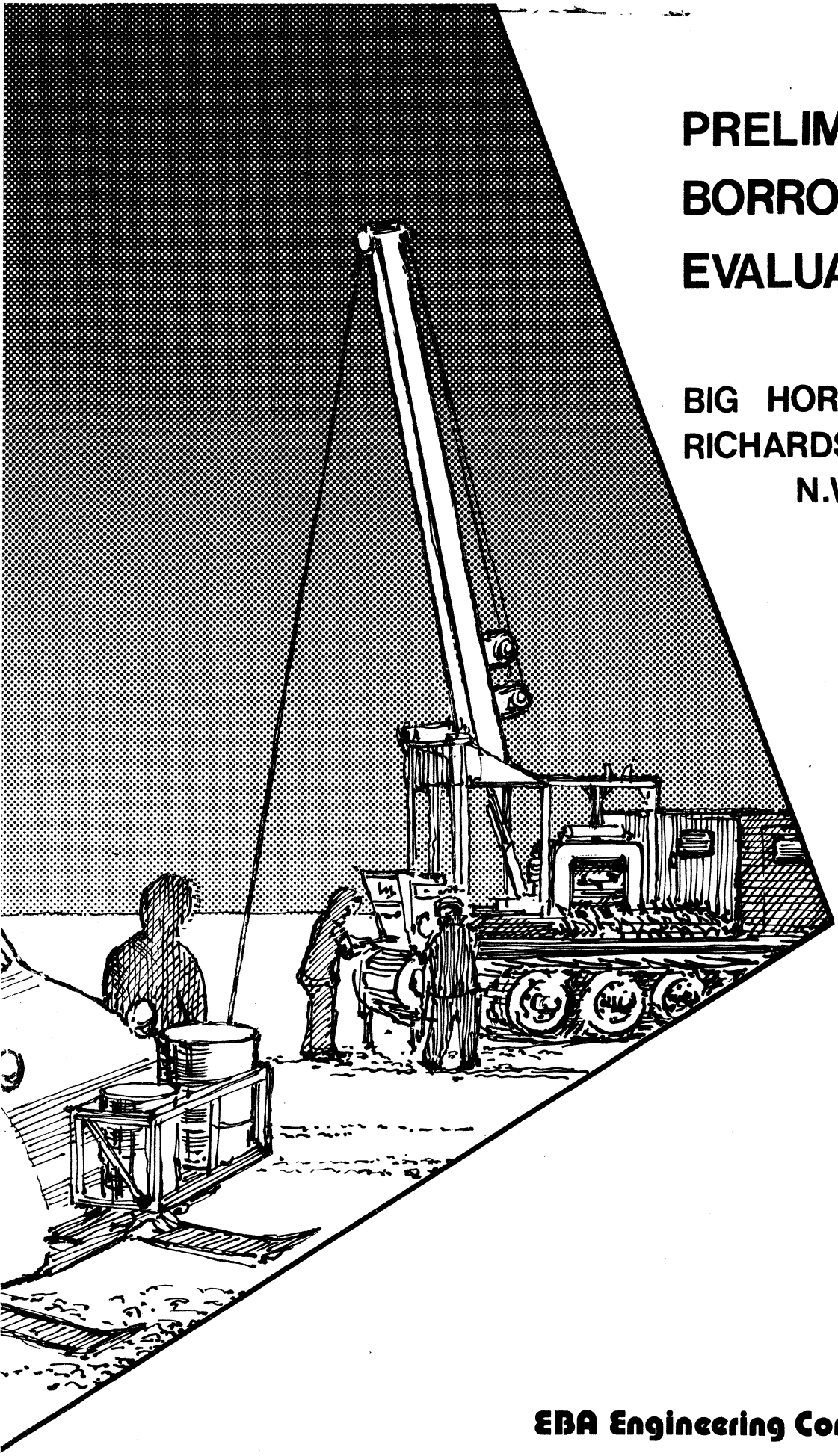


PRELIMINARY BORROW EVALUATION

BIG HORN POINT RICHARDS ISLAND, N.W.T

EBA Engineering Consultants Ltd.

Arctic Geotechnical Group

PRELIMINARY BORROW EVALUATION
BIG HORN POINT
RICHARDS ISLAND, N.W.T.

Submitted To:

IMPERIAL OIL LIMITED

BY

EBA ENGINEERING CONSULTANTS LTD.

OCTOBER, 1975

ABSTRACT

This report presents the results of a river bottom granular borrow investigation. The area examined is in the Harry Channel of the Mackenzie River near Big Horn Point.

A drilling program consisting of 23 boreholes was conducted from the river ice during February and April of 1975. A track mounted B-61 drill and solid stem flight augers were used. The sampling method consisted of advancing the augers into the soft sediments with minimal rotation and sampling the sediments upon pulling out of the hole.

Approximately 1.6 million cubic yards of acceptable material and 3.6 million cubic yards of unacceptable material were discovered. This material is located under 5.9 million cubic yards of overburden.

The acceptability of the material was determined from handling and placement criteria. Engineering properties such as bearing capacity and frost heave characteristics may determine the suitability of the material as fill.

TABLE OF CONTENTS

LIST OF FIGURES

1. INTRODUCTION

1.1 General

In response to recent natural gas discoveries in the Mackenzie Delta, Imperial Oil Limited has undertaken the planning of a central gas gathering and processing facility. Because of the scarcity of granular borrow resources in the area, the Big Horn Point area was investigated for possible river bottom, granular sediments. This report describes the drilling program undertaken and extent of the granular resource encountered. Big Horn Point is located as shown in Figure 1.1 on the Harry Channel of the Mackenzie River approximately six miles from Mackenzie Bay.

1.2 Engineering Objectives

The scope of the investigation program was established by Imperial Oil Limited internal memorandum No. C-5295, dated October 15, 1974. The scope consisted of providing an estimate of the quantity of suitable construction material in the prospective sand deposit at Big Horn Point.

1.3 Authorization and Personnel

The investigation program was initiated by Service Order No. 13S608194 issued by Imperial Oil Limited dated December, 1974. The field work was carried out as one part of an extensive winter drilling program undertaken by Imperial Oil Limited, Field Services Department, Edmonton for which EBA was commissioned to provide technical and engineering support. Logistics of all aspects of the field operation were directed by Imperial Oil Limited Field Services Department in Edmonton (Mr. C.R. Kippen) whereas technical laison and direction were provided by Imperial Oil's Beaufort Gas Project, Calgary (Mr. J.C. McDougall and Mr. L. Keeling).

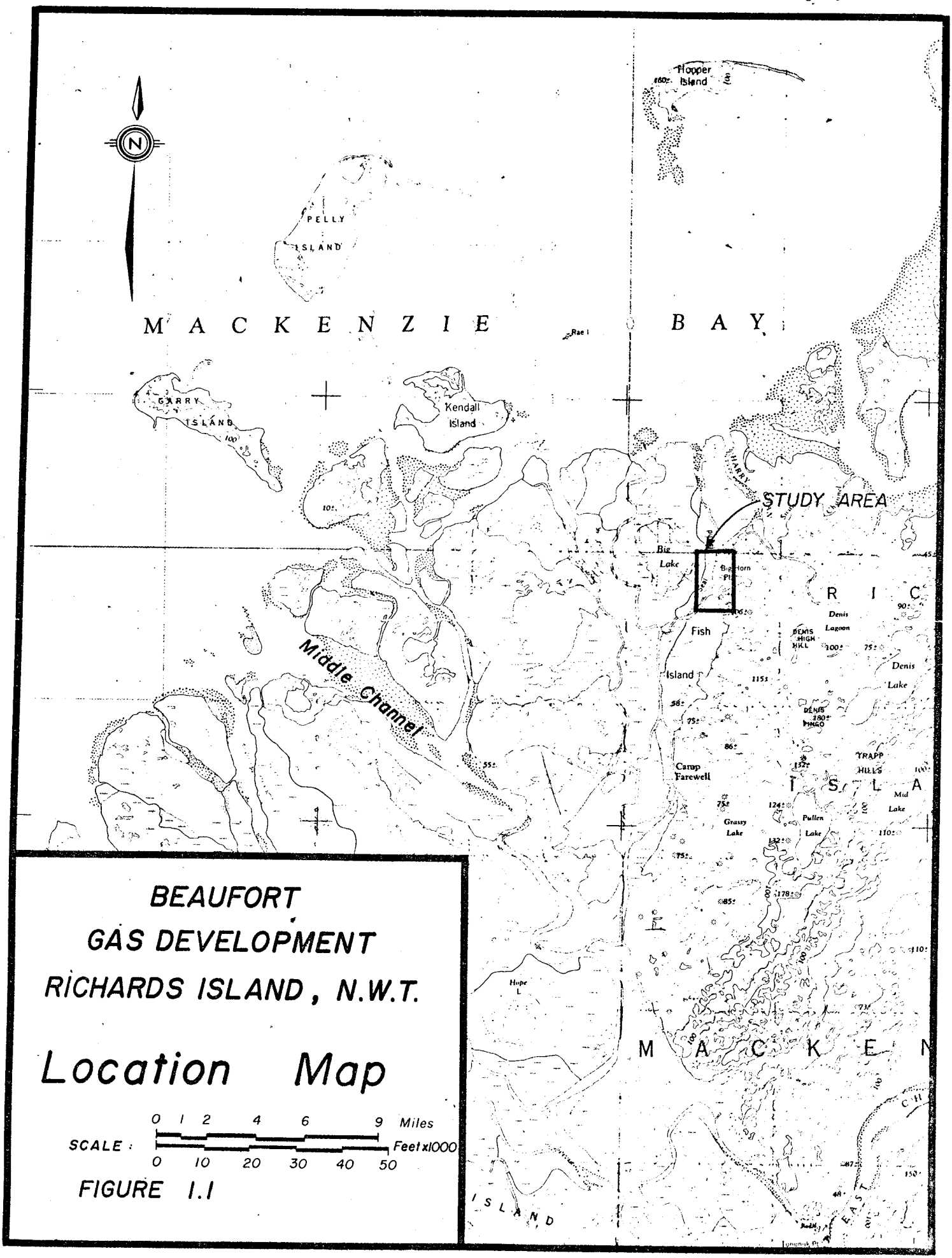

N
Hopper Island
PELLY ISLAND
MACKENZIE BAY
GARRY ISLAND
Kendall Island
STUDY AREA
Big Lake
Fish Island
Middle Channel
Denis Lagoon
Denis Lake
Carnp Farewell
TRAPP HILLS
Grassy Lake
Pullen Lake
Mid Lake
Hope L
ISLAND
MACKEN
BEAUFORT
GAS DEVELOPMENT
RICHARDS ISLAND, N.W.T.
Location Map
SCALE :
0 1 2 4 6 9 Miles
0 10 20 30 40 50 Feet x1000

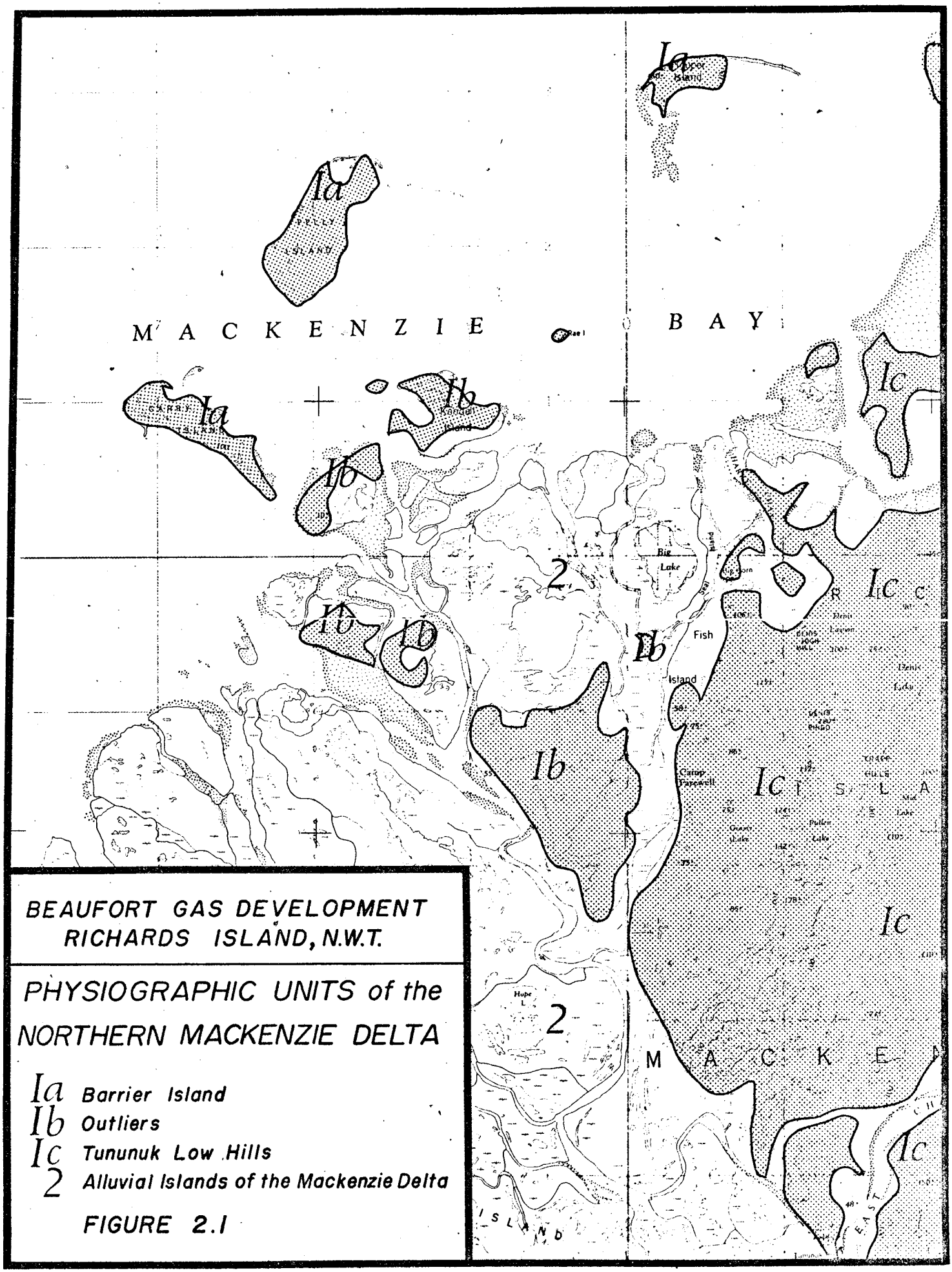
FIGURE 1.1

II. GEOLOGIC SETTING

2.1 Regional Physiography

The two major physiographic units of the northern delta are shown in Figure 2.1. These units correspond to the older Pleistocene soils and to the Recent (geologic sense) soils. The pliestocene sediments consist of sands, silts and clays deposited in an interglacial, deltaic environment. Within the map area, shown on Figure 2.1, the Pleistocene deposits have been divided into three sub units which are; Area 1a, the barrier islands (Garry, Pelly, Rae, and Hooper), Area 1b, the residual highs or outliers of former islands now buried in the delta alluvium, and Area 1c, the Richards Island part of the Tununuk Low Hills (Mackay, 1963).

