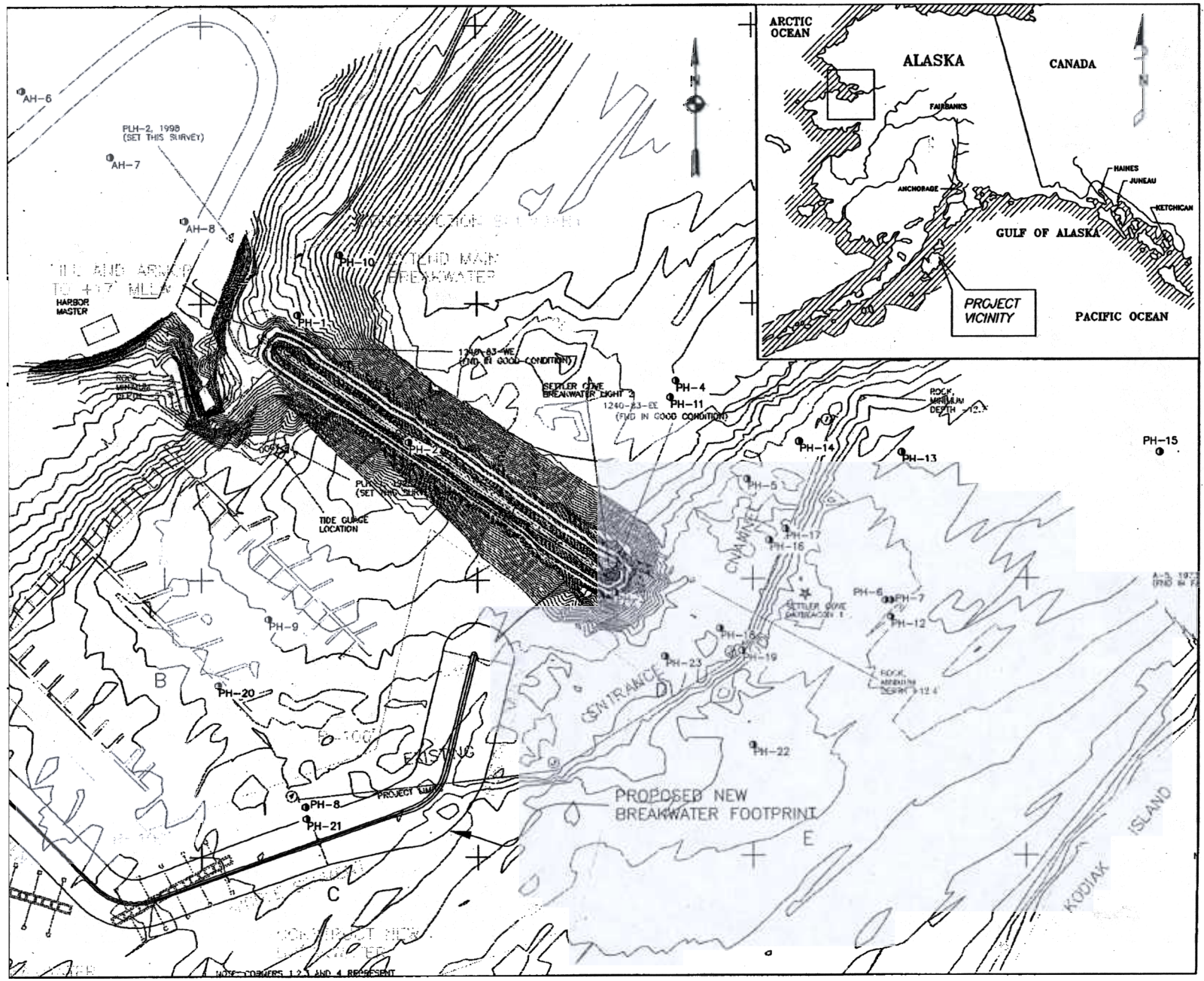
The exploration logs indicate the bedrock offshore to be overlain by up to 12.5 feet of overburden in the project area. The exploration logs indicate this overburden consists predominately of silt, silty and clayey sands and gravels (ML, SM, SC, GM, GC). The exploration logs indicate that a few localized upper areas of the overburden consist of poorly graded sand with silt, well-graded sand with silt, and well-graded gravel with silt (SP-SM, SW-SM, GW-GM). The N-values on the exploration logs indicate these soils are loose to very dense. The exploration logs indicate the top of bedrock ranges from approximately elevations zero to –33.0 feet MLLW within the project area.

6. Conclusions

The subsurface data are not comprehensive and do not fully cover the proposed project limits. However, a general knowledge can be interpreted of the subsurface conditions within the project area. The foundation materials in the vicinity of the Port Lions Breakwater have adequately supported that structure to present. Furthermore, the exploration logs show the jet probes near the existing breakwater to favorably compares with those in the footprint of the proposed breakwater. There is no indication that the conditions differ significantly. Therefore, construction of the breakwater, as proposed, is considered feasible. From these conclusions, it is reasonable to assume the material in the vicinity of the new proposed breakwater will provide adequate support. The proposed design and construction can be accomplished at this site and no further explorations are required. However, additional explorations will be required if dredging is a project component.

Enclosures:

1. Figure 1 - Exploration Location and Vicinity Map
2. Appendix A - 1985 Geotechnical Investigation and Exploration Logs
3. Appendix B – 1973 and 1977 Exploration Logs



ALASKA DISTRICT
CORPS OF ENGINEERS
SOILS AND GEOLOGY

EXPLORATION LOCATION AND VICINITY MAP
PORT LIONS NEW BREAKWATER
PORT LIONS, ALASKA

SCALE: 1 in. = 250 ft.
DATE: OCT 2003
DRAWN/RVW: RTW/CRW
FIGURE 1

Appendix A

1985 Geotechnical Investigation and Exploration Logs

GEOTECHNICAL INVESTIGATION
Port Lions Small Boat Harbor
Port Lions, Alaska

1. Purpose:

This investigation was conducted at the Request of Construction/Operations Division. It's purpose was to verify that the boring logs included in contract DACW85-83-C-0001 were accurate.

2. Field Investigation:

The field investigation began on 16 and 17 April 1985, but was temporarily discontinued when the anchors for the drill barge would not hold due to high winds. The field work concluded on 24-27 April 1985 using larger anchors. The drill barge consisted of a plywood platform constructed on two 26-foot skiffs powered by an outboard engine. On the 16th and 17th danforth anchors weighing 25-35 pounds were used to hold the barge in position. On the 24th through 27th, four 300 pound anchors were used. The holes were advanced by jetting to the desired depth thru "A-Rods" using a Bean 20 pump and sea water. Samples were obtained using a standard split barrel sampler. The sampler was driven into the soil by means of a 140 lb. hammer dropping 30 inches per blow. The number of blows to drive the sampler 18 inches was counted and recorded for each 6-inch interval. The total for the last two 6 inch increments is noted on the boring logs as "N". The drilling was performed by a Corps of Engineers drill crew and logged by a Corps of Engineers Geologist and Civil Engineer. Mr. Lawrence Perko of R & M Consultants, representing the contractor, was present most of the time. The hole locations were established by transit and stadia using control points on the existing breakwater. Bottom elevations were established using tide tables and checking the results with the location plotted on the bathymetry.

3. Laboratory:

A testing program was established to determine the average properties of each stratum. Tests were performed to determine the grain size distribution and the soil classification. The field logs were revised and supplemented based on the results of the testing program. These final logs represent our interpretation of the contents of the field logs and the results of the laboratory tests of the field samples. The stratification lines represent the approximate boundary between soil types; the transition may be gradual.