The outliers and barrier islands are eroded, detached portions of Richards Island. These may be sub-deltaicly continuous with Richards Island or may have been completely separated by glacial meltwater and Mackenzie River channels. The delta has grown to engross the outliers which were probably separate islands, in much the same way that Kendall Island is presently being surrounded. The extent of the outliers and barrier islands under the delta cannot be predicted. However, they are probably continuous under the delta alluvium to the north and possibly to the south where channel erosion would have been less severe. In appearance the outliers are generally flat, "with a predominant altitude of about 50 feet" (Mackay, 1963). The altitude of the barrier islands ranges between 100 and 200 feet above sea level except for tiny Rae Island at about 50 feet.



BEAUFORT GAS DEVELOPMENT
RICHARDS ISLAND, N.W.T.

PHYSIOGRAPHIC UNITS of the NORTHERN MACKENZIE DELTA

Ia Barrier Island
Ib Outliers
Ic Tununuk Low Hills
2 Alluvial Islands of the Mackenzie Delta

FIGURE 2.1

The Tununuk low hills area is irregular with broad, drained flats and drowned valleys. Generally the Richards Island portion of the Tununuk low hills consists of "stone free sands, silts and clays" (Mackay, 1963). The errosional bluffs examined in the Big Horn Point area were found to consist of fine, reddish brown sand.

The second physiographic unit, is the Mackenzie River delta. Of the three physiographic regions of the delta, the one which borders the study area is the "alluvial islands". Mackay reports that "flood waters rise at least 8.5 feet above low water level, thus inundating all the alluvial islands". Flood waters of this extent probably only occur at break up. In general the highest altitudes in this region excluding pingos is less than six feet above sea level. Most of the land within a ten mile coastal fringe is less than four feet in altitude. Levees in the study area, where they exist, are about five feet above late summer low-water levels (Mackay 1963, Fig. 57). "However, levee development is vistually absent in areas less than four feet above sea level" (Mackay, 1963).

2.2 Regional Geology

The Mackenzie Delta occupies a subsiding structural trough in the underlying bedrock. This trough has allowed a thick accumulation of deltaic sediments. The region of interest was probably offshore of the delta at the beginning of the Pleistocene. The sediments which were being deposited were probably pro-delta clay and some silt with moderate organic contents.

During the Pleistocene, the area was exposed by the drop in sea level and over-ridden by continental glaciation. Glacial erosion probably removed much of the exposed pre-glacial delta sediments. Glacial till was deposited over much of the present Richards Island and out past Garry, Pelly and Hooper Islands. Sub-marine till deposits have been encountered as far as 14 miles northwest of Pelly Island (EBA, 1974 a). As the glacier retreated, outwash channels spread out over the exposed till plain. Much of the till was removed by erosion and some of it was buried under outwash sands and gravel (mainly sand in the Big Horn Point area).

At the end of the Pleistocene in this area, approximately 12,000 to 13,000 years ago, the sea may have flooded the delta before isostatic rebound lifted the land above sea level and exposed it to erosion. Eventually the rate of rebound slowed, the rise in sea level continued and the land was slowly flooded until sea level reached its present position.

The Mackenzie River system was certainly active throughout deglaciation. As soon as it was free of ice, it carried a substantial meltwater discharge which cut into and possibly through the ancestral Richards Island causing the outliers of Pleistocene material. As the flow subsided, the sea level rose and the post-glacial Mackenzie River continued to build a delta over the old delta and around the outliers. The growth of the delta continues today.

III. BORROW EVALUATION

3.1 General

The Big Horn Point borrow area is located as shown in Figure 3.1 on the Harry Channel approximately 3 miles north east of the proposed Taglu gas plant development. The river is flanked on the east side for a considerable distance upstream by exposures of frozen, pliestocene deposits of the Tununuk low hills. This material is constantly being eroded by the river, sorted and redeposited downstream. It is believed that this is the source of the sand found in the Harry Channel, near Big Horn Point.

This section discusses the drilling and testing program, material acceptability criteria and the potential amount of borrow material.

3.2 Drilling and Laboratory Testing Program

The drilling program was conducted in two phases. The first phase was performed between February 5 and February 14, 1975. The initial drilling, which consisted of 14 boreholes, established that a significant amount of sand was present and delineated the downstream extent of the deposit. The second drilling phase performed on April 16, 1975 consisted of nine additional holes and delineated the upstream extent of the borrow material. The borehole locations are shown in Figure 3.2 and the borehole logs presented in Appendix A.

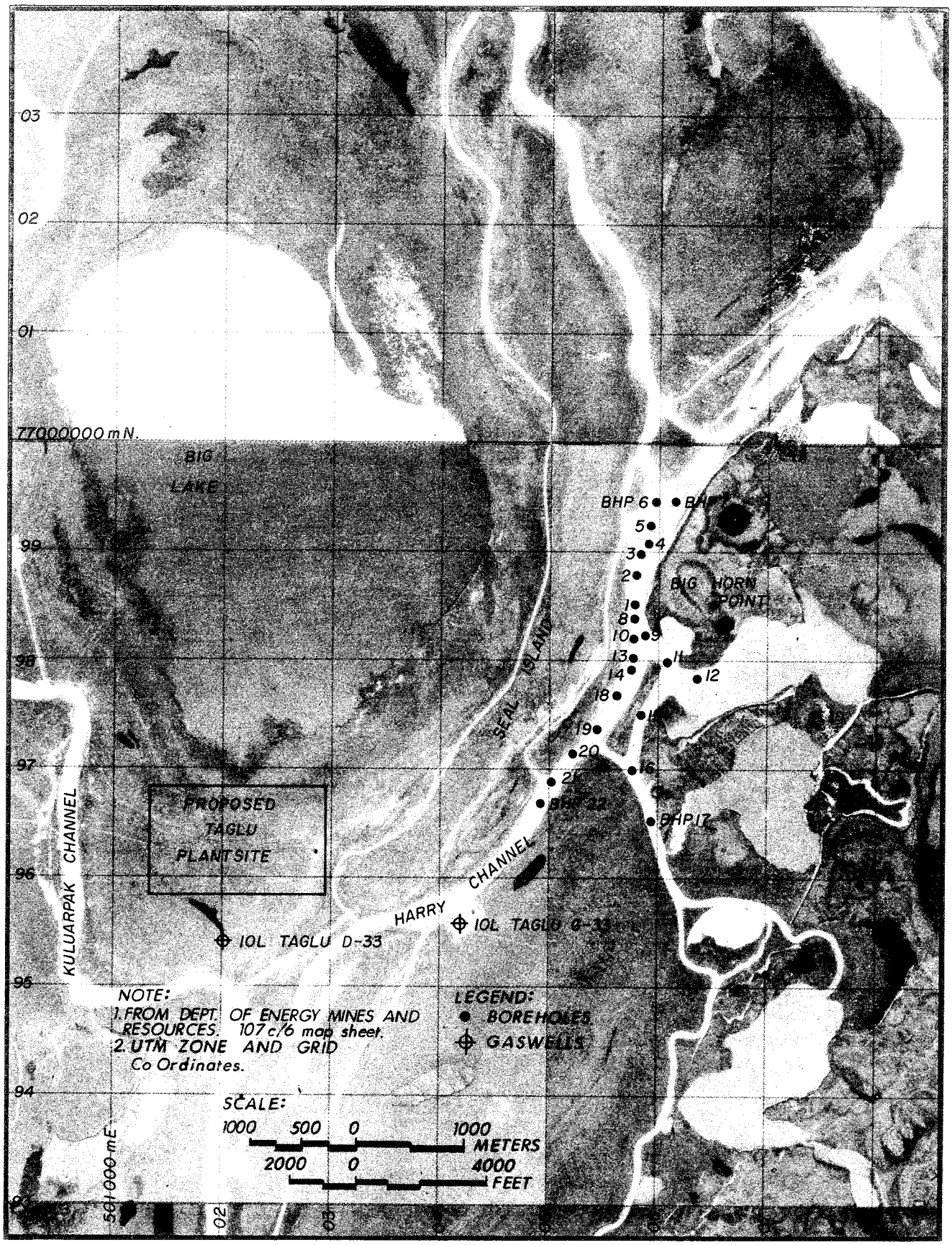
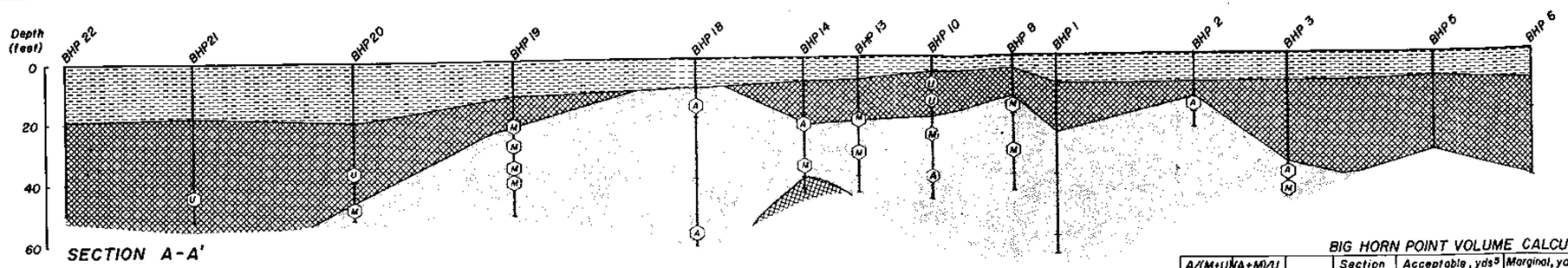
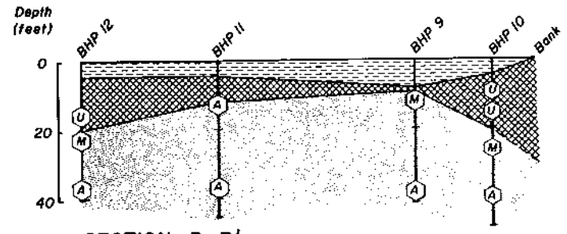
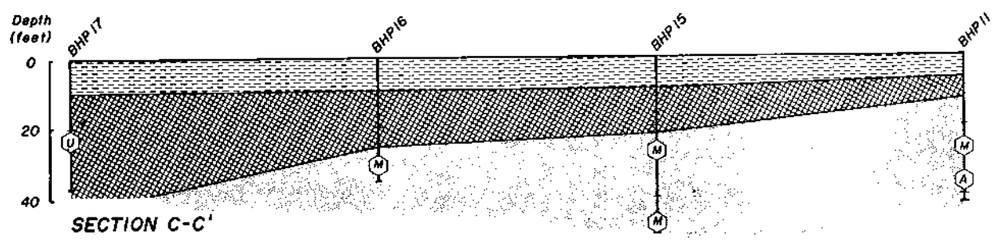
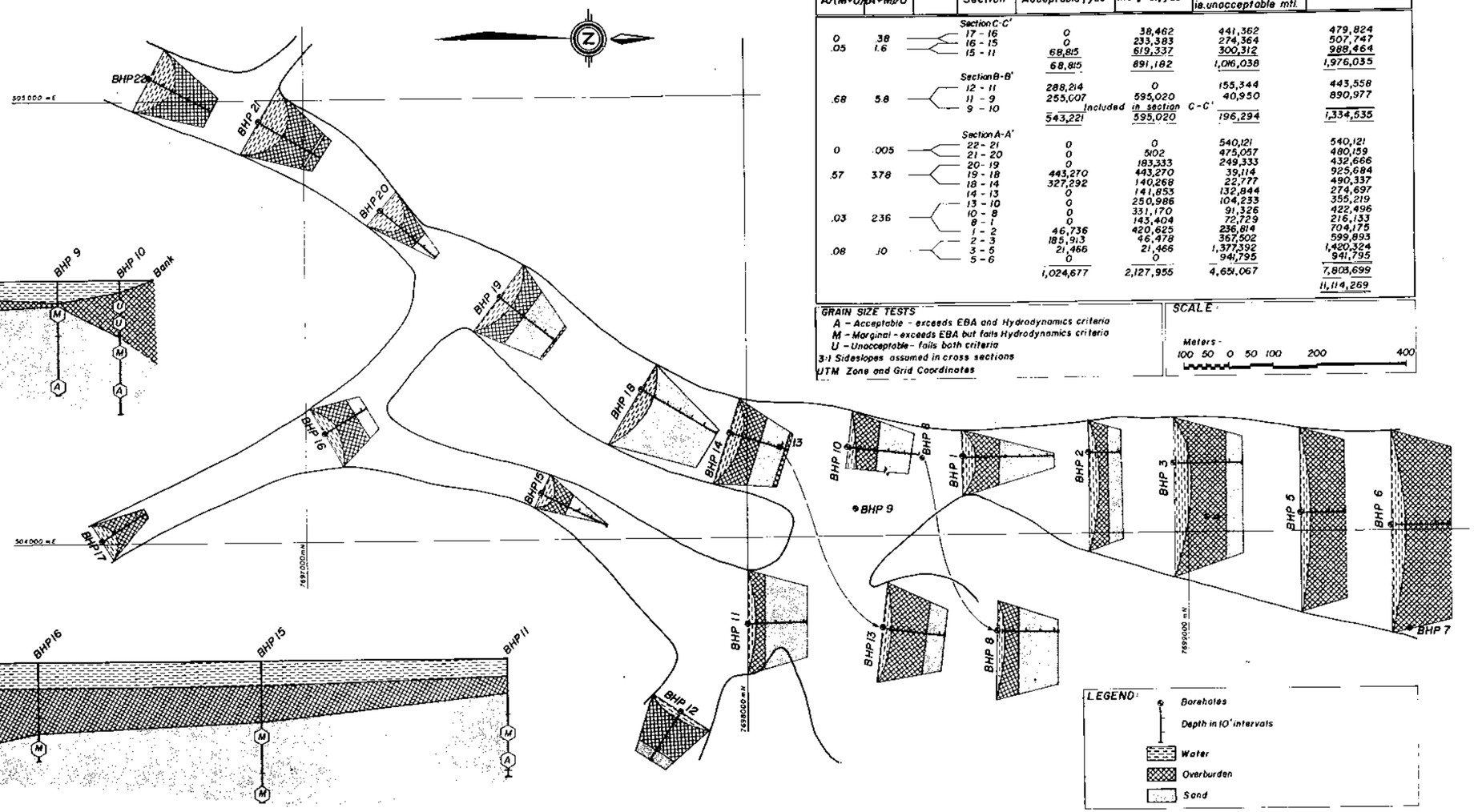


FIGURE 3·1 DETAILED LOCATION PLAN









BIG HORN POINT VOLUME CALCULATIONS

A/(M+U)	(A+M)/U		Section	Acceptable, yds³	Marginal, yds³	Overburden, yds³ ie. unacceptable mtl.	TOTAL yds³
			Section C-C'				
0	.38		17 - 16	0	38,462	441,362	479,824
.05	1.6		16 - 15	0	233,383	274,364	507,747
			15 - 11	68,815	619,337	300,312	988,464
				68,815	891,182	1,016,038	1,976,035
			Section B-B'				
			12 - 11	288,214	0	155,344	443,558
.68	5.8		11 - 9	255,007	595,020	40,950	890,977
			9 - 10	Included	in section	C-C'	
				543,221	595,020	196,294	1,334,535
			Section A-A'				
0	.005		22 - 21	0	0	540,121	540,121
			21 - 20	0	502	475,057	480,159
			20 - 19	0	183,333	249,333	432,666
.57	378		19 - 18	443,270	443,270	39,114	925,684
			18 - 14	327,292	140,268	22,777	490,337
			14 - 13	0	141,853	132,844	274,697
			13 - 10	0	250,986	104,233	355,219
.03	236		10 - 8	0	331,170	91,326	422,496
			8 - 1	0	143,404	72,729	216,133
			1 - 2	46,736	420,625	256,814	704,175
			2 - 3	185,913	46,478	367,502	599,893
.08	.10		3 - 5	21,466	21,466	1,377,392	1,420,324
			5 - 6	0	0	941,795	941,795
				1,024,677	2,127,955	4,651,067	7,803,699
							11,114,269

GRAIN SIZE TESTS
A – Acceptable - exceeds EBA and Hydrodynamics criteria
M – Marginal - exceeds EBA but fails Hydrodynamics criteria
U – Unacceptable - fails both criteria
3:1 Sideslopes assumed in cross sections
UTM Zone and Grid Coordinates

SCALE
Meters
100 50 0 50 100 200 400

LEGEND
Boreholes
Depth in 10' intervals
Water
Overburden
Sand

DRAWN BY:	R A H
DATE DRAWN:	JULY 1975
SCALE:	SHOWN
JOB No.	E-965-1

EBA Engineering Consultants Ltd.

BEAUFORT GAS DEVELOPMENT
BIG HORN POINT BORROW AREA
PLAN AND CROSS SECTIONS

FIGURE 3.2
SHEET No

The majority of the holes were drilled using the Mobile B-61 drilling rig. It was found that the most efficient drilling method was to advance the solid flight auger with minimum rotation to approximately 40 feet and sample the sediments retained on the flighting upon pulling out of the hole. Previous experience has proven this method reliable in soft submarine sediments of the type encountered. Grain size analyses of the material determined in EBA's Edmonton laboratory are presented in Appendix B and summarized on the borehole logs.

3.3 Acceptability Criteria for Handling and Placement

Two separate criteria were considered for borrow material acceptability. The EBA criteria, (EBA, 1974b) which was based upon observation from a confined hydraulic fill, requires no more than 50 percent passing the 200 sieve and 90 percent passing the 100 sieve. The second, more stringent criteria for material suitable for dredging has been established by Mr. K. Hoffman of hydronamics B.V. It requires no more than 20 percent passing the number 200 sieve and 50 percent passing the number 100 sieve. This criteria, which was developed for offshore island construction, was established on the basis of efficient particle settlement in a loading barge and may not be totally applicable to the construction of an onshore hydraulic fill. Material which did not meet either of these requirements was classified as unacceptable, material which met EBA requirements but not Hydrodynamics was classed as marginal and material which satisfies both requirements is classed as acceptable. These criteria, which formed the basis of acceptance or rejection of potential borrow resources, are shown in Figure 3.3.

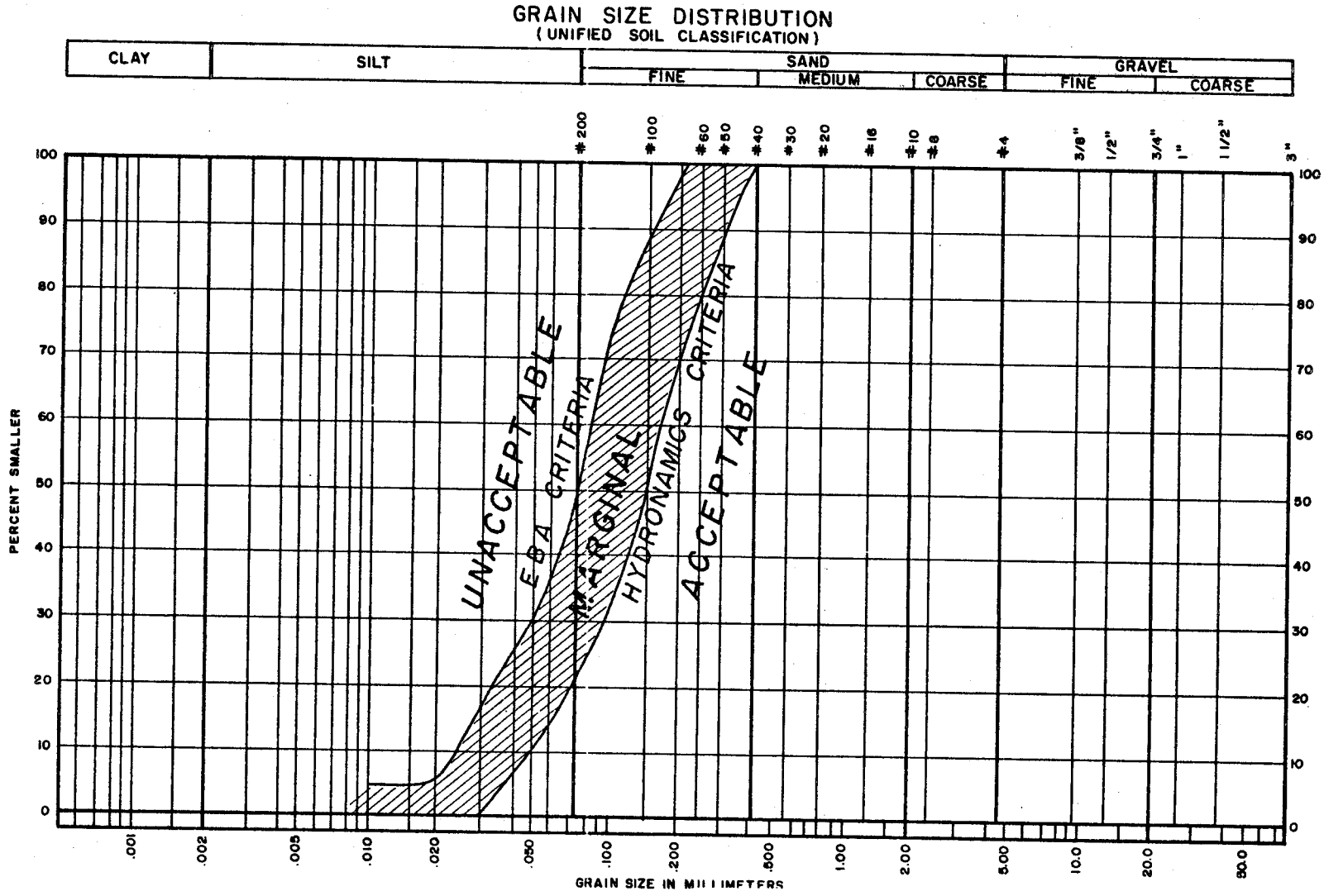


FIGURE 3·3 ACCEPTABILITY LIMITS

It is recommended that only material which is deemed "acceptable" be considered for construction by this method unless additional full scale field testing similar to the 10L Taglu test pad is carried out (EBA, 1974b).

3.4 Borrow Evaluation

The borehole location plan, cross sections and volume summary table are shown in Figure 3.2. The borehole logs are presented in Appendix A and the grain size curves in Appendix B. The cross sections show the total amount of acceptable and marginal material. The circled letters on the cross sections are quality classifications for the material. The sand deposit was divided into acceptable and marginal zones for the purpose of the volume calculations. It was assumed that the strata were horizontal in a perpendicular direction at the river and varied linearly between boreholes. The maximum slidelope of the excavation was assumed to be 3 horizontal to 1 vertical. It is believed that this is a reasonable assumption for a granular material such as loose silt and sands. It was further assumed that the permafrost boundary was sufficiently steep beneath the river so that it would not interfere with the dredging operation. This is reasonable considering the steep permafrost boundaries which were observed at several of the river crossing sites which were investigated in the same area.

The volumes of overburden material presented are based upon the river conditions at the time of the drilling program. Scour action can alter the river bed conditions drastically; however, it is expected that winter conditions will result in a conservative estimate of the amount of overburden.

The maximum amount of insitu acceptable and marginal material is approximately 5.2 million cubic yards and is located under approximately 5.9 million cubic yards of overburden. This results in an overall overburden to material ratio of 113 percent. Approximately 30 percent of the material may be lost due to washing during dredging and handling. Therefore, approximately 3.6 million cubic yards of useable material remains. Lesser amounts of material may be obtained at much more favourable overburden to material ratios. For example, 1.3 million cubic yards of marginal and acceptable material may be obtained between Boreholes BHP 19 and BHP 14 at an overburden to material ratio of 5 percent. This results in approximately 1 million cubic yards of useable material if the 30 percent loss factor applies.

The total amount of insitu "acceptable" material (as defined in Section 5.3) is 1.6 million cubic yards of which approximately 1.1 million yards should be readily recoverable. Unfortunately, the marginal material typically overlies the acceptable material and must, in this case, be considered as overburden. The total overburden is 9.5 million cubic yards for an overall overburden to material ratio of approximately 600 percent. However, in this case some of the marginal overburden would certainly be useable as lower quality fill borrow material.

The volumes of each section and the borrow material to overburden material ratios are shown in Figure 3.2. When the quality and volume requirements are known, this data can be used to determine the most economical limits of excavation.

IV. CONCLUSIONS

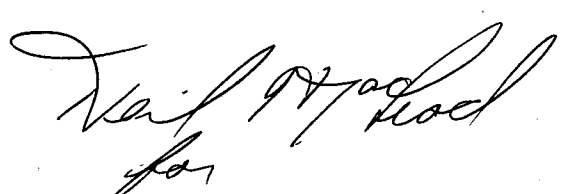
A potentially exploitable borrow resource exists at Big Horn Point but the amount of useable material is very dependent upon the grain size limits set on material acceptability. Material which meets both EBA and Hydrodynamics criteria for hydraulic transport and placement is not extensive and is generally under substantial overburden whereas marginal material is quite plentiful and very substantial quantities may be obtained at low overburden to material ratios.

If excavation into a spoil pile to allow drainage is considered a viable construction technique, then the material classified marginally acceptable may be considered. Acceptability of the sand from Big Horn Point has considered only the handling and placement of general fill. Performance of the fill in place, with respect to frost susceptability bearing capacity and compaction characteristics has not been considered in this section. Specific requirements for overall performance of foundation pads or access roads may preclude use of any fill from Big Horn Point.

Respectfully submitted,

EBA Engineering Consultants Ltd.

David D. Kent, P. Eng.



D.W. Hayley, P. Eng.

DDK:lmh

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2. EBA, 1974b, EBA Contributions to progress report on Taglu Silt Pad by IOL PR & TS Laboratories.

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APPENDIX A
BOREHOLE LOGS
FOR BIG HORN POINT BORROW AREA

BEAUFORT GAS DEVELOPMENT
RICHARDS ISLAND, N.W.T.

DEPTH (feet)	SOIL DESCRIPTION	SAMPLE	PERCENT SAND	PERCENT SILT	PERCENT CLAY	MOISTURE CONTENT % ● / SPT RESISTANCE ▲ (10 20 30 40 50 60 70) / COMP. STRENGTH T.S.F ■ (1 2 3)
2	ICE					
4						
6	WATER					
8						
10						
12	SILT - dark grey - soft - drill stem advanced under its own weight unfrozen					
14						
16						
18						
20						
22						
24	- dark grey - till - some fine rounded gravel - denser					
26						
28	SAND - med to dark grey brown - very loose - fine, uniform					
30						

eda	ICE THICKNESS (ft.) 4 1/2	DATE DRILLED 5/2/75	HOLE Nº BHP - 1
	WATER DEPTH (ft.) 10	TECHNICIAN DK	
	COMPLETION DEPTH (ft.) 66	REGION BIG HORN POINT	Page 1 of 3

BEAUFORT GAS DEVELOPMENT
RICHARDS ISLAND, N.W.T.