4. Results & Comparision with Contract Logs:

Boring PH-4 (1977) indicated loose silty gravelly sand to a depth of 12 feet 6 inches. Boring PH-11 (1985) approximately 45 feet away indicates the same material to its depth of 1½ feet.

Boring PH-6 and PH-7 (1977) showed medium dense gravelly silty clayey sand with refusal of the standard penetration test on rock, at 1 and 3 feet respectively. PH-12 (1985) approximately 40 feet away indicated dense silty gravelly sand overlying very dense clayey sand to the bottom of the hole at 3.3 feet.

PH-8 (1973) was a test pile which showed a 1 foot layer of gravel overlying sand to a depth of 6 feet. PH-21 (1985) indicates 1½ feet of loose silty sand over a 1 foot layer of gravel with loose sand and silty sand under that, to a depth of 5.2 feet. The location of PH-21 was about 30 feet from PH-8.

PH-5 (1977) at the edge of the dredged area indicated 1 foot of gravelly silty clayey sand with refusal of the standard penetration test on rock at 1 foot. PH-3 (1977) was located under the existing breakwater and consisted of 4 feet of medium dense sandy gravelly silt over dense silty sandy gravel. Due to the difficulties in anchoring, no hole was drilled immediately adjacent to PH-5. No hole could be drilled at PH-3 because of the breakwater. PH-14 through PH-19 and PH-23 were drilled within the dredged area to depths ranging to 4.9 feet. The material was a dense to very dense silty or clayey sand with gravel. Refusal, which is defined as a blow count in excess of 50 blows/6 inches, a total of 100 blows with less than 18 inches of penetration, or 10 blows with no advance of the sampler, was reached in PH-16 and PH-19.

PH-13 and PH-20 (1985) were drilled outside but adjacent to the dredged area at distances of 110 and 60 feet respectively. PH-13 indicates clayey sand to 3.4 feet with density varying from medium dense to dense with depth. PH-20 showed medium dense sand and gravel over dense clayey gravel and sand.

5. Conclusions:

The results obtained in the 1985 explorations are very comparable to those which are included in the contract documents. Borings at approximately the same locations showed comparable results at comparable depths. The 1985 borings within the dredged area indicated more dense material at the surface than was indicated in the contract borings around the dredged area. This does not seem surprising since the original surface materials have been removed by the contractor in fulfillment of contract requirements. Both the contract borings and the 1985 borings outside the dredged area indicate increasing density with depth. A location map and logs of the 1985 borings are attached.

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION
U.S. ARMY ENGINEER DISTRICT, ALASKA

EXPLORATION LOG

PROJECT	Pt Lions Small Boat Harbor
SHEET	1 of 1
LOCATION (Coordinates or Station)	N. 1,416,830 E. 721,850
DRILLING AGENCY	[ ] OTHER [XX] CORPS OF ENGINEERS AK District
NAME OF DRILLER	Vanlandingham
WEATHER	cool, windy
HOLE NO. FIELD	
HOLE NO. PERMANENT	PH-11
TYPE OF HOLE	Probe — TEST PIT [XX] AUGER HOLE [ ] CHURN DRILL [ ]
DEPTH TO	
DEPTH DRILLED INTO	
TOTAL DEPTH OF HOLE	1.5'
SIZE AND TYPE OF BIT	std 2" split spoon
DATUM FOR ELEVATION SHOWN	[ ] TBM. [XX] MSL.
TYPE OF EQUIPMENT	A rod jet w/std split spoon
TOTAL NO. OF SAMPLES	1
TYPE OF SAMPLES	drive
DEPTH TO GROUND-WATER	n/a
DATE HOLE STARTED	26 Apr 85
DATE HOLE COMPLETED	26 Apr 85
EL. TOP OF HOLE	-21.2
Geologist	P. Galbraith
Chief, Geology Section	J. Williamson
Chief, Foundations & Materials Branch	D. Thomas
Date	

elev.	DEPTH FEET	% WATER CONTENT	SAMPLE NO.	SOIL LEGEND	CLASSIFICATION	MAX SIZE PARTICLE	FORMATION DESCRIPTION & REMARKS
-21.2	1			SM	Silty sand w/gravel		N=8 blows/ft 25.6% gr, 57.4% sa, 17% fines
-22.7					Bottom of Hole		1.5'

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PROJECT Pt. Lions Small Boat Harbor PERMANENT HOLE NO. PH-11

2080-76

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U.S. ARMY ENGINEER DISTRICT, ALASKA

EXPLORATION LOG

PROJECT	Pt. Lions Small Boat Harbor
SHEET	1 OF 1
LOCATION (Coordinates or Station)	N. 1,416,430 E. 722,250
DRILLING AGENCY	[ ] OTHER AK District [X] CORPS OF ENGINEERS
HOLE NO.	PERMANENT PH12
FIELD	
NAME OF DRILLER	D. VanLandingham
WEATHER	cool, snow squalls
TYPE OF HOLE	Probe Hole [X] AUGER HOLE [ ] CHURN DRILL [ ]
DEPTH TO	
DEPTH DRILLED INTO	
TOTAL DEPTH OF HOLE	3.3
SIZE AND TYPE OF BIT	Std 2" split spoon
DATUM FOR ELEVATION SHOWN	[ ] TBM. [X] MSL.
TYPE OF EQUIPMENT	A-Rod Jet w/std Split Spoon
TOTAL NO. OF SAMPLES	2
TYPE OF SAMPLES	Drive
DEPTH TO GROUND-WATER	N/a
DATE HOLE STARTED	25 Apr 85
DATE HOLE COMPLETED	25 Apr 85
EL. TOP OF HOLE	-10.4
Geologist	P Galbraith
Chief, Geology Section	J. Williamson
Chief, Foundations & Materials Branch	D. Thomas
Date	

DEPTH FEET	% WATER CONTENT	SAMPLE NO.	SOIL LEGEND	CLASSIFICATION	MAX SIZE PARTICLE	FORMATION DESCRIPTION & REMARKS
elev. -10.4 / 0		1	SW-SM	Well graded sand with silt and gravel		blow count= 37 blows/ft 36.6% gr, 52.9% sa, 10.5% fines LL=15.9 PI=.15 Jet A-rod @ 20psi & 18gpm boosted to 30psi & 25gpm
1						
2		2	SC	Clayey sand w/gravel		Refused jetting at 1.75' Blow count= 60 blows/ft 0.7' spl retained 15.8% gr, 36.3% sa, 47.9% fines LL= 25.22 PI=10.88
3 / -13.6						3.3'
				Bottom of Hole		
4						
5						
6						
7						

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PROJECT Pt. Lions Small Boat Harbor PERMANENT HOLE NO. PH-12

2000-76

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EXPLORATION LOG

PROJECT	Pt. Lions Small Boat Harbor
SHEET	1 OF 1
LOCATION (Coordinates or Station)	N. 1,416,730 E. 722,270
DRILLING AGENCY	[XXX] CORPS OF ENGINEERS [ ] OTHER AK District
HOLE NO.	PERMANENT PH 13
NAME OF DRILLER	D. VanLandingham
WEATHER	cool, windy
TYPE OF HOLE	Probe Hole [XXX] AUGER HOLE [ ] CHURN DRILL [ ]
DEPTH TO	
DEPTH DRILLED INTO	
TOTAL DEPTH OF HOLE	3.4'
SIZE AND TYPE OF BIT	Std 2" split spoon
DATUM FOR ELEVATION SHOWN	[ ] TBM. [XXX] MSL.
TYPE OF EQUIPMENT	A-Rod Jet w/std Split Spoon
TOTAL NO. OF SAMPLES	2
TYPE OF SAMPLES	Drive
DEPTH TO GROUND-WATER	N/a
DATE HOLE STARTED	26 Apr 85
DATE HOLE COMPLETED	
EL. TOP OF HOLE	-11.2
Geologist	P Galbraith
Chief, Geology Section	J. Williamson
Chief, Foundations & Materials Branch	D. Thomas
Date	