DEPTH (feet)	SOIL DESCRIPTION	SAMPLE	PERCENT SAND	PERCENT SILT	PERCENT CLAY
	SAND - cont.		UNFROZEN		
32					
34					
36					
38					
40					
42	- wood - hammering reg.				
44					
46					
48					
50					
52					
54					
56					
58					
60					

MOISTURE CONTENT % ●
SPT RESISTANCE ▲
10 20 30 40 50 60 70
COMP. STRENGTH T.S.F ■
1 2 3

eba	ICE THICKNESS (ft.) 4 1/2	DATE DRILLED 5/2/75	HOLE Nº BHP 1
	WATER DEPTH (ft.) 10	TECHNICIAN D.K.	
	COMPLETION DEPTH (ft.) 66	REGION BIG HORN POINT	Page 2 of 3

BEAUFORT GAS DEVELOPMENT
RICHARD S ISLAND, N.W.T.

DEPTH (feet)	SOIL DESCRIPTION	SAMPLE	PERCENT SAND	PERCENT SILT	PERCENT CLAY	MOISTURE CONTENT % ● / SPT RESISTANCE ▲ (10 20 30 40 50 60 70) / COMP. STRENGTH T.S.F ■ (1 2 3)
62	SAND - cont					
64						
66						
	END OF HOLE					
68						

eaa	ICE THICKNESS (ft.) 4 1/2	DATE DRILLED 5/2/75	HOLE Nº BHP 1
	WATER DEPTH (ft.) 10	TECHNICIAN DK	
	COMPLETION DEPTH (ft.) 66	REGION BIG HORN POINT	Page 3 of 3

BEAUFORT GAS DEVELOPMENT
RICHARD S ISLAND, N.W.T.

DEPTH (feet)	SOIL DESCRIPTION	SAMPLE	PERCENT SAND	PERCENT SILT	PERCENT CLAY
2	ICE				
4					
6	WATER				
8					
10	SILT - dark grey - tr. clay - soft, wet				
12	- unfrozen				
14	GRAVEL - med grey - well graded, sandy				
16					
18	SAND - med grey brown - fine to med - tr. fine gravel - silty		93	7	0
20					
22					
24	END OF HOLE				
26					
28					
30					

MOISTURE CONTENT % ●
SPT RESISTANCE ▲
10 20 30 40 50 60 70
COMP. STRENGTH T.S.F ■
1 2 3

eba	ICE THICKNESS (ft.) 4 1/2	DATE DRILLED 10/2/75	HOLE Nº BHP-2
	WATER DEPTH (ft.) 9	TECHNICIAN KS	
	COMPLETION DEPTH (ft.) 24	REGION BIG HORN POINT	Page 1 of 1

BEAUFORT GAS DEVELOPMENT
RICHARDS ISLAND, N.W.T.

DEPTH (feet)	SOIL DESCRIPTION	SAMPLE	PERCENT SAND	PERCENT SILT	PERCENT CLAY
2	ICE				
4	WATER				
6					
8					
10	SILT - dark grey - clayey, slighty plastic - soft - unfrozen				
12					
14					
16					
18					
20	- med to dk. grey - non plastic - tr. fine sand				
22					
24	- clayey - organic - stiff				
26					
28	GRAVEL AND SAND				
30	SILT				

MOISTURE CONTENT % ●
SPT RESISTANCE ▲
10 20 30 40 50 60 70
COMP. STRENGTH T.S.F ■
1 2 3

eda	ICE THICKNESS (ft.) 4	DATE DRILLED 12/2/75	HOLE Nº BHP 3
	WATER DEPTH (ft.) 9	TECHNICIAN KS	
	COMPLETION DEPTH (ft.) 48	REGION BIG HORN POINT	Page 1 of 2

BEAUFORT GAS DEVELOPMENT
RICHARDS ISLAND, N.W.T.

DEPTH (feet)	SOIL DESCRIPTION	SAMPLE	PERCENT SAND	PERCENT SILT	PERCENT CLAY
32	SILT (cont) - dark grey to black - slightly organic and clayey - firm, slightly plastic				
34	- laminated - non plastic				
36	SAND				
38	- dk grey to black - silty - tr. organics				
40	- dark grey brown - not bedded				
42	- silty		84	16	-
44	very silty				
46			70	18	12
48	END OF HOLE				

MOISTURE CONTENT % ●
SPT RESISTANCE ▲
10 20 30 40 50 60 70
COMP. STRENGTH T.S.F ■
1 2 3

eba	ICE THICKNESS (ft.) 4	DATE DRILLED 12/2/75	HOLE Nº BHP 3
	WATER DEPTH (ft.) 9	TECHNICIAN KS	
	COMPLETION DEPTH (ft.) 48	REGION BIG HORN POINT	Page 2 of 2

BEAUFORT GAS DEVELOPMENT
RICHARDS ISLAND, N.W.T.

DEPTH (feet)	SOIL DESCRIPTION	SAMPLE	PERCENT SAND	PERCENT SILT	PERCENT CLAY	MOISTURE CONTENT % ● / SPT RESISTANCE ▲ (10 20 30 40 50 60 70) / COMP. STRENGTH T.S.F ■ (1 2 3)
2	ICE					
4						
6	WATER					
8						
10	SILT - grey - organic - tr. very fine sand - unfrozen					▲
12						
14						
16						
18						
20	BLEW IN HOLLOW STEM INDICATION OF SANDY GREY SILT					
22	END OF HOLE					
24						
26						
28						
30						

eba	ICE THICKNESS (ft.) 4.5	DATE DRILLED 13/2/75	HOLE Nº BHP 4
	WATER DEPTH (ft.) 9	TECHNICIAN J.S.	
	COMPLETION DEPTH (ft.) 22	REGION BIG HORN POINT	Page 1 of 1

BEAUFORT GAS DEVELOPMENT
RICHARD S ISLAND, N.W.T.

DEPTH (feet)	SOIL DESCRIPTION	SAMPLE	PERCENT SAND	PERCENT SILT	PERCENT CLAY
2	ICE.				
4	WATER				
6					
8	SILT - grey - soft - unfrozen				
10					
12					
14					
16					
18					
20					
22					
24					
26	-dark grey -tr. sand				
28	-denser				
30					

MOISTURE CONTENT % ●
SPT RESISTANCE ▲
10 20 30 40 50 60 70
COMP. STRENGTH T.S.F ■
1 2 3

eaa	ICE THICKNESS (ft.) 3.5	DATE DRILLED 13/2/75	HOLE Nº BHP 5
	WATER DEPTH (ft.) 7.0	TECHNICIAN JS	
	COMPLETION DEPTH (ft.) 32	REGION BIG HORN PLANT	Page 1 of 2

BEAUFORT GAS DEVELOPMENT
RICHARD S ISLAND, N.W.T.

DEPTH (feet)	SOIL DESCRIPTION	SAMPLE	PERCENT SAND	PERCENT SILT	PERCENT CLAY	MOISTURE CONTENT % ● / SPT RESISTANCE ▲ (10 20 30 40 50 60 70) / COMP. STRENGTH T.S.F ■ (1 2 3)
	SAME					
32	END OF HOLE					

eba	ICE THICKNESS (ft.) 3.5	DATE DRILLED 13/2/75	HOLE Nº BHP 5
	WATER DEPTH (ft.) 7	TECHNICIAN JS	
	COMPLETION DEPTH (ft.) 32	REGION BIG HORN POINT	Page 2 of 2

BEAUFORT GAS DEVELOPMENT
RICHARDS ISLAND, N.W.T.

DEPTH (feet)	SOIL DESCRIPTION	SAMPLE	PERCENT SAND	PERCENT SILT	PERCENT CLAY
2	ICE				
4					
6	WATER				
8					
10	SILT - grey - soft - organic				
12					
14	- med dense - some sand - unfrozen				
16					
18	- grey black - med. dense to dense				
20					
22					
24					
26					
28					
30					

MOISTURE CONTENT % ●
SPT RESISTANCE ▲
10 20 30 40 50 60 70
COMP. STRENGTH T.S.F ■
1 2 3

ICE THICKNESS (ft.) 4.5	DATE DRILLED 13/2/75	HOLE Nº BHP 6
WATER DEPTH (ft.) 10	TECHNICIAN JS	
COMPLETION DEPTH (ft.) 42	REGION BIG HORN POINT	Page 1 of 2

BEAUFORT GAS DEVELOPMENT
RICHARDS ISLAND, N.W.T.

DEPTH (feet)	SOIL DESCRIPTION	SAMPLE	PERCENT SAND	PERCENT SILT	PERCENT CLAY
32					
	SAND - grey				
34	- fine to med, clean				
	SILT - black (till)				
36	- sandy				
	- clayey				
38	- few pebbles				
40					
42					
	END OF HOLE				

MOISTURE CONTENT % ●
SPT RESISTANCE ▲
10 20 30 40 50 60 70
COMP. STRENGTH T.S.F ■
1 2 3

ICE THICKNESS (ft.) 4.5	DATE DRILLED 13/2/75	HOLE Nº BHP 6
WATER DEPTH (ft.) 10	TECHNICIAN JS	
COMPLETION DEPTH (ft.) 42	REGION Big Horn Point	Page 2 of 2

BEAUFORT GAS DEVELOPMENT
RICHARD S ISLAND, N.W.T.

DEPTH (feet)	SOIL DESCRIPTION	SAMPLE	PERCENT SAND	PERCENT SILT	PERCENT CLAY
2	SILT - grey - tr. clay - frozen				
4					
6					
8	SAND - fine - some silt - laminated - biotite flakes				
10					
12					
14	- grey brown - some silt - fine				
16	very silty				
18					
20					
22	SILT - drk grey - Nbn		26	74	--
24	END OF HOLE				
26					
28					
30					

MOISTURE CONTENT % ●
SPT RESISTANCE ▲
10 20 30 40 50 60 70
COMP. STRENGTH T.S.F ■
1 2 3

ICE THICKNESS (ft.)	DATE DRILLED 11/2/75	HOLE Nº BHP 7
WATER DEPTH (ft.)	TECHNICIAN JS	
COMPLETION DEPTH (ft.) 22	REGION BIG HORN POINT	Page 1 of 1

BEAUFORT GAS DEVELOPMENT
RICHARDS ISLAND, N.W.T.

DEPTH (feet)	SOIL DESCRIPTION	SAMPLE	PERCENT SAND	PERCENT SILT	PERCENT CLAY
2	ICE				
4					
6	SILT - grey - very loose - tr. sand - unfrozen				
8					
10					
12					
14	SAND - very fine. - very silty				
16					
18			63	32	5
20					
22					
24	- possible till strata				
26					
28					
30					

MOISTURE CONTENT % ●
SPT RESISTANCE ▲
10 20 30 40 50 60 70
COMP. STRENGTH T.S.F ■
1 2 3

eoa	ICE THICKNESS (ft.) 4.5	DATE DRILLED 14/2/75	HOLE Nº BHP 8
	WATER DEPTH (ft.) 8	TECHNICIAN JS	
	COMPLETION DEPTH (ft.) 42	REGION BIG HORN POINT	Page 1 of 2

BEAUFORT GAS DEVELOPMENT
RICHARD S ISLAND, N.W.T.

DEPTH (feet)	SOIL DESCRIPTION	SAMPLE	PERCENT SAND	PERCENT SILT	PERCENT CLAY
32	-fine to med. - silty				
34			55	45	--
36					
38					
40					
42	END OF HOLE				

MOISTURE CONTENT % ●
SPT RESISTANCE ▲
10 20 30 40 50 60 70
COMP. STRENGTH T.S.F ■
1 2 3

eda	ICE THICKNESS (ft.) 4.5	DATE DRILLED 14/2/75	HOLE Nº BHP 8
	WATER DEPTH (ft.) 4.5	TECHNICIAN JS	
	COMPLETION DEPTH (ft.) 42	REGION BIG HORN POINT	Page 2 of 2

BEAUFORT GAS DEVELOPMENT
RICHARDS ISLAND, N.W.T.

DEPTH (feet)	SOIL DESCRIPTION	SAMPLE	PERCENT SAND	PERCENT SILT	PERCENT CLAY
2	ICE				
4					
6	WATER				
8					
10	SAND - grey - very fine - very silty - soft - unfrozen		72	21	7
12					
14					
16					
18					
20					
22	- med to fine - less silt				
24					
26					
28					
30					

MOISTURE CONTENT % ●
SPT RESISTANCE ▲
10 20 30 40 50 60 70
COMP. STRENGTH T.S.F ■
1 2 3

eda	ICE THICKNESS (ft.) 4	DATE DRILLED 19/2/75	HOLE Nº BHP 9
	WATER DEPTH (ft.) 8	TECHNICIAN JS	
	COMPLETION DEPTH (ft.) 42	REGION BIG HORN POINT	Page 1 of 2

BEAUFORT GAS DEVELOPMENT
RICHARDS ISLAND, N.W.T.

DEPTH (feet)	SOIL DESCRIPTION	SAMPLE	PERCENT SAND	PERCENT SILT	PERCENT CLAY
32	- med - clean				
34					
36					
38					
40	SILT - grey - sandy, tr. clay		82	15	3
42	END OF HOLE				

MOISTURE CONTENT % ●
SPT RESISTANCE ▲
10 20 30 40 50 60 70
COMP. STRENGTH T.S.F ■
1 2 3

eba	ICE THICKNESS (ft.) 4.5	DATE DRILLED 14/2/75	HOLE Nº BHP 9
	WATER DEPTH (ft.) 8	TECHNICIAN JS	
	COMPLETION DEPTH (ft.) 42	REGION BIG HORN POINT	Page 2 of 2

BEAUFORT GAS DEVELOPMENT
RICHARDS ISLAND, N.W.T.

DEPTH (feet)	SOIL DESCRIPTION	SAMPLE	PERCENT SAND	PERCENT SILT	PERCENT CLAY
2	ICE				
4	WATER				
6	SILT - dark grey brown - fine - very sandy - clayey - unfrozen				
10			40	46	14
12					
14					
16			42	40	18
18					
20	SAND - med dk. brown - fine - silty				
22					
24					
26			65	35	--
28					
30					

MOISTURE CONTENT % ●
SPT RESISTANCE ▲
10 20 30 40 50 60 70
COMP. STRENGTH T.S.F ■
1 2 3

eda	ICE THICKNESS (ft.) 4	DATE DRILLED 14/2/75	HOLE Nº BHP 10
	WATER DEPTH (ft.) 5	TECHNICIAN JS	
	COMPLETION DEPTH (ft.) 45	REGION BIG HORN POINT	Page 1 of 2

BEAUFORT GAS DEVELOPMENT
RICHARDS ISLAND, N.W.T.