DEPTH FEET	% WATER CONTENT	SAMPLE NO.	SOIL LEGEND	CLASSIFICATION	MAX SIZE PARTICLE	FORMATION DESCRIPTION & REMARKS
elev. -11.2' 0						
		1				blow count= 29/blows/ft 20.1% gr, 53.3% sa,26.7% fines LL=25 PI=7.26
1			SC	Clayey sand w/gravel		
						Hard at elev. 12.8' Jet A-rod @ 30 psi & 20 gpm Refuse jetting @ I.9'
2						
		2				Blow count = 43 blows/ft 24.6% gr, 37.6% sa, 37.8% fines
3						3.4'
-14.6				Bottom of hole		
4						
5						
6						
7						

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PROJECT Pt. Lions Small Boat Harbor PERMANENT HOLE NO. PH-13

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EXPLORATION LOG

PROJECT	Pt. Lions Small Boat Harbor
SHEET	1 OF 1
LOCATION (Coordinates or Station)	N. 1,416,750 E. 722,085
DRILLING AGENCY	[XXX] CORPS OF ENGINEERS [ ] OTHER AK District
HOLE NO. / PERMANENT	PH 14
NAME OF DRILLER	D. VanLandingham
WEATHER	cool, snow squalls
FIELD	
TYPE OF HOLE	Probe Hole [XX] AUGER HOLE [ ] CHURN DRILL [ ]
DEPTH TO	
DEPTH DRILLED INTO	
TOTAL DEPTH OF HOLE	4.2
SIZE AND TYPE OF BIT	Std 2" split spoon
DATUM FOR ELEVATION SHOWN	[ ] TBM. [XXX] MSL.
TYPE OF EQUIPMENT	A-Rod Jet w/std Split Spoon
TOTAL NO. OF SAMPLES	2
TYPE OF SAMPLES	Drive
DEPTH TO GROUND-WATER	N/a
DATE HOLE STARTED	
DATE HOLE COMPLETED	24 Apr 85
EL. TOP OF HOLE	-14.9
Geologist	P Galbraith
Chief, Geology Section	J. Williamson
Chief, Foundations & Materials Branch	D. Thomas
Date	

elev. -14.9'

DEPTH FEET	% WATER CONTENT	SAMPLE NO.	SOIL LEGEND	CLASSIFICATION	MAX SIZE PARTICLE	FORMATION DESCRIPTION & REMARKS
0						NQ CSG refused jetting @ surface Jet A-rod 50-60 psi @ 25 gpm
1		1	SC	Clayey sand w/gravel		Blow count = 64 blows/ft 1.0' spl. retained 22.9% gr, 36.6% sa, 40.4% fines LL=23.55 PI=7.05
2						Jet A-rod 40 psi @ 18 gpm Refused jetting A-4od at 2.7'
3		2				20.% gr. 36.1% sa, 43.9% fines blow count = 69/blows/ft 0.9' spl. retained
4						4.2'
-19.1				Bottom of Hole		
5						
6						
7						

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PROJECT Pt. Lions Small Boat Harbor PERMANENT HOLE NO. PH- 14

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NORTH PACIFIC DIVISION
U.S. ARMY ENGINEER DISTRICT, ALASKA

EXPLORATION LOG

PROJECT	Pt. Lions Small Boat Harbor
SHEET	1 OF 1
LOCATION (Coordinates or Station)	N. 1,416,730 E. 722,740
DRILLING AGENCY	[X] CORPS OF ENGINEERS [ ] OTHER AK District
HOLE NO.	FIELD / PERMANENT PH 15
NAME OF DRILLER	D. VanLandingham
WEATHER	cool, windy
TYPE OF HOLE	Probe Hole [X] AUGER HOLE [ ] CHURN DRILL [ ]
DEPTH TO	
DEPTH DRILLED INTO	
TOTAL DEPTH OF HOLE	3.2'
SIZE AND TYPE OF BIT	Std 2" split spoon
DATUM FOR ELEVATION SHOWN	[ ] TBM. [X] MSL.
TYPE OF EQUIPMENT	A-Rod Jet w/std Split Spoon
TOTAL NO. OF SAMPLES	2
TYPE OF SAMPLES	Drive
DEPTH TO GROUND-WATER	N/a
DATE HOLE STARTED	
DATE HOLE COMPLETED	24 Apr 85
EL. TOP OF HOLE	-14.8
Geologist	P Galbraith
Chief, Geology Section	J. Williamson
Chief, Foundations & Materials Branch	D. Thomas
Date	

elev.	DEPTH FEET	% WATER CONTENT	SAMPLE NO.	SOIL LEGEND	CLASSIFICATION	MAX SIZE PARTICLE	FORMATION DESCRIPTION & REMARKS
-14.8	0						Wash NQ rod @ 25 gpm & 10 psi
	1						
				SC	Clayey sand w/gravel		Refuse washing @ 1.7'
	2						
		6.6	1				blow count= 66 blows/ft 22.5% gr, 38.4% sa, 39.1% fines LL=23.98 PI=10.37
	3						
-18.0							3.2'
					Bottom of Hole		Hole shifted - second drive sample taken. 1.3'-2.8', blow count = 69 blows/ft, 41.8% gr, 27.3% sa, 30.9% fines LL=24.21 PI=6.8 classification GC-GM Silty clayey gravel with sand.
	4						
	5						
	6						
	7						

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PROJECT Pt. Lions Small Boat Harbor PERMANENT HOLE NO. PH-15

2000-76

DEPARTMENT OF THE ARMY
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EXPLORATION LOG

PROJECT	Pt. Lions Small Boat Harbor
SHEET	1 OF 1
LOCATION (Coordinates or Station)	N. 1,416,570 E. 722,030
DRILLING AGENCY	[XXX] CORPS OF ENGINEERS [ ] OTHER AK District
HOLE NO.	PERMANENT PH 16
NAME OF DRILLER	D. VanLandingham
WEATHER	windy, snow squalls
TYPE OF HOLE	Probe Hole [XXX] AUGER HOLE [ ] CHURN DRILL [ ]
DEPTH TO	
DEPTH DRILLED INTO	
TOTAL DEPTH OF HOLE	2.0'
SIZE AND TYPE OF BIT	Std 2" split spoon
DATUM FOR ELEVATION SHOWN	[ ] TBM. [XXX] MSL.
TYPE OF EQUIPMENT	A-Rod Jet w/std Split Spoon
TOTAL NO. OF SAMPLES	1
TYPE OF SAMPLES	Drive
DEPTH TO GROUND-WATER	N/a
DATE HOLE STARTED	
DATE HOLE COMPLETED	25 Apr 85
EL. TOP OF HOLE	-15.0
Geologist	P Galbraith
Chief, Geology Section	J. Williamson
Chief, Foundations & Materials Branch	D. Thomas
Date	

elev.	DEPTH FEET	% WATER CONTENT	SAMPLE NO.	SOIL LEGEND	CLASSIFICATION	MAX SIZE PARTICLE	FORMATION DESCRIPTION & REMARKS
-15.0	0						Jet A-rod @ 40 psi & 20 gpm Refused jetting @ 0.5'
	1		1	SM	Silty sand w/gravel		Blow counts = refusal, sampler was driven past refusal with following count N=42/56/42 23.6% gr, 48.1% sa, 28.3% fines LL=17.38 PI=3.83 1.0' spl. retained
-17.0	2						2.0'
					Bottom of Hole		
	3						
	4						
	5						
	6						
	7						

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PROJECT Pt. Lions Small Boat Harbor PERMANENT HOLE NO. PH- 16

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EXPLORATION LOG

SHEET, OF

1,416,590 722,060

OTHER

HOLE NO.