DEPTH (feet)	SOIL DESCRIPTION	SAMPLE	PERCENT SAND	PERCENT SILT	PERCENT CLAY
32					
34	- med. brown - fine - tr. silt				
36					
38					
40			85	10	5
42	- fine - tr. silt - tr. clay				
44					
46	END OF HOLE				

MOISTURE CONTENT % ●
SPT RESISTANCE ▲
10 20 30 40 50 60 70
COMP. STRENGTH T.S.F ■
1 2 3

eda	ICE THICKNESS (ft.) 4	DATE DRILLED 14/2/75	HOLE Nº
	WATER DEPTH (ft.) 5	TECHNICIAN JS	BHP 10
	COMPLETION DEPTH (ft.) 45	REGION BIG HORN POINT	Page 2 of 2

BEAUFORT GAS DEVELOPMENT
RICHARDS ISLAND, N.W.T.

DEPTH (feet)	SOIL DESCRIPTION	SAMPLE	PERCENT SAND	PERCENT SILT	PERCENT CLAY
2	ICE				
4					
6	SILT - grey - tr fine sand - soft - unfrozen				
8					
10					
12	SAND - med. to fine - silty		74	19	7
14					
16					
18					
20					
22					
24					
26	- less silt				
28					
30					

MOISTURE CONTENT % ●
SPT RESISTANCE ▲
10 20 30 40 50 60 70
COMP. STRENGTH T.S.F ■
1 2 3

eba	ICE THICKNESS (ft.) 5	DATE DRILLED 14/2/75	HOLE Nº BHP 11
	WATER DEPTH (ft.) 5	TECHNICIAN JS	
	COMPLETION DEPTH (ft.) 42	REGION BIG HORN POINT	Page 1 of 2

BEAUFORT GAS DEVELOPMENT
RICHARDS ISLAND, N.W.T.

DEPTH (feet)	SOIL DESCRIPTION	SAMPLE	PERCENT SAND	PERCENT SILT	PERCENT CLAY
32	- med. to fine - some silt				
34					
36					
38			84	11	5
40					
42	- no silt				
	END OF HOLE				
44					

MOISTURE CONTENT % ●
SPT RESISTANCE ▲
10 20 30 40 50 60 70
COMP. STRENGTH T.S.F ■
1 2 3

ICE THICKNESS (ft.) 5	DATE DRILLED 14/2/75	HOLE Nº BHP 11
WATER DEPTH (ft.) 5	TECHNICIAN JS	
COMPLETION DEPTH (ft.) 42	REGION BIG HORN POINT	Page 2 of 2

BEAUFORT GAS DEVELOPMENT
RICHARD S ISLAND, N.W.T.

DEPTH (feet)	SOIL DESCRIPTION	SAMPLE	PERCENT SAND	PERCENT SILT	PERCENT CLAY
2	ICE				
4					
6	SILT (till) -med. brown - trace sand & pebbles - med stiff				
8					
10					
12					
14					
16					
18	- med grey brown - very sandy (fine)		44	46	10
20					
22					
24					
26					
28					
30					

MOISTURE CONTENT % ●
SPT RESISTANCE ▲
10 20 30 40 50 60 70
COMP. STRENGTH T.S.F ■
1 2 3

eda	ICE THICKNESS (ft.) 5	DATE DRILLED 14/2/75	HOLE Nº BHP 12
	WATER DEPTH (ft.) 5	TECHNICIAN JS	
	COMPLETION DEPTH (ft.) 42	REGION BIG HORN POINT	Page 1 of 2

BEAUFORT GAS DEVELOPMENT
RICHARDS ISLAND, N.W.T.

DEPTH (feet)	SOIL DESCRIPTION	SAMPLE	PERCENT SAND	PERCENT SILT	PERCENT CLAY	MOISTURE CONTENT % ● / SPT RESISTANCE ▲ (10 20 30 40 50 60 70) / COMP. STRENGTH T.S.F ■ (1 2 3)
32	- grey - med grained - some silt					
34						
36						
38						
40	SILT - sandy - med stiff					
42	END OF HOLE					
44						

eda	ICE THICKNESS (ft.) 5	DATE DRILLED 14/2/75	HOLE Nº BHP 12
	WATER DEPTH (ft.) 5	TECHNICIAN JS	
	COMPLETION DEPTH (ft.) 42	REGION BIG HORN POINT	Page 2 of 2

BEAUFORT GAS DEVELOPMENT
RICHARD S ISLAND, N.W.T.

DEPTH (feet)	SOIL DESCRIPTION	SAMPLE	PERCENT SAND	PERCENT SILT	PERCENT CLAY
2	ICE				
4	WATER				
8	SILT - (till) - med grey brown - tr. clay - tr. fine gravel - well consolidated - unfrozen				
22	SILT AND SAND		55	32	13
30					

MOISTURE CONTENT % ●
SPT RESISTANCE ▲
10 20 30 40 50 60 70
COMP. STRENGTH T.S.F ■
1 2 3

	ICE THICKNESS (ft.) 4	DATE DRILLED 14/2/75	HOLE Nº BHP 13
	WATER DEPTH (ft.) 8	TECHNICIAN JS	
	COMPLETION DEPTH (ft.) 45	REGION BIG HORN POINT	Page 1 of 2

BEAUFORT GAS DEVELOPMENT
RICHARDS ISLAND, N.W.T.

DEPTH (feet)	SOIL DESCRIPTION	SAMPLE	PERCENT SAND	PERCENT SILT	PERCENT CLAY
32	SAND - med. brown - silty		50	42	8
34					
36					
38					
40					
42	- silty - clayey - soft				
44					
46					

MOISTURE CONTENT % ●
SPT RESISTANCE ▲
10 20 30 40 50 60 70
COMP. STRENGTH T.S.F ■
1 2 3

eba	ICE THICKNESS (ft.) 4	DATE DRILLED 14/2/75	HOLE Nº BHP 13
	WATER DEPTH (ft.) 8	TECHNICIAN JS	
	COMPLETION DEPTH (ft.) 45	REGION BIG HORN POINT	Page 2 of 2

BEAUFORT GAS DEVELOPMENT
RICHARDS ISLAND, N.W.T.

DEPTH (feet)	SOIL DESCRIPTION	SAMPLE	PERCENT SAND	PERCENT SILT	PERCENT CLAY
2	ICE				
4					
6	WATER				
8					
10	SILT - grey				
12	- tr. fine sand				
14					
16					
18	- some fine sand				
20					
22	SAND		80	14	6
24	- med grey brown				
26	- very fine - silty				
28					
30					

MOISTURE CONTENT % ●
SPT RESISTANCE ▲
10 20 30 40 50 60 70
COMP. STRENGTH T.S.F ■
1 2 3

eoa	ICE THICKNESS (ft.) 4	DATE DRILLED 14/2/75	HOLE Nº BHP 14
	WATER DEPTH (ft.) 9	TECHNICIAN JS	
	COMPLETION DEPTH (ft.) 45	REGION BIG HORN POINT	Page 1 of 2

BEAUFORT GAS DEVELOPMENT
RICHARD S ISLAND, N.W.T.

DEPTH (feet)	SOIL DESCRIPTION	SAMPLE	PERCENT SAND	PERCENT SILT	PERCENT CLAY
32	- less silty				
34					
36					
38	- med grey brown - coarser - silty		70	22	8
40	SILT - dark grey - sandy - clayey				
42					
44					
46	END OF HOLE				

MOISTURE CONTENT % ●
SPT RESISTANCE ▲
10 20 30 40 50 60 70
COMP. STRENGTH T.S.F ■
1 2 3

	ICE THICKNESS (ft.) 4	DATE DRILLED 19/2/75	HOLE Nº BHP 14
	WATER DEPTH (ft.) 9	TECHNICIAN JS	
	COMPLETION DEPTH (ft.) 45	REGION BIG HORN POINT	Page 2 of 2

BEAUFORT GAS DEVELOPMENT
RICHARD S ISLAND, N.W.T.

DEPTH (feet)	SOIL DESCRIPTION	SAMPLE	PERCENT SAND	PERCENT SILT	PERCENT CLAY
2	ICE				
4					
6	WATER				
8					
10	SILT - med. grey - some clay - low plastic - very organic - unfrozen				
12					
14					
16	-med. to dk. grey - very sandy				
18					
20					
22					
24					
26	SAND - med grey - some silt to silty				
28			50	41	9
30					

MOISTURE CONTENT % ●
SPT RESISTANCE ▲
10 20 30 40 50 60 70
COMP. STRENGTH T.S.F ■
1 2 3

eda	ICE THICKNESS (ft.) 4 1/2	DATE DRILLED 16/4/75	HOLE Nº BHP 15
	WATER DEPTH (ft.) 9	TECHNICIAN JK	
	COMPLETION DEPTH (ft.) 52	REGION BIG HORN POINT	Page 1 of 2

BEAUFORT GAS DEVELOPMENT
RICHARDS ISLAND, N.W.T.

DEPTH (feet)	SOIL DESCRIPTION	SAMPLE	PERCENT SAND	PERCENT SILT	PERCENT CLAY
32	some silt				
34					
36					
38	some silt to silty				
40					
42					
44					
46					
48					
50					
52			65	30	5
54	END OF HOLE				

MOISTURE CONTENT % ●
SPT RESISTANCE ▲
10 20 30 40 50 60 70
COMP. STRENGTH T.S.F ■
1 2 3

ICE THICKNESS (ft.) 4 1/2	DATE DRILLED 16/4/75	HOLE Nº BHP 15
WATER DEPTH (ft.) 9	TECHNICIAN JK	
COMPLETION DEPTH (ft.) 52	REGION BIG HORN POINT	Page 2 of 2

BEAUFORT GAS DEVELOPMENT
RICHARD S ISLAND, N.W.T.

DEPTH (feet)	SOIL DESCRIPTION	SAMPLE	PERCENT SAND	PERCENT SILT	PERCENT CLAY
2	ICE				
4					
6	WATER				
8					
10	SILT - med.grey brown				
12	CLAY (till) - silty - some sand - tr. fine gravel - stiff - low to med. plastic - unfrozen				
14					
16					
18					
20					
22					
24					
26	SAND - med. grey brown - some silt - dense				
28					
30			63	31	6

MOISTURE CONTENT % ●
SPT RESISTANCE ▲
10 20 30 40 50 60 70
COMP. STRENGTH T.S.F ■
1 2 3

eba	ICE THICKNESS (ft.) 5	DATE DRILLED 16/4/75	HOLE Nº BHP 16
	WATER DEPTH (ft.) 9	TECHNICIAN JK	
	COMPLETION DEPTH (ft.) 35	REGION BIG HORN POINT	Page 1 of 2

BEAUFORT GAS DEVELOPMENT
RICHARDS ISLAND, N.W.T.

DEPTH (feet)	SOIL DESCRIPTION	SAMPLE	PERCENT SAND	PERCENT SILT	PERCENT CLAY	MOISTURE CONTENT % ● / SPT RESISTANCE ▲ (10 20 30 40 50 60 70) / COMP. STRENGTH T.S.F ■ (1 2 3)
32	SAME					
34						
36	END OF HOLE					

	ICE THICKNESS (ft.) 5	DATE DRILLED 16/4/75	HOLE Nº BHP16
	WATER DEPTH (ft.) 9	TECHNICIAN J.K.	
	COMPLETION DEPTH (ft.) 35	REGION BIG HORN POINT	Page 2 of 2

BEAUFORT GAS DEVELOPMENT
RICHARDS ISLAND, N.W.T.

DEPTH (feet)	SOIL DESCRIPTION	SAMPLE	PERCENT SAND	PERCENT SILT	PERCENT CLAY
2	ICE				
4					
6	WATER				
8					
10					
12	CLAY (till) - dark grey - silty - some sand - tr. pebbles - low to med. plastic - stiff and moist - unfrozen		35	45	20
14					
16					
18					
20					
22					
24					
26					
28					
30					

MOISTURE CONTENT % ●
SPT RESISTANCE ▲
10 20 30 40 50 60 70
COMP. STRENGTH T.S.F ■
1 2 3

	ICE THICKNESS (ft.) 5	DATE DRILLED 16/4/75	HOLE Nº BHP 17
	WATER DEPTH (ft.) 11	TECHNICIAN JK	
	COMPLETION DEPTH (ft.) 37	REGION BIG HORN POINT	Page 1 of 2

BEAUFORT GAS DEVELOPMENT
RICHARD S ISLAND, N.W.T.

DEPTH (feet)	SOIL DESCRIPTION	SAMPLE	PERCENT SAND	PERCENT SILT	PERCENT CLAY	MOISTURE CONTENT % ● / SPT RESISTANCE ▲ (10 20 30 40 50 60 70) / COMP. STRENGTH T.S.F ■ (1 2 3)
32	SAME					
34						
36						
38	END OF HOLE					

eba	ICE THICKNESS (ft.) 5	DATE DRILLED 16/4/75	HOLE Nº BHP 17
	WATER DEPTH (ft.) 11	TECHNICIAN JK	
	COMPLETION DEPTH (ft.) 37	REGION BIG HORN POINT	Page 2 of 2

BEAUFORT GAS DEVELOPMENT
RICHARD S ISLAND, N.W.T.

DEPTH (feet)	SOIL DESCRIPTION	SAMPLE	PERCENT SAND	PERCENT SILT	PERCENT CLAY
2	ICE				
4					
6					
8	WATER				
10					
12	SAND - med grey brown - some silt to silty - unfrozen				
14					
16					
18			82	14	4
20					
22					
24					
26					
28					
30					

MOISTURE CONTENT % ●
SPT RESISTANCE ▲
10 20 30 40 50 60 70
COMP. STRENGTH T.S.F ■
1 2 3

eda	ICE THICKNESS (ft.) 6	DATE DRILLED 16/4/75	HOLE Nº BHP 18
	WATER DEPTH (ft.) 10	TECHNICIAN J.K.	
	COMPLETION DEPTH (ft.) 62	REGION BIG HORN POINT	Page 1 of 2

BEAUFORT GAS DEVELOPMENT
RICHARDS ISLAND, N.W.T.