FIELD PERMANENT PH 17 D. VanLandingham windy snow squalls

AUGER HOLE CHURN DRILL TO 4.9'

2" MSL.

STARTED 85

2

EL. TOP OF HOLE -16.0 Geologist

DEPTH FEET	% WATER CONTENT	SAMPLE NO.	SOIL LEGEND	CLASSIFICATION	FORMATION DESCRIPTION & REMARKS
elev. -16.0					Jet A-rod @ 30 psi & 18 gpm
1		1			Blows count = 48 blows/ft 1.1' spl. retained 29.5% gr, 32.1% sa, 38.5% LL-22.78 PI-5.89
2			SC	Silty clayey sand w/gravel	Jet A-rod @ 30-40 Psi & 20
3					
4		2			[illegible] count = 68 blows/ft 27% gr, 36.1% sa, 36.9% fines LL=27.2 PI=12.39 [illegible] 5' spl. retained
-20.9 5					
6					
7					

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PROJECT Pt. Lions Small Boat Harbor PERMANENT HOLE NO. PH-17

2000-76

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION
U.S. ARMY ENGINEER DISTRICT, ALASKA

EXPLORATION LOG

PROJECT	Pt. Lions Small Boat Harbor
SHEET	1 OF 1
LOCATION (Coordinates or Station)	N. 1,416,410 E. 721,940
DRILLING AGENCY	[XXX] CORPS OF ENGINEERS [ ] OTHER AK District
HOLE NO.	PERMANENT PH 18
FIELD	
NAME OF DRILLER	D. VanLandingham
WEATHER	windy snow squalls
TYPE OF HOLE	Probe Hole [XXX] AUGER HOLE [ ] CHURN DRILL [ ]
DEPTH TO	
DEPTH DRILLED INTO	
TOTAL DEPTH OF HOLE	3.4'
SIZE AND TYPE OF BIT	Std 2" split spoon
DATUM FOR ELEVATION SHOWN	[ ] TBM. [XXX] MSL.
TYPE OF EQUIPMENT	A-Rod Jet w/std Split Spoon
TOTAL NO. OF SAMPLES	2
TYPE OF SAMPLES	Drive
DEPTH TO GROUND-WATER	N/a
DATE HOLE STARTED	
DATE HOLE COMPLETED	25 Apr 85
EL. TOP OF HOLE	-16.2
Geologist	P Galbraith
Chief, Geology Section	J. Williamson
Chief, Foundations & Materials Branch	D. Thomas
Date	

elev.	DEPTH FEET	% WATER CONTENT	SAMPLE NO.	SOIL LEGEND	CLASSIFICATION	MAX SIZE PARTICLE	FORMATION DESCRIPTION & REMARKS
-16.2	0						
		19.6	1				Blow count = 56 blows/ft 21.4% gr, 38.8% sa, 39.8% fines LL-25.2 PI=7.69
	1						
				SC	Clayey sand w/gravel		Jet A=rod @ 20 psi & 16 gpm
	2						Blow count= 58 blows/ft
			2				21.4% gr, 38.8% sa,39.8% fines LL=25.2 PI=7.69
	3						
-19.6							3.4'
					Bottom of Hole		
	4						
	5						
	6						
	7						

NPA FORM 19 (REV) DEC. 1959

PROJECT Pt. Lions Small Boat Harbor PERMANENT HOLE NO. PH- 18

2000-76

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION
U.S. ARMY ENGINEER DISTRICT, ALASKA

EXPLORATION LOG

PROJECT	Pt. Lions Small Boat Harbor
SHEET	1 OF 1
LOCATION (Coordinates or Station)	N. 1,416,370 E. 721,980
DRILLING AGENCY	XXX CORPS OF ENGINEERS; OTHER AK District
HOLE NO.	FIELD; PERMANENT PH 19
NAME OF DRILLER	D. VanLandingham
WEATHER	
TYPE OF HOLE	Probe Hole; XXXXXXX AUGER HOLE; CHURN DRILL
DEPTH TO	
DEPTH DRILLED INTO	
TOTAL DEPTH OF HOLE	4.2
SIZE AND TYPE OF BIT	Std 2" split spoon
DATUM FOR ELEVATION SHOWN	TBM; XXX MSL
TYPE OF EQUIPMENT	A-Rod Jet w/std Split Spoon
TOTAL NO. OF SAMPLES	2
TYPE OF SAMPLES	Drive
DEPTH TO GROUND-WATER	N/a
DATE HOLE STARTED	25 April 85
DATE HOLE COMPLETED	
EL. TOP OF HOLE	-15.0
Geologist	P Galbraith
Chief, Geology Section	J. Williamson
Chief, Foundations & Materials Branch	D. Thomas
Date	

elev.	DEPTH FEET	% WATER CONTENT	SAMPLE NO.	SOIL LEGEND	CLASSIFICATION	MAX SIZE PARTICLE	FORMATION DESCRIPTION & REMARKS
-15.0	0						Jet A-rod
			1				22.6% gr, 33.3% sa, 44.1% fines LL=28.51 PI=9.03 Blow count= 47 blows/ft 0.7' spl. retained
	1						
	2			SC	Clayey sand w/gravel		Jet A-rod @ 20 psi & 18 gpm Refusal jetting at 2.7'
	3		2				Blow count = refusal, N= 20/27/50 (for .4 ft) 0.7' spl. retained 12.7% gr, 38.6% sa, 48.7% fines LL= 26.41 PI=9.14
	4						
-19.2					Bottom Of Hole		4.2' Refusal
	5						
	6						
	7						

NPA FORM DEC. 1959 19 (REV)

PROJECT Pt. Lions Small Boat Harbor PERMANENT HOLE NO. PH- 19

2000-76

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION
U.S. ARMY ENGINEER DISTRICT, ALASKA

EXPLORATION LOG

PROJECT	Pt. Lions Small Boat Harbor
SHEET	1 OF 1
LOCATION (Coordinates or Station)	N. 1,416,310 E. 721,030
DRILLING AGENCY	☒ CORPS OF ENGINEERS ☐ OTHER AK District
HOLE NO.	
FIELD	PERMANENT PH 20
NAME OF DRILLER	D. VanLandingham
WEATHER	cool, windy
TYPE OF HOLE	Probe Hole ☒ AUGER HOLE ☐ CHURN DRILL ☐
DEPTH TO	
DEPTH DRILLED INTO	
TOTAL DEPTH OF HOLE	4.4'
SIZE AND TYPE OF BIT	Std 2" split spoon
DATUM FOR ELEVATION SHOWN	☐ TBM. ☒ MSL.
TYPE OF EQUIPMENT	A-Rod Jet w/std Split Spoon
TOTAL NO. OF SAMPLES	3
TYPE OF SAMPLES	Drive
DEPTH TO GROUND-WATER	N/a
DATE HOLE STARTED	
DATE HOLE COMPLETED	26 Apr 85
EL. TOP OF HOLE	-11.4
Geologist	P Galbraith
Chief, Geology Section	J. Williamson
Chief, Foundations & Materials Branch	D. Thomas
Date	

elev.	DEPTH FEET	% WATER CONTENT	SAMPLE NO.	SOIL LEGEND	CLASSIFICATION	MAX SIZE PARTICLE	FORMATION DESCRIPTION & REMARKS
-11.4	0		1	SP-SM	Poorly graded sand w/silt & gravel		Blow count = 26 blows/ft. 21.5% gr, 70.6% sa, 8% fines
	1			GM	Silty gravel w/sand		35% gr, 30.3% sa, 34.7% fines
	2		2	GC	Clayey gravel w/sand		Jet A-rod @ 30=40 Psi & 25 gpm Refusal jet @ 1.6' Blow count = 46 blows/ft 31.9% gr, 28.9% sa, 39.1% fines LL= 24.5 PI= 9.79
	3		3	SC-SM	Silty clayey sand		Blow count = 41 blows/ft 13.4% gr, 42.7% sa, 43.9% fines LL=21.42 PI=6.08
-15.8	4				Bottom of Hole		4.4'
	5						
	6						
	7						