DEPTH (feet)	SOIL DESCRIPTION	SAMPLE	PERCENT SAND	PERCENT SILT	PERCENT CLAY	MOISTURE CONTENT % ● / SPT RESISTANCE ▲ (10 20 30 40 50 60 70) / COMP. STRENGTH T.S.F ■ (1 2 3)
32	tr. silt					
34						
36						
38						
40						
42						
44						
46						
48						
50						
52						
54						
56						
58						
60	END OF HOLE @ 62'		82	14	4	

eda	ICE THICKNESS (ft.) 6	DATE DRILLED 16/4/75	HOLE Nº BHP 18
	WATER DEPTH (ft.) 10	TECHNICIAN JK	
	COMPLETION DEPTH (ft.) 62	REGION BIG HORN Point	Page 2 of 2

BEAUFORT GAS DEVELOPMENT
RICHARDS ISLAND, N.W.T.

DEPTH (feet)	SOIL DESCRIPTION	SAMPLE	PERCENT SAND	PERCENT SILT	PERCENT CLAY
2	ICE				
4					
6	WATER				
8					
10					
12	SILT - med grey brown - unfrozen				
14					
16					
18					
20					
22	SAND - fine grained, uniform - silty		62	29	9
24					
26					
28			67	29	4
30					

MOISTURE CONTENT % ●
SPT RESISTANCE ▲
10 20 30 40 50 60 70
COMP. STRENGTH T.S.F ■
1 2 3

ICE THICKNESS (ft.) 5 1/2	DATE DRILLED 16/4/75	HOLE Nº BHP 19
WATER DEPTH (ft.) 12	TECHNICIAN J.K.	
COMPLETION DEPTH (ft.) 52	REGION BIG HORN POINT	Page 1 of 2

BEAUFORT GAS DEVELOPMENT
RICHARD S ISLAND, N.W.T.

DEPTH (feet)	SOIL DESCRIPTION	SAMPLE	PERCENT SAND	PERCENT SILT	PERCENT CLAY
32					
34			71	26	3
36					
38					
40	-some silt		71	26	3
42					
44	- tr. silt				
46					
48					
50					
52	SILT - med grey brown - sandy				
	END OF HOLE				

MOISTURE CONTENT % ●
SPT RESISTANCE ▲
10 20 30 40 50 60 70
COMP. STRENGTH T.S.F ■
1 2 3

eda	ICE THICKNESS (ft.) 5 1/2	DATE DRILLED 16/4/75	HOLE Nº BHP 19
	WATER DEPTH (ft.) 12	TECHNICIAN JK	
	COMPLETION DEPTH (ft.) 52	REGION BIG HORN POINT	Page 2 of 2

BEAUFORT GAS DEVELOPMENT
RICHARDS ISLAND, N.W.T.

DEPTH (feet)	SOIL DESCRIPTION	SAMPLE	PERCENT SAND	PERCENT SILT	PERCENT CLAY	MOISTURE CONTENT % ● / SPT RESISTANCE ▲ (10 20 30 40 50 60 70) / COMP. STRENGTH T.S.F ■ (1 2 3)
2	ICE					
4						
6	WATER					
8						
10						
12						
14						
16						
18						
20	SILT - med grey brown - unfrozen					
22						
24						
26						
28						
30						

eda	ICE THICKNESS (ft.) 5	DATE DRILLED 16/9/75	HOLE Nº BHP 20
	WATER DEPTH (ft.) 20	TECHNICIAN J.K.	
	COMPLETION DEPTH (ft.) 52	REGION BIG HORN POINT	Page 1 of 2

BEAUFORT GAS DEVELOPMENT
RICHARD S ISLAND, N.W.T.

DEPTH (feet)	SOIL DESCRIPTION	SAMPLE	PERCENT SAND	PERCENT SILT	PERCENT CLAY
32	SAME				
34					
36					
38	- very sandy		26	70	4
40	SAND - med. brown - fine grained - uniform				
42					
44					
46	tr. silt				
48					
50	_ very silty		64	33	3
52	END OF HOLE				

MOISTURE CONTENT % ●
SPT RESISTANCE ▲
10 20 30 40 50 60 70
COMP. STRENGTH T.S.F ■
1 2 3

	ICE THICKNESS (ft.) 5	DATE DRILLED 16/4/75	HOLE Nº BHP 20
	WATER DEPTH (ft.) 20	TECHNICIAN JK	
	COMPLETION DEPTH (ft.) 52	REGION BIG HORN POINT	Page 2 of 2

BEAUFORT GAS DEVELOPMENT
RICHARDS ISLAND, N.W.T

DEPTH (feet)	SOIL DESCRIPTION	SAMPLE	PERCENT SAND	PERCENT SILT	PERCENT CLAY	MOISTURE CONTENT % ● SPT RESISTANCE ▲ 10 20 30 40 50 60 70 COMP. STRENGTH T.S.F ■ 1 2 3
0	ICE					
2						
4						
6	WATER					
8						
10						
12						
14						
16						
18	SILT - med grey brown - unfrozen					
20						
22						
24						
26						
28						
30						

eda	ICE THICKNESS (ft.) 5	DATE DRILLED 16/4/75	HOLE Nº BHP 21
	WATER DEPTH (ft.) 18	TECHNICIAN JK	
	COMPLETION DEPTH (ft.) 52	REGION BIG HORN POINT	Page 1 of 2

BEAUFORT GAS DEVELOPMENT
RICHARDS ISLAND, N.W.T.

DEPTH (feet)	SOIL DESCRIPTION	SAMPLE	PERCENT SAND	PERCENT SILT	PERCENT CLAY
32	SAME				
34					
36					
38					
40					
42					
44	SAND - med grey brown - fine grained, uniform - very silty - tr. med		36	59	5
46					
48	SILT - med grey br.				
50					
52	END OF HOLE				

MOISTURE CONTENT % ●
SPT RESISTANCE ▲
10 20 30 40 50 60 70
COMP. STRENGTH T.S.F ■
1 2 3

ICE THICKNESS (ft.)	5	DATE DRILLED 16/4/75	HOLE No. BHP 21
WATER DEPTH (ft.)	18	TECHNICIAN JK	
COMPLETION DEPTH (ft.)	52	REGION BIG HORN POINT	Page 2 of 2

BEAUFORT GAS DEVELOPMENT
RICHARDS ISLAND, N.W.T.

DEPTH (feet)	SOIL DESCRIPTION	SAMPLE	PERCENT SAND	PERCENT SILT	PERCENT CLAY	MOISTURE CONTENT % ● / SPT RESISTANCE ▲ (10 20 30 40 50 60 70) / COMP. STRENGTH T.S.F ■ (1 2 3)
2	ICE					
4						
6						
8	WATER					
10						
12						
14						
16						
18						
20	SILT - med grey brown - unfrozen					
22						
24						
26						
28						
30						

eda	ICE THICKNESS (ft.) 5	DATE DRILLED 16/9/75	HOLE Nº BHP 22
	WATER DEPTH (ft.) 19	TECHNICIAN JK	
	COMPLETION DEPTH (ft.) 52	REGION BIG HORN POINT	Page 1 of 2

BEAUFORT GAS DEVELOPMENT
RICHARD S ISLAND, N.W.T.

DEPTH (feet)	SOIL DESCRIPTION	SAMPLE	PERCENT SAND	PERCENT SILT	PERCENT CLAY	MOISTURE CONTENT % ● / SPT RESISTANCE ▲ (10 20 30 40 50 60 70) / COMP. STRENGTH T.S.F ■ (1 2 3)
32	SAME					
34						
36						
38						
40						
42						
44						
46						
48						
50	END OF HOLE					
52						

eoa	ICE THICKNESS (ft.) 5	DATE DRILLED 16/9/75	HOLE Nº BHP 22
	WATER DEPTH (ft.) 19	TECHNICIAN JK	
	COMPLETION DEPTH (ft.) 52	REGION BIG HORN POINT	Page 2 of 2

BEAUFORT GAS DEVELOPMENT
RICHARDS ISLAND, N.W.T.

DEPTH (feet)	SOIL DESCRIPTION	SAMPLE	PERCENT SAND	PERCENT SILT	PERCENT CLAY	MOISTURE CONTENT % ● / SPT RESISTANCE ▲ (10 20 30 40 50 60 70) / COMP. STRENGTH T.S.F ■ (1 2 3)
2	ICE					
4						
6	WATER					
8						
10						
12						
14						
16						
18	SILT - med grey - unfrozen					
20						
22						
24						
26						
28						
30						

eda	ICE THICKNESS (ft.) 5 1/2	DATE DRILLED 16/4/75	HOLE Nº BHP 23
	WATER DEPTH (ft.) 17	TECHNICIAN JK	
	COMPLETION DEPTH (ft.) 52	REGION BIG HORN POINT	Page 1 of 2

BEAUFORT GAS DEVELOPMENT
RICHARDS ISLAND, N.W.T.

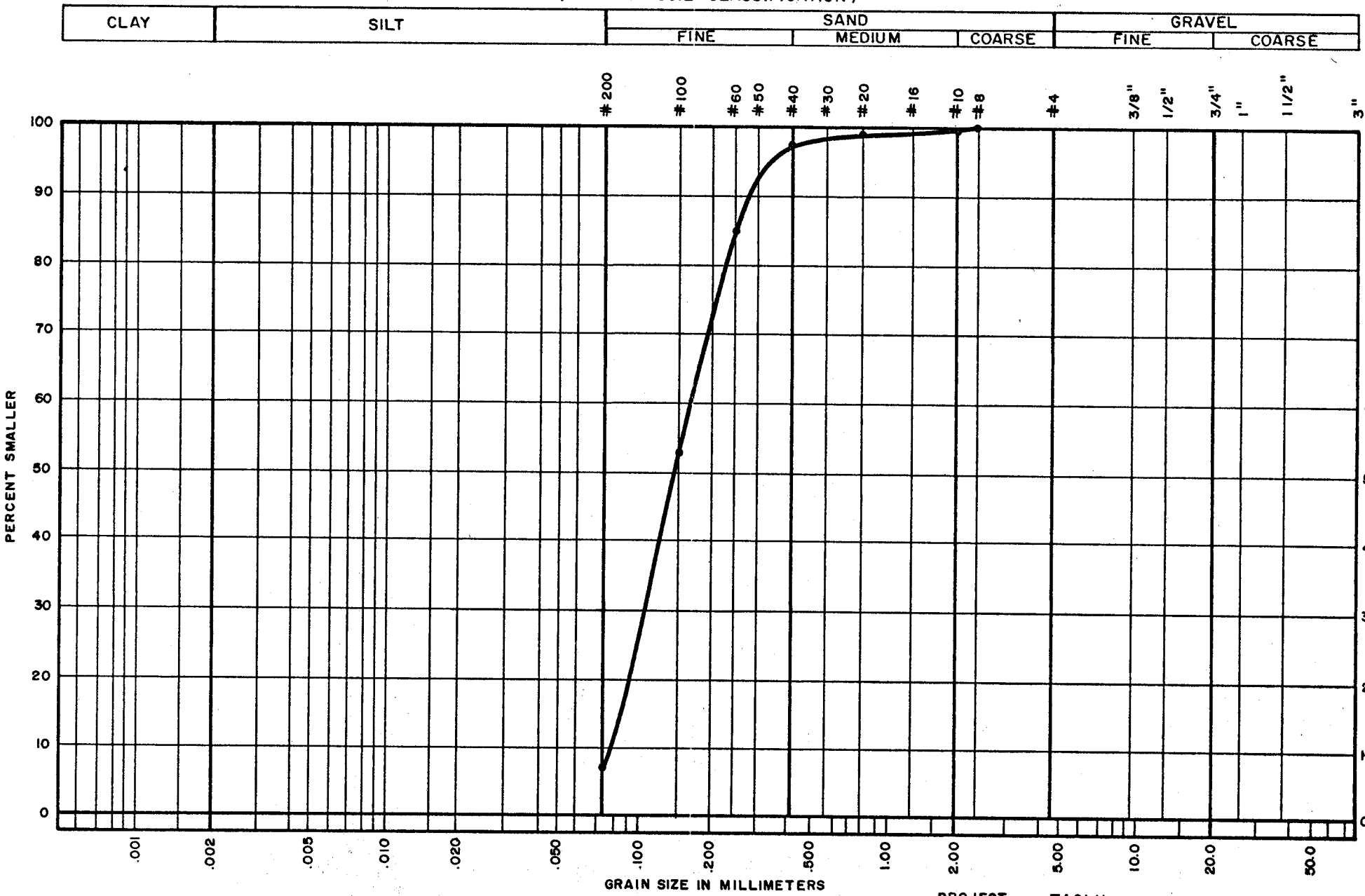
DEPTH (feet)	SOIL DESCRIPTION	SAMPLE	PERCENT SAND	PERCENT SILT	PERCENT CLAY	MOISTURE CONTENT % ● SPT RESISTANCE ▲ 10 20 30 40 50 60 70 COMP. STRENGTH T.S.F ■ 1 2 3
32	SAME					
34						
36						
38						
40						
42						
44						
46						
48						
50						
52	END OF HOLE					

eba	ICE THICKNESS (ft.) 5 1/2	DATE DRILLED 16/9/75	HOLE Nº BHP 23
	WATER DEPTH (ft.) 17	TECHNICIAN JK	
	COMPLETION DEPTH (ft.) 52	REGION BIG HORN POINT	Page 2 of 2