NPA FORM DEC. 1959 19 (REV)

PROJECT Pt. Lions Small Boat Harbor PERMANENT HOLE NO. PH- 20

2000-76

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION
U.S. ARMY ENGINEER DISTRICT, ALASKA

EXPLORATION LOG

PROJECT	Pt. Lions Small Boat Harbor
SHEET	1 OF 1
LOCATION (Coordinates or Station)	N. 1,416,070 E. 721,190
DRILLING AGENCY	[XXX] CORPS OF ENGINEERS; [ ] OTHER AK District
NAME OF DRILLER	D. VanLandingham
WEATHER	cool, windy
HOLE NO. / PERMANENT	PH 21
FIELD	
TYPE OF HOLE	Probe Hole; [XXX] AUGER HOLE; [ ] CHURN DRILL; [ ]
DEPTH TO	
DEPTH DRILLED INTO	
TOTAL DEPTH OF HOLE	5.2'
SIZE AND TYPE OF BIT	Std 2" split spoon
DATUM FOR ELEVATION SHOWN	[ ] TBM. [XXX] MSL.
TYPE OF EQUIPMENT	A-Rod Jet w/std Split Spoon
TOTAL NO. OF SAMPLES	4
TYPE OF SAMPLES	3 Drive ; 1 grab
DEPTH TO GROUND-WATER	N/a
DATE HOLE STARTED / COMPLETED	26 Apr 85
EL. TOP OF HOLE	-15.2
Geologist	P Galbraith
Chief, Geology Section	J. Williamson
Chief, Foundations & Materials Branch	D. Thomas
Date	

elev.	DEPTH FEET	% WATER CONTENT	SAMPLE NO.	SOIL LEGEND	CLASSIFICATION	MAX SIZE PARTICLE	FORMATION DESCRIPTION & REMARKS
-15.2	0		1	SM	Silty sand		Blow count = 5 blows/ft 63% sa, 37% fines 0.5' spl. retained
	1						
			G R A B	GP	Poorly graded gravel w/sand		70.4% gr, 24.6% sa, 5% fines
	2		2	SW	Well graded sand w/gravel		~~blow count - 11 blows/ft~~ 42.7% gr, 53.2% sa, 4.1% fines Very poor spl. drive tip plugged w/large gravel.
	3						
	4		3	SM	Silty sand		Blow count = 8 blows/ft 72.2% sa, 27.8% fines
	5						
-20.4					Bottom of Hole		5.2' NQ CSG sanded in.
	6						
	7						

NPA FORM DEC. 1959 19 (REV)

PROJECT Pt. Lions Small Boat Harbor PERMANENT HOLE NO. PH- 21

3000-76

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION
U.S. ARMY ENGINEER DISTRICT, ALASKA

EXPLORATION LOG

SHEET OF

☐ OTHER

HOLE NO.

FIELD PERMANENT PH D. VanLandingham

AUGER HOLE ☐ CHURN DRILL ☐

5'

2"

STARTED

15.5± H.

FEET	CONTENT	SAMPLE NO.	SOIL LEGEND	CLASSIFICATION	FORMATION DESCRIPTION & REMARKS
					Blow count = 6 blows/ft
1		1			No recovery except trace of fine sand.
2					Blow count = 10 blows/ft 6.1% gr, 79.5% sa, 14.4% fines
				Silty sand	5% gr, 76% sa, 19% fines
3		&			
4					Blow count = 7 blows/ft
5					
				of Hole	
7					

NPA FORM DEC. 1959 19 (REV)

OTHER

D. VanLandingham

TO

1.5'

2"

TBM.

Date

elev.		CLASSIFICATION	FORMATION DESCRIPTION & REMARKS
-15.5			count = 31 blows/ft
	1 SC	sand w/gravel	.4% gr,36.1% sa,44.5% fines LL= 24.21 PI=8.77
			5'
-17.0		of Hole	

1 2 3 4 5 6 7

NPA FORM 19 (REV)
DEC. 1959

PROJECT Pt. Lions Small Boat Harbor PERMANENT HOLE NO. PH- 23

2000-76

Appendix B

1973 and 1977 Exploration Logs

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION
U.S. ARMY ENGINEER DISTRICT, ALASKA

EXPLORATION LOG

PROJECT	Port Lions Small Boat Harbor
SHEET	1 OF 1
LOCATION (Coordinates or Station)	N. 1,416,980 E. 721,175
DRILLING AGENCY	[ ] OTHER [XX] CORPS OF ENGINEERS
NAME OF DRILLER	Mitchell
WEATHER	Wind, Snow, Cold
HOLE NO. FIELD	PH- 1
HOLE NO. PERMANENT	PH-1
TYPE OF HOLE	TEST PIT [ ] AUGER HOLE [ ] CHURN DRILL [ ]
DEPTH TO	
DEPTH DRILLED INTO	
TOTAL DEPTH OF HOLE	0'
SIZE AND TYPE OF BIT	Standard Split Spoon
DATUM FOR ELEVATION SHOWN	[ ] TBM. MLLW [XX] MSL
TYPE OF EQUIPMENT	Ax Rod - Jet Probe
TOTAL NO. OF SAMPLES	0
TYPE OF SAMPLES	
DEPTH TO GROUND-WATER	
DATE HOLE STARTED	13 December 1977
DATE HOLE COMPLETED	
EL. TOP OF HOLE	-12
Geologist	J. Raychel
Chief, Geology Section	
Chief Foundations & Materials Branch	
Date	

DEPTH FEET	% WATER CONTENT	SAMPLE NO.	SOIL LEGEND	CLASSIFICATION	MAX SIZE PARTICLE	FORMATION DESCRIPTION & REMARKS
1				Refusal on Rock at B		Several attempts were made to probe within a 15 foot radius of the location indicated and refusal on rock was encountered at the bottom surface each time.
2						
3						
4						
5						
7						
8						
9						
10						
11						
12						

NPA FORM 19 (REV)
DEC. 1955

PROJECT Port Lions Small Boat Harbor PERMANENT HOLE NO. PH- 1

1832-60

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION
U.S. ARMY ENGINEER DISTRICT, ALASKA

EXPLORATION LOG

Port Lions Small Boat Harbor — SHEET 1 OF 1

LOCATION (Coordinates or Station): N. 1,416,750 E. 721,375

DRILLING AGENCY: [XX] CORPS OF ENGINEERS [ ] OTHER

HOLE NO. — FIELD: PH-2 PERMANENT: PH-2

NAME OF DRILLER: Mitchell

WEATHER: Overcast

TYPE OF HOLE: TEST PIT [ ] AUGER HOLE [ ] CHURN DRILL [ ]

DEPTH TO: | DEPTH DRILLED INTO: | TOTAL DEPTH OF HOLE: 11'

SIZE AND TYPE OF BIT: Standard Split Spoon

DATUM FOR ELEVATION SHOWN: [ ] TBM. MLLW [XX] MSL

TYPE OF EQUIPMENT: Ax Rod - Jet Probe

TOTAL NO. OF SAMPLES: 2

TYPE OF SAMPLES: Drive

DEPTH TO GROUND-WATER:

DATE HOLE STARTED: 15 December 1977 COMPLETED:

EL. TOP OF HOLE: -22

Geologist: J. Raychel

Chief, Geology Section:

Chief, Foundations & Materials Branch: Date

DEPTH FEET	% WATER CONTENT	SAMPLE NO.	SOIL LEGEND	CLASSIFICATION	MAX SIZE PARTICLE	FORMATION DESCRIPTION & REMARKS
1		1	ML	Sandy Silt		Volcanic Ash in tip of Sampler 40% Sa, 60%Si, 13 Blows per foot. Easy Jetting
2						
3						Refused Further Jetting
4		2	GW/GM	Silty Sandy Gravel		Very Angular Gravels 51%Gr, 42%Sa, 7%Si 7 Blows per foot
5						
6						
7						
8						
9						
10						
11						
12				Refusal on Rock		

NPA FORM DEC. 1959 19 (REV)

PROJECT: Port Lions Small Boat Harbor PERMANENT HOLE NO. PH-2

1832-60

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION
U.S. ARMY ENGINEER DISTRICT, ALASKA

EXPLORATION LOG

PROJECT	Port Lions Small Boat Harbor
SHEET	1 OF 1
LOCATION (Coordinates or Station)	N. 1,416,475 E. 721,750
DRILLING AGENCY	[XX] CORPS OF ENGINEERS [ ] OTHER
HOLE NO. FIELD	PH-3
HOLE NO. PERMANENT	PH-3
NAME OF DRILLER	Mitchell
WEATHER	Fair
TYPE OF HOLE	TEST PIT [ ] AUGER HOLE [ ] CHURN DRILL [ ]
DEPTH TO	
DEPTH DRILLED INTO	
TOTAL DEPTH OF HOLE	9'-0"
SIZE AND TYPE OF BIT	Standard Split Spoon
DATUM FOR ELEVATION SHOWN	[ ] TBM. MLLW [XX] MSL
TYPE OF EQUIPMENT	Ax Rod - Jet Probe
TOTAL NO. OF SAMPLES	2
TYPE OF SAMPLES	Drive
DEPTH TO GROUND-WATER	
DATE HOLE STARTED	15 December 1977
DATE HOLE COMPLETED	
EL. TOP OF HOLE	-16'
Geologist	J. Raychel
Chief, Geology Section	
Chief, Foundations & Materials Branch	
Date	

DEPTH FEET	% WATER CONTENT	SAMPLE NO.	SOIL LEGEND	CLASSIFICATION	MAX SIZE PARTICLE	FORMATION DESCRIPTION & REMARKS
1		1	ML	Sandy Gravelly Silt		Sample not recovered 18 Blows/Foot Hard Jetting
2						
3						
4						Refused further Jetting
5		2	GM	Silty Sandy Gravel		50%Gr, 31%Sa, 19%Si Gravel and Sand percentage is approximate. 34 Blows/foot Drove from 5'6" to 9' through Gravels, Cobbles and Small Boulders
6						
7						
8						
9				Bottom of Hole No Refusal		
10						
11						
12						

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DEC. 1959

PROJECT Port Lions Small Boat Harbor PERMANENT HOLE NO. PH-3

18X-60

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION
U.S. ARMY ENGINEER DISTRICT, ALASKA

EXPLORATION LOG

PROJECT: Port Lions Small Boat Harbor | SHEET 1 OF 1

LOCATION (Coordinates or Station): N. 1,416,860 E. 721,860

DRILLING AGENCY: [XX] CORPS OF ENGINEERS [ ] OTHER

NAME OF DRILLER: Mitchell | WEATHER:

HOLE NO. — FIELD: PH- 4 PERMANENT: PH-4

TYPE OF HOLE: TEST PIT [ ] AUGER HOLE [ ] CHURN DRILL [ ]

DEPTH TO: | DEPTH DRILLED INTO: | TOTAL DEPTH OF HOLE: 12'6"

SIZE AND TYPE OF BIT: Standard Split Spoon

DATUM FOR ELEVATION SHOWN: [ ] TBM. MLLW [XX] MSL

TYPE OF EQUIPMENT: Ax Rod - Jet Probe

TOTAL NO. OF SAMPLES: 1 | TYPE OF SAMPLES: | DEPTH TO GROUND-WATER: | DATE HOLE STARTED: 16 December 1977 | COMPLETED:

EL. TOP OF HOLE: -22 | Geologist: J. Raychel | Chief, Geology Section: | Chief Foundations & Materials Branch: | Date:

DEPTH FEET	% WATER CONTENT	SAMPLE NO.	SOIL LEGEND	CLASSIFICATION	MAX SIZE PARTICLE	FORMATION DESCRIPTION & REMARKS
1		1	SW/SM	Silty Gravelly Sand	1"	45%Gr, 50%Sa, 5%Si 6 Blows/Foot Refused further Jetting @ 2'
2						Drove Rod the remaining distance; blow count as follows:
3						
4						11 Blows per foot
5						
6						11 Blows per foot
7			SM	Silty Gravelly Sand		7 Blows per foot
8						9 Blows per foot
9						10 Blows per foot
10						9 Blows per foot
11						5 Blows per foot
12						10 Blows per foot
				Bottom of Hole No Refusal		

NPA FORM DEC. 1959 19 (REV)

PROJECT Port Lions Small Boat Harbor PERMANENT HOLE NO. PH- 4

1892-60

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION
U.S. ARMY ENGINEER DISTRICT, ALASKA

EXPLORATION LOG

PROJECT: Port Lions Small Boat Harbor
SHEET 1 OF 1

LOCATION (Coordinates or Station): N. 1,416,680 E. 421,990

DRILLING AGENCY: [XX] CORPS OF ENGINEERS [ ] OTHER

NAME OF DRILLER: Mitchell
WEATHER: Overcast

HOLE NO. — FIELD: PH- 5 PERMANENT: PH- 5

TYPE OF HOLE: TEST PIT [ ] AUGER HOLE [ ] CHURN DRILL [ ]

DEPTH TO:
DEPTH DRILLED INTO:
TOTAL DEPTH OF HOLE: 1'

SIZE AND TYPE OF BIT: Standard Split Spoon

DATUM FOR ELEVATION SHOWN: [ ] TBM. MLLW [XX] MSL

TYPE OF EQUIPMENT: Ax Rod - Jet Probe

TOTAL NO. OF SAMPLES:
TYPE OF SAMPLES:
DEPTH TO GROUND-WATER:
DATE HOLE STARTED: 16 December 1977 COMPLETED

EL. TOP OF HOLE: -15'
Geologist: J. Raychel
Chief, Geology Section:
Chief Foundations & Materials Branch: Date

DEPTH FEET	% WATER CONTENT	SAMPLE NO.	SOIL LEGEND	CLASSIFICATION	MAX SIZE PARTICLE	FORMATION DESCRIPTION & REMARKS
1		1	SM	Gravelly Silty Clayey Sand		36%Gr, 26%Sa, 24%Silt and Clay Gravel and Sand percentages are approximate. 24 Blows per foot
				Refusal on Rock		Made two attempts to drive within a 10-foot radius. Met Refusal at same depth.