APPENDIX B

GRAIN SIZE CURVES FOR BIG HORN POINT

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



SAMPLE DESCRIPTION FINE SAND
TR. SILT

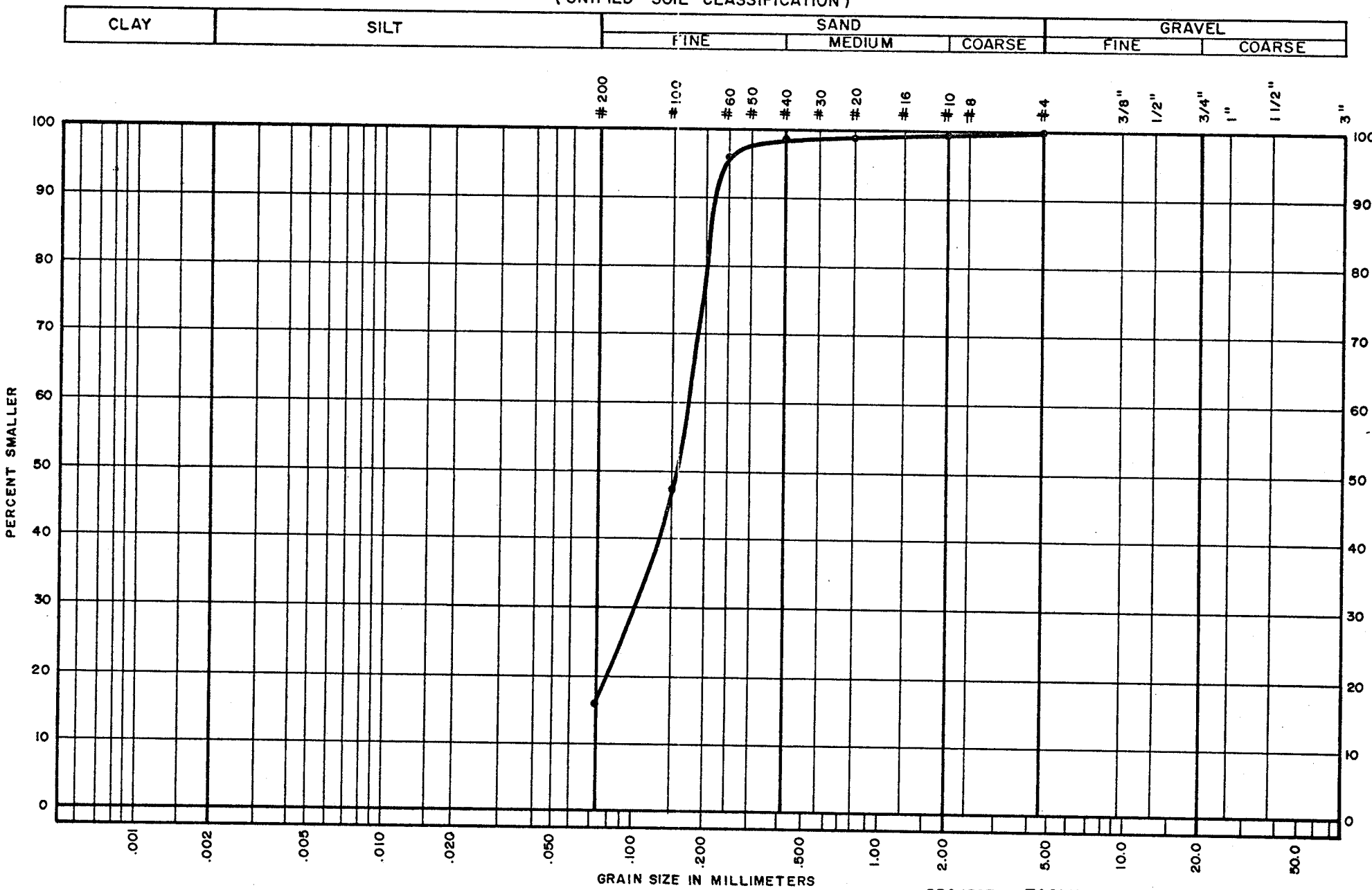
PROJECT TAGLU
JOB No. E965.1 DATE 13 May, 1975
HOLE No. BHP 2 SAMPLE No.
DEPTH 16-20'

EBA Engineering Consultants Ltd.

FIGURE

Page B-1

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



SAMPLE DESCRIPTION FINE SAND
SOME SILT

PROJECT TAGLU

JOB No. E965.1 DATE 13 May, 1975

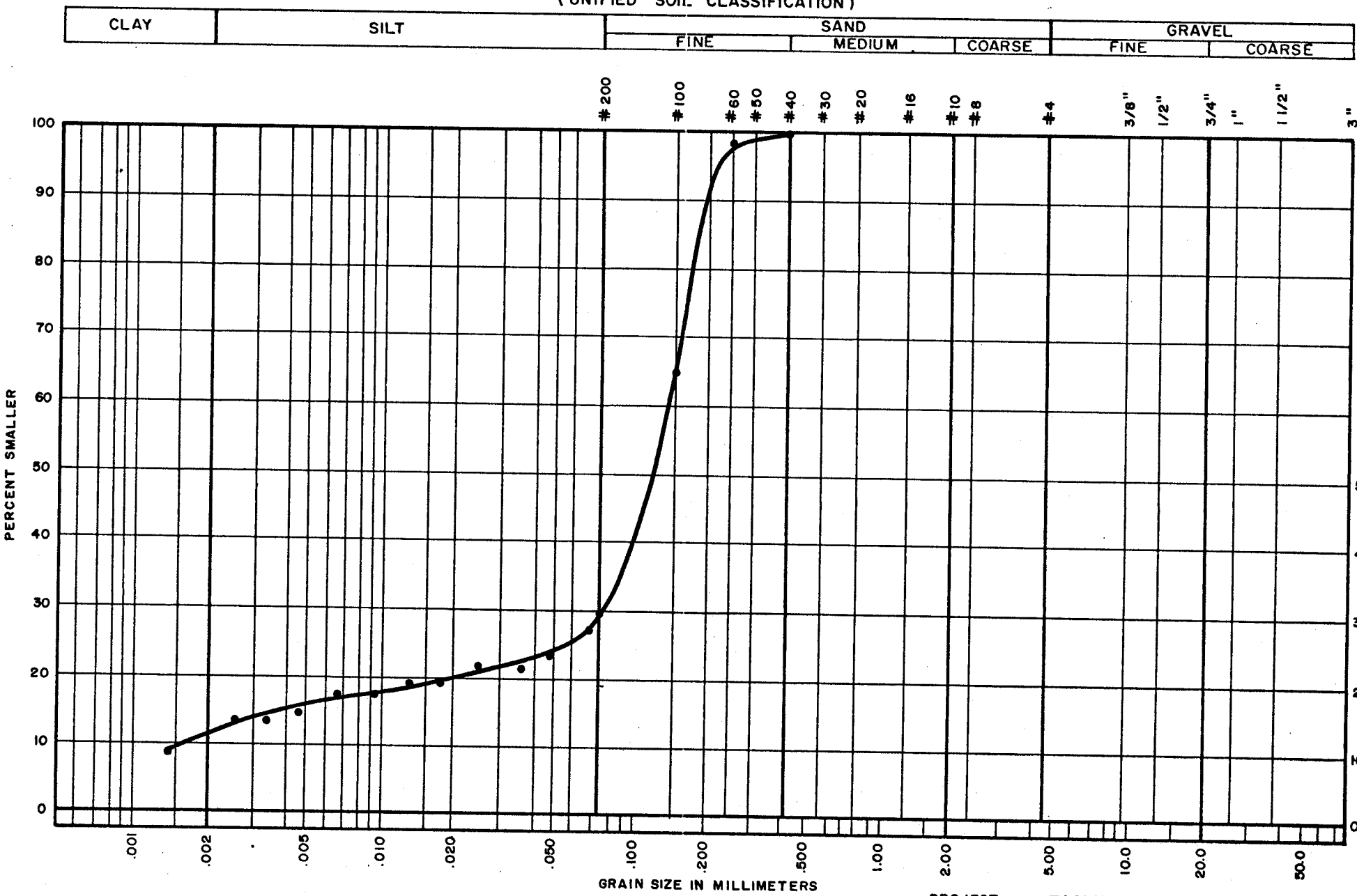
HOLE No. BHP 3 SAMPLE No.

DEPTH 40-41 1/2'

EBA Engineering Consultants Ltd.

FIGURE

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



SAMPLE DESCRIPTION FINE SAND, SILTY, TRACE CLAY

PROJECT TAGLU

JOB No. E965.1 DATE 14 May, 1975

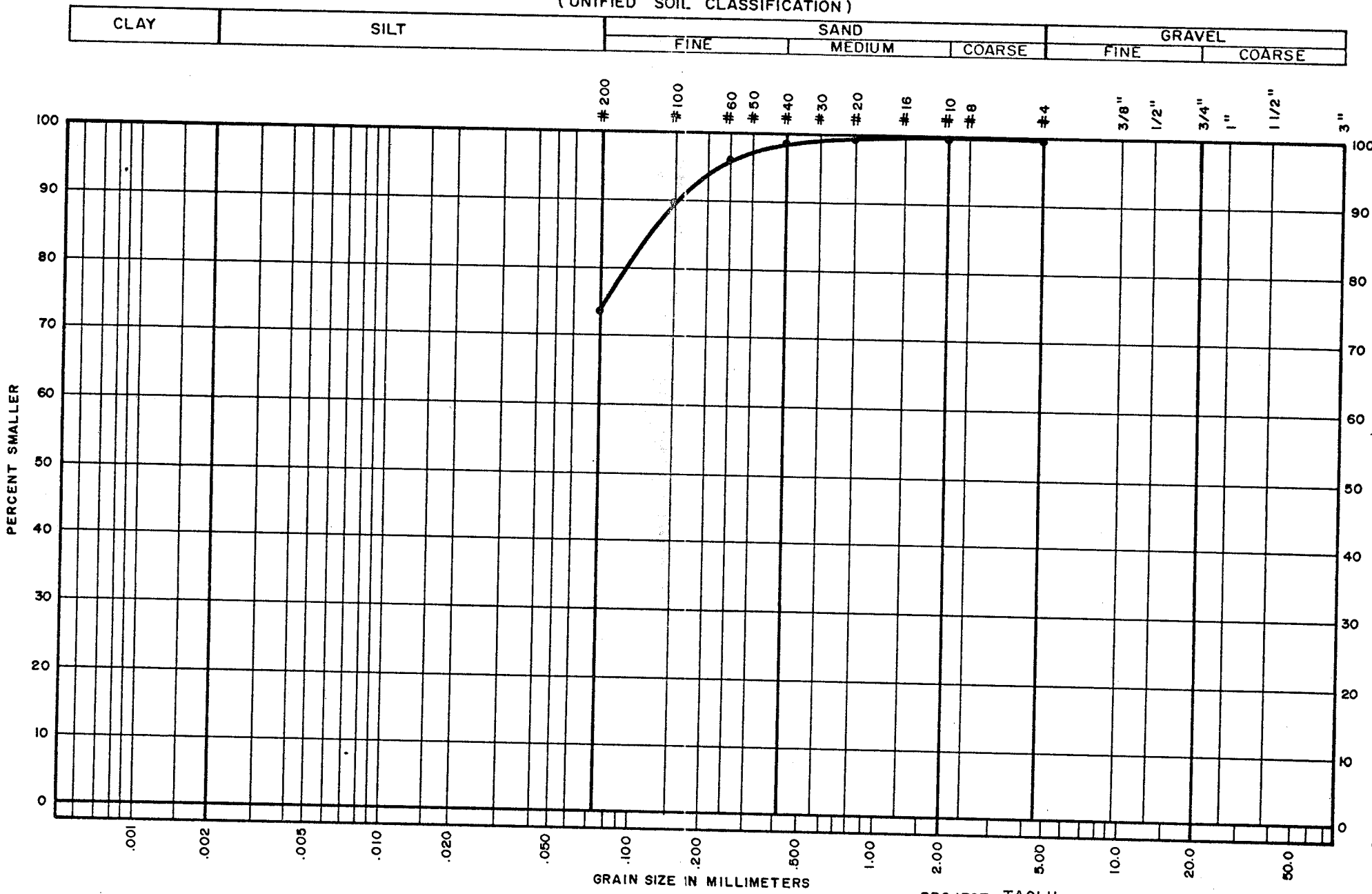
HOLE No. BHP 3 SAMPLE No.

DEPTH 44-48'

EBA Engineering Consultants Ltd.

FIGURE

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



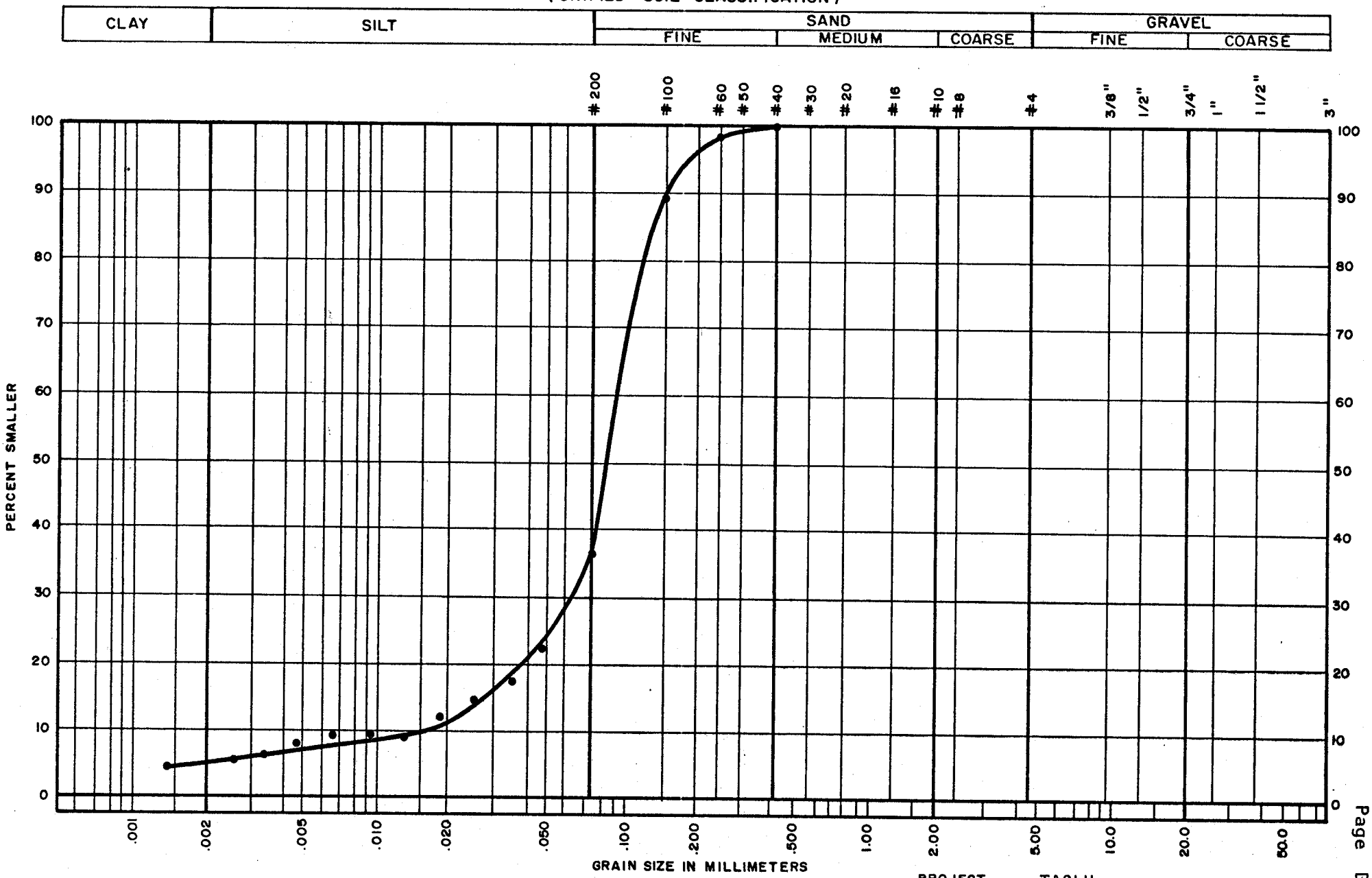
SAMPLE DESCRIPTION SILT
- sandy

PROJECT TAGLU
JOB No. E965.1 DATE 13, May, 1975
HOLE No. BHP 7 SAMPLE No.
DEPTH 22'

EBA Engineering Consultants Ltd.