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PROJECT Port Lions Small Boat Harbor PERMANENT HOLE NO. PH- 5

1632-(0

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION
U.S. ARMY ENGINEER DISTRICT, ALASKA

EXPLORATION LOG

PROJECT	Port Lions Small Boat Harbor
SHEET	1 OF 1
LOCATION (Coordinates or Station)	N. 1,416,460 E. 722,240
DRILLING AGENCY	[XX] CORPS OF ENGINEERS [ ] OTHER
HOLE NO. FIELD	PH- 6
HOLE NO. PERMANENT	PH- 6
NAME OF DRILLER	Mitchell
WEATHER	Overcast
TYPE OF HOLE	TEST PIT [ ] AUGER HOLE [ ] CHURN DRILL [ ]
DEPTH TO	
DEPTH DRILLED INTO	
TOTAL DEPTH OF HOLE	1'0"
SIZE AND TYPE OF BIT	Standard Split Spoon
DATUM FOR ELEVATION SHOWN	[ ] TBM. MLLW [XX] MSL
TYPE OF EQUIPMENT	Ax Rod - Jet Probe
TOTAL NO. OF SAMPLES	1
TYPE OF SAMPLES	Drive
DEPTH TO GROUND-WATER	
DATE HOLE STARTED	16 December 1977
DATE HOLE COMPLETED	
EL. TOP OF HOLE	-11
Geologist	J. Raychel
Chief, Geology Section	
Chief, Foundations & Materials Branch	
Date	

DEPTH FEET	% WATER CONTENT	SAMPLE NO.	SOIL LEGEND	CLASSIFICATION	MAX SIZE PARTICLE	FORMATION DESCRIPTION & REMARKS
		1	SM	Gravelly Silty Clayey Sand		20%Gr, 58%Sa, 22%SI&CL percentages of Sand and Gravel are approximate. 23 Blows per foot
1				Refusal on Rock		

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PROJECT Port Lions Small Boat Harbor PERMANENT HOLE NO. PH- 6

1832-60

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION
U.S. ARMY ENGINEER DISTRICT, ALASKA

EXPLORATION LOG

PROJECT: Port Lions Small Boat Harbor | SHEET 1 OF 1

LOCATION (Coordinates or Station): N. 1,416,460 E. 722,250

DRILLING AGENCY: [XX] CORPS OF ENGINEERS [ ] OTHER

NAME OF DRILLER: Mitchell | WEATHER: Overcast

HOLE NO. — FIELD: PH- 6a | PERMANENT: PH- 7

TYPE OF HOLE: TEST PIT [ ] AUGER HOLE [ ] CHURN DRILL [ ]

DEPTH TO | DEPTH DRILLED INTO | TOTAL DEPTH OF HOLE: 3'

SIZE AND TYPE OF BIT: Standard Split Spoon

DATUM FOR ELEVATION SHOWN: [ ] TBM. MLLW [XX] MSK

TYPE OF EQUIPMENT: Ax Rod - Jet Probe

TOTAL NO. OF SAMPLES: 1 | TYPE OF SAMPLES: Drive

DEPTH TO GROUND-WATER | STARTED: 16 December 1977 | DATE HOLE COMPLETED

EL. TOP OF HOLE: -11' | Geologist: J. Baychel | Chief, Geology Section | Chief, Foundations & Materials Branch | Date

DEPTH FEET	% WATER CONTENT	SAMPLE NO.	SOIL LEGEND	CLASSIFICATION	MAX. SIZE PARTICLE	FORMATION DESCRIPTION & REMARKS
1		1	SM	Gravelly Silty Clayey Sand		15%Gr, 42%Sa, 43%Si&CL Percentages of Sand and Gravel are approximate. 17 Blows per foot
2						20 Blows per foot
3						26 Blows per 6"
				Refusal on Rock		

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PROJECT: Port Lions Small Boat Harbor | PERMANENT HOLE NO. PH- 7

1892-60

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION
U.S. ARMY ENGINEER DISTRICT, ALASKA

EXPLORATION LOG

PROJECT	Port Lions Boat Harbor
SHEET	1 OF 1
LOCATION (Coordinates or Station)	N. Settler Cove E.
DRILLING AGENCY	[ ] CORPS OF ENGINEERS [X] OTHER Larmon Const. Co.
HOLE NO.	FIELD 1 PERMANENT PH-8
NAME OF DRILLER	Amil Larmon
WEATHER	Partly Cloudly
TYPE OF HOLE	TEST PIT [ ] AUGER HOLE [ ] CHURN DRILL [ ] Test Pile
DEPTH TO	
DEPTH DRILLED INTO	
TOTAL DEPTH OF HOLE	6 ft.
SIZE AND TYPE OF BIT	16" Pipe Pile
DATUM FOR ELEVATION SHOWN	[ ] TBM. Tide [ ] MSL.
TYPE OF EQUIPMENT	Floating Pile Driver w/5000#hammer
TOTAL NO. OF SAMPLES	1
TYPE OF SAMPLES	Sand Pump Bailer
DEPTH TO GROUND-WATER	
DATE HOLE STARTED	15 June 73
DATE HOLE COMPLETED	15 June 73
EL. TOP OF HOLE	-14' MLLW
Geologist	F. Anderson
Chief, Geology Section	
Chief, Foundations & Materials Branch	Date

DEPTH FEET	% WATER CONTENT	SAMPLE NO.	SOIL LEGEND	CLASSIFICATION	MAX. SIZE PARTICLE	FORMATION DESCRIPTION & REMARKS
-14' MLLW				Layer of graywacke gravel		
-15' 1						
-16' 2						
-17' 3				Poorly graded sand (SP)		
-18' 4						
-19' 5						
-20' 6				Bottom of probe No refusal		

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NPA FORM 19 (REV) DEC. 1959

PROJECT Port Lions Boat Harbor PERMANENT HOLE NO. PH-8

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION
U.S. ARMY ENGINEER DISTRICT, ALASKA

EXPLORATION LOG

LOCATION (Co. & Station)	Port Lions Boat Harbor
	N. Settler Cover E.
SHEET	1 OF 1
DRILLING AGENCY	☒ OTHER Larmon Const. Co. ☐ CORPS OF ENGINEERS
NAME OF DRILLER	Amil Larmon
WEATHER	Partly Cloudy
FIELD	3
HOLE NO.	PERMANENT PH-9
TYPE OF HOLE	Test Pile
TEST PIT ☐ AUGER HOLE ☐ CHURN DRILL ☐	
DEPTH TO	
DEPTH DRILLED INTO	
TOTAL DEPTH OF HOLE	9 ft.
SIZE AND TYPE OF BIT	16" Pipe Pile
DATUM FOR ELEVATION SHOWN	☐ TBM. Tide ☐ MSL.
TYPE OF EQUIPMENT	Floating Pile Driver w/5000# Hamme
TOTAL NO. OF SAMPLES	0
TYPE OF SAMPLES	
DEPTH TO GROUND-WATER	
DATE HOLE STARTED	16 Jun 73
DATE HOLE COMPLETED	16 Jun
EL. TOP OF HOLE	-15 MLLW
Geologist	F. Anderson
Chief, Geology Section	
Chief, Foundations & Materials Branch	
Date	

DEPTH FEET	% WATER CONTENT	SAMPLE NO.	SOIL LEGEND	CLASSIFICATION	MAX. SIZE PARTICLE	FORMATION DESCRIPTION & REMARKS
1						
2						
3						
4						
5				Gravelly Sand		
6						
7						
8						
9				Bottom of probe No refusal		

-15 MLLW
-16
-17
-18
-19
-20
-21
-22
-23
-24

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NPA FORM DEC. 1959 19 (REV)

PROJECT Port Lions Boat Harbor

PERMANENT HOLE NO. PH-9

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION
U.S. ARMY ENGINEER DISTRICT, ALASKA

EXPLORATION LOG

PROJECT: Port Lions Small Boat Harbor — SHEET 1 OF 1

LOCATION (Coordinates or Station): N. 1,417,385 E. 720,675

DRILLING AGENCY: [XX] CORPS OF ENGINEERS [ ] OTHER

HOLE NO. — FIELD: AH-6 — PERMANENT: AH-6

NAME OF DRILLER: Mitchell

WEATHER: Snow, Wind

TYPE OF HOLE: TEST PIT [ ] AUGER HOLE [XX] CHURN DRILL [ ]

DEPTH TO | DEPTH DRILLED INTO | TOTAL DEPTH OF HOLE: 3'-6"

SIZE AND TYPE OF BIT: 3" Auger

DATUM FOR ELEVATION SHOWN: [ ] TBM. MLLW [XX] MSK

TYPE OF EQUIPMENT: Mobile Mini Drill

TOTAL NO. OF SAMPLES: 0

TYPE OF SAMPLES:

DEPTH TO GROUND-WATER:

DATE HOLE STARTED: 14 December 1977 COMPLETED:

EL. TOP OF HOLE: 98'

Geologist: . Ravchel

Chief, Geology Section:

Chief, Foundations & Materials Branch:

Date:

DEPTH FEET	% WATER CONTENT	SAMPLE NO.	SOIL LEGEND	CLASSIFICATION	MAX SIZE PARTICLE	FORMATION DESCRIPTION & REMARKS
			Pt	Peat		Frozen
1			OL	Organic Silt		
2						
3						
				Refusal on Rock		
4						
5						
6						

NPA FORM 19 (REV.) DEC. 1959

PROJECT Port Lions Small Boat Harbor PERMANENT HOLE NO. AH-6

1892-60

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION
U.S. ARMY ENGINEER DISTRICT, ALASKA

EXPLORATION LOG

PROJECT: Port Lions Boat Harbor
SHEET 1 OF 1
LOCATION (Coordinates or Station): N. Settler Cove E.
DRILLING AGENCY: [ ] CORPS OF ENGINEERS [V] OTHER Larmon Const. Co.
HOLE NO. FIELD 5 PERMANENT PH-10
NAME OF DRILLER: Amil Larmon
WEATHER: Partly Cloudy
TYPE OF HOLE: Test Pile
TEST PIT [ ] AUGER HOLE [ ] CHURN DRILL [ ]
DEPTH TO
DEPTH DRILLED INTO
TOTAL DEPTH OF HOLE 7ft.
SIZE AND TYPE OF BIT: 16" Pipe Pile
DATUM FOR ELEVATION SHOWN: [ ] T&M. Tide [ ] MSL.
TYPE OF EQUIPMENT: Floating Pile Driver w/5000# Hamme
TOTAL NO. OF SAMPLES: 1
TYPE OF SAMPLES: Sand Pump Bailer
DEPTH TO GROUND-WATER
DATE HOLE STARTED 16 Jun 73 COMPLETED 16 Jun 7
EL. TOP OF HOLE: -10"MLLW
Geologist: F. Anderson
Chief, Geology Section
Chief, Foundations & Materials Branch
Date

	DEPTH FEET	% WATER CONTENT	SAMPLE NO.	SOIL LEGEND	CLASSIFICATION	MAX. SIZE PARTICLE	FORMATION DESCRIPTION & REMARKS
-10'MLLW							
-11'	1						
-12'	2						
-13'	3						
-14'	4				Gravelly Sand		
-15'	5						
-16'	6						
-17'	7				Refusal		

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NPA FORM DEC. 1959 19 (REV)

PROJECT Port Lions Boat Harbor PERMANENT HOLE NO. PH-10

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION
U.S. ARMY ENGINEER DISTRICT, ALASKA

EXPLORATION LOG

PROJECT	Port Lions Small Boat Harbor
SHEET	1 OF 1
LOCATION (Coordinates or Station)	N. 1417265 E. 720,835
DRILLING AGENCY	[XX] CORPS OF ENGINEERS [ ] OTHER
NAME OF DRILLER	Mitchell
WEATHER	Snow, Wind
HOLE NO. FIELD	AH-7
HOLE NO. PERMANENT	AH-7
TYPE OF HOLE	TEST PIT [ ] AUGER HOLE [XX] CHURN DRILL [ ]
DEPTH TO	
DEPTH DRILLED INTO	
TOTAL DEPTH OF HOLE	1'-6"
SIZE AND TYPE OF BIT	3" Auger
DATUM FOR ELEVATION SHOWN	[ ] TBM. MLLW [XX] Other
TYPE OF EQUIPMENT	Mobile Mini Drill
TOTAL NO. OF SAMPLES	0
TYPE OF SAMPLES	
DEPTH TO GROUND-WATER	
DATE HOLE STARTED	14 December 1977
DATE HOLE COMPLETED	
EL. TOP OF HOLE	76'
Geologist	J. Ravchel
Chief, Geology Section	
Chief Foundations & Materials Branch	
Date	

DEPTH FEET	% WATER CONTENT	SAMPLE NO.	SOIL LEGEND	CLASSIFICATION	MAX SIZE PARTICLE	FORMATION DESCRIPTION & REMARKS
1			SW	Sand		Coarse
				Refusal on Rock		
2						
3						
4						
5						
6						

NPA FORM DEC. 1959 19 (REV.)

PROJECT Port Lions Small Boat Harbor PERMANENT HOLE NO. AH-7

18X-6

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION
U.S. ARMY ENGINEER DISTRICT, ALASKA

EXPLORATION LOG

PROJECT	Port Lions Small Boat Harbor
SHEET	1 OF 1
LOCATION (Coordinates or Station)	N. 1,417,150 E. 720,970
DRILLING AGENCY	[X] CORPS OF ENGINEERS [ ] OTHER
NAME OF DRILLER	Mitchell
WEATHER	Snow, Wind
HOLE NO. FIELD	AH-8
HOLE NO. PERMANENT	AH-8
TYPE OF HOLE	TEST PIT [ ] AUGER HOLE [X] CHURN DRILL [ ]
DEPTH TO	
DEPTH DRILLED INTO	
TOTAL DEPTH OF HOLE	2'-0"
SIZE AND TYPE OF BIT	3" Auger
DATUM FOR ELEVATION SHOWN	[ ] TBM MLLW [X] MSL
TYPE OF EQUIPMENT	Mobile Mini Drill
TOTAL NO. OF SAMPLES	0
TYPE OF SAMPLES	
DEPTH TO GROUND-WATER	
DATE HOLE STARTED	14 December 1977
DATE HOLE COMPLETED	
EL. TOP OF HOLE	22'
Geologist	J. Ravchel
Chief, Geology Section	
Chief, Foundations & Materials Branch	
Date	

DEPTH FEET	% WATER CONTENT	SAMPLE NO.	SOIL LEGEND	CLASSIFICATION	MAX SIZE PARTICLE	FORMATION DESCRIPTION & REMARKS
1			Pt	Peat		Frozen
2			SW	Sand		Coarse
3				Refusal on Rock		
4						
5						
6						

NPA FORM DEC. 1959 19 (REV)

PROJECT Port Lions Small Boat Harbor PERMANENT HOLE NO. AH-8

1872-60