FIGURE

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



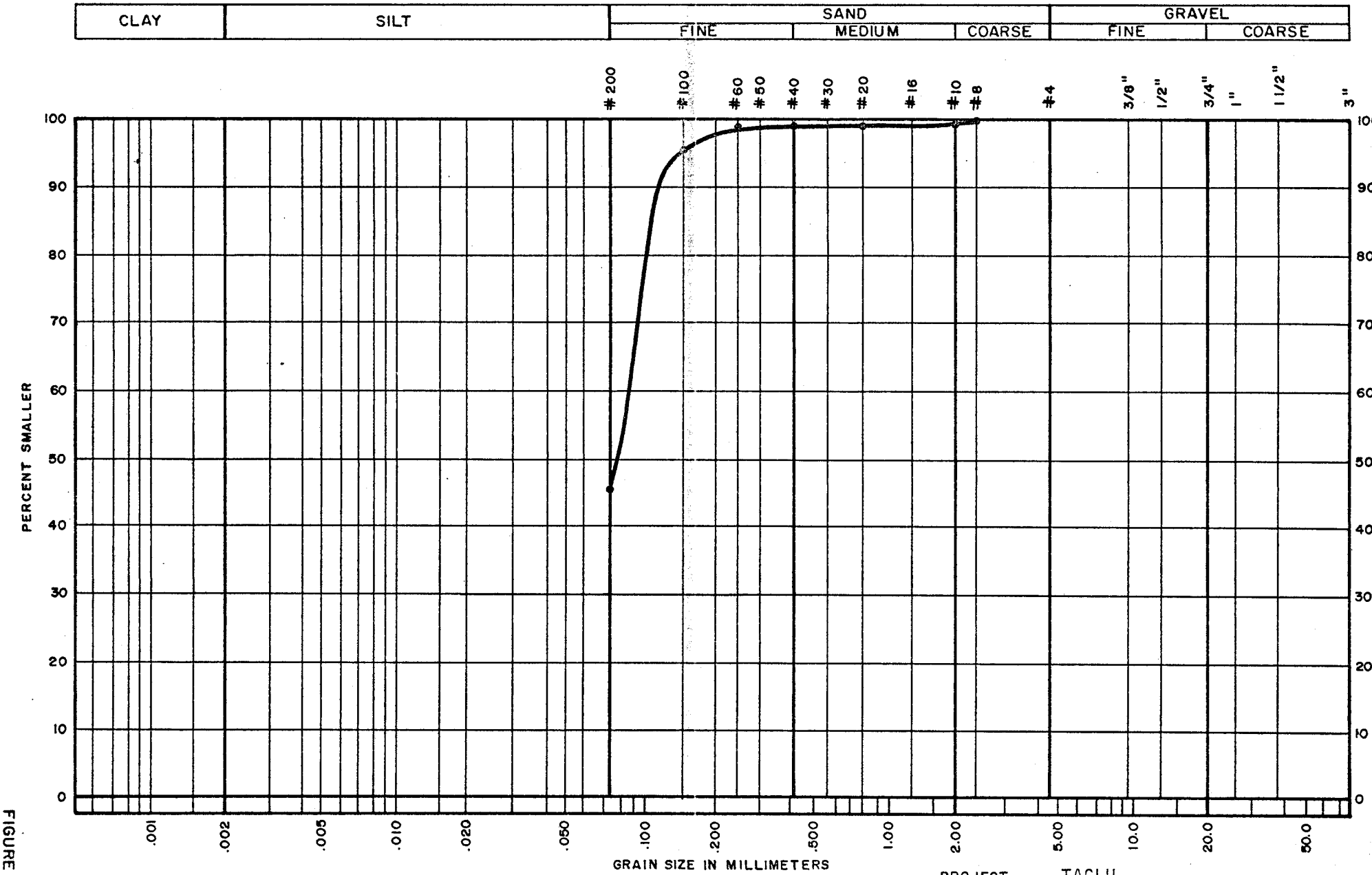
SAMPLE DESCRIPTION FINE SAND and SILT
TRACE CLAY

PROJECT TAGIU
JOB No. E965.1 DATE 14 May, 1975
HOLE No. BHP 8 SAMPLE No.
DEPTH 18'

EBA Engineering Consultants Ltd.

FIGURE

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



FIGURE

SAMPLE DESCRIPTION SAND and SILT

EBA Engineering Consultants Ltd.

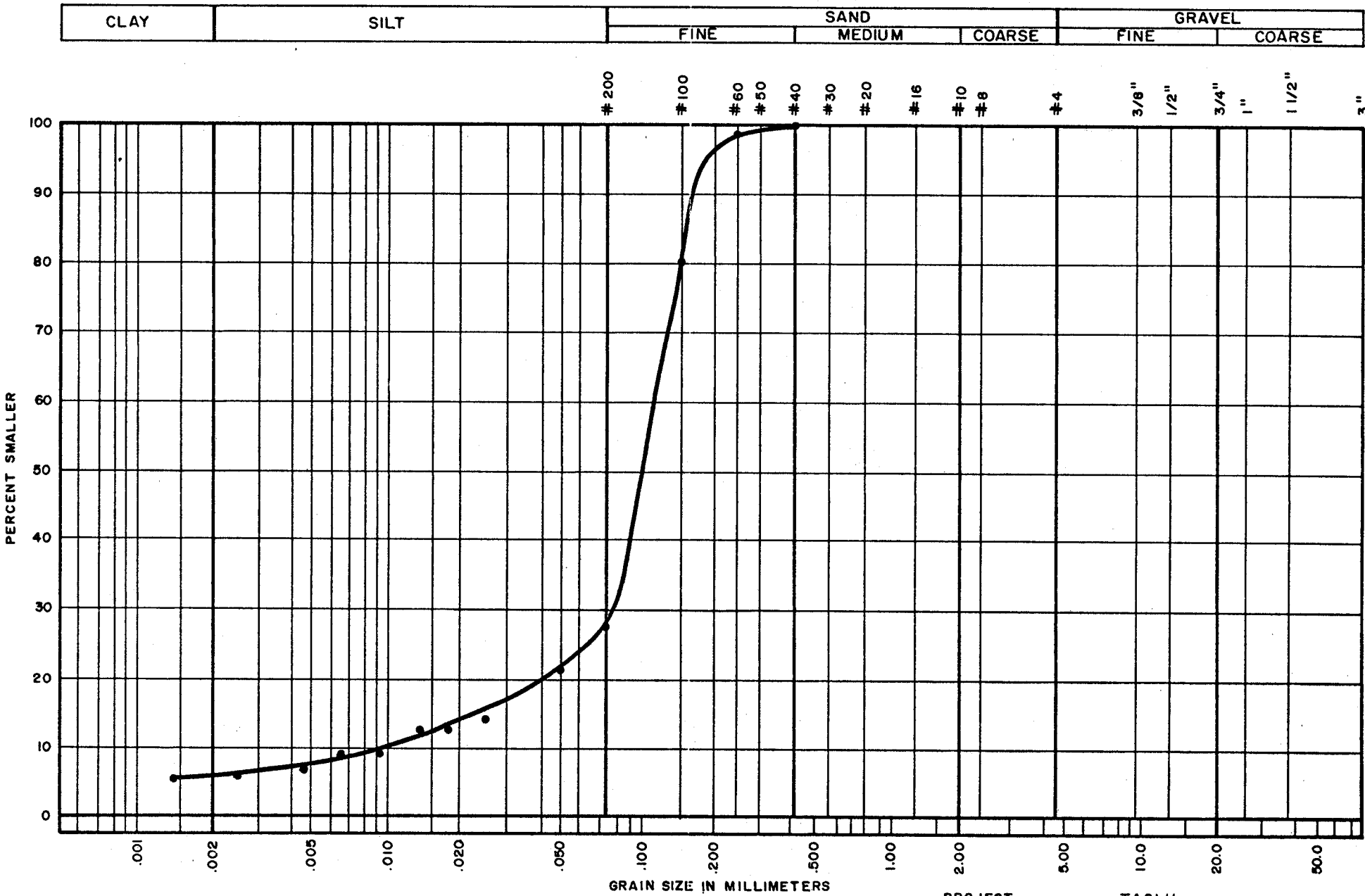
PROJECT TAGLU

JOB No. E965.1 DATE 13 May, 1975

HOLE No. BHP 8 SAMPLE No.

DEPTH 33'

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



SAMPLE DESCRIPTION FINE SAND
SILTY, TRACE CLAY

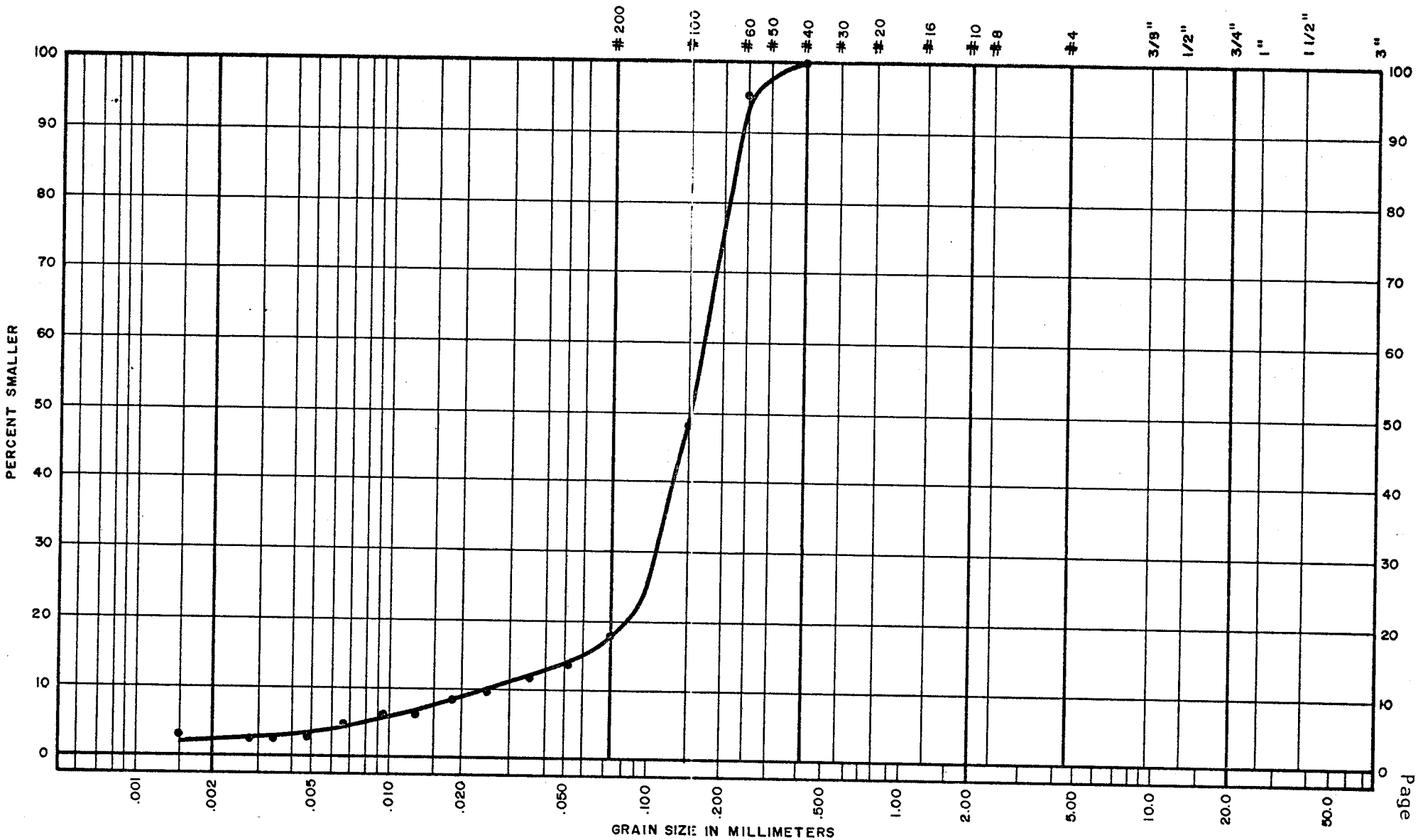
PROJECT TAGLU
JOB No. E965.1 DATE 14 May, 1975
HOLE No. BHP 9 SAMPLE No.
DEPTH 12'

EBA Engineering Consultants Ltd.

FIGURE

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



SAMPLE DESCRIPTION SAND
- fine
- some silt

PROJECT TAGLU
JOB No. E965.1 DATE 16 MAY, 1975
HOLE No. BHP 9 SAMPLE No.
DEPTH 40'

EBA Engineering Consultants Ltd.

FIGURE

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)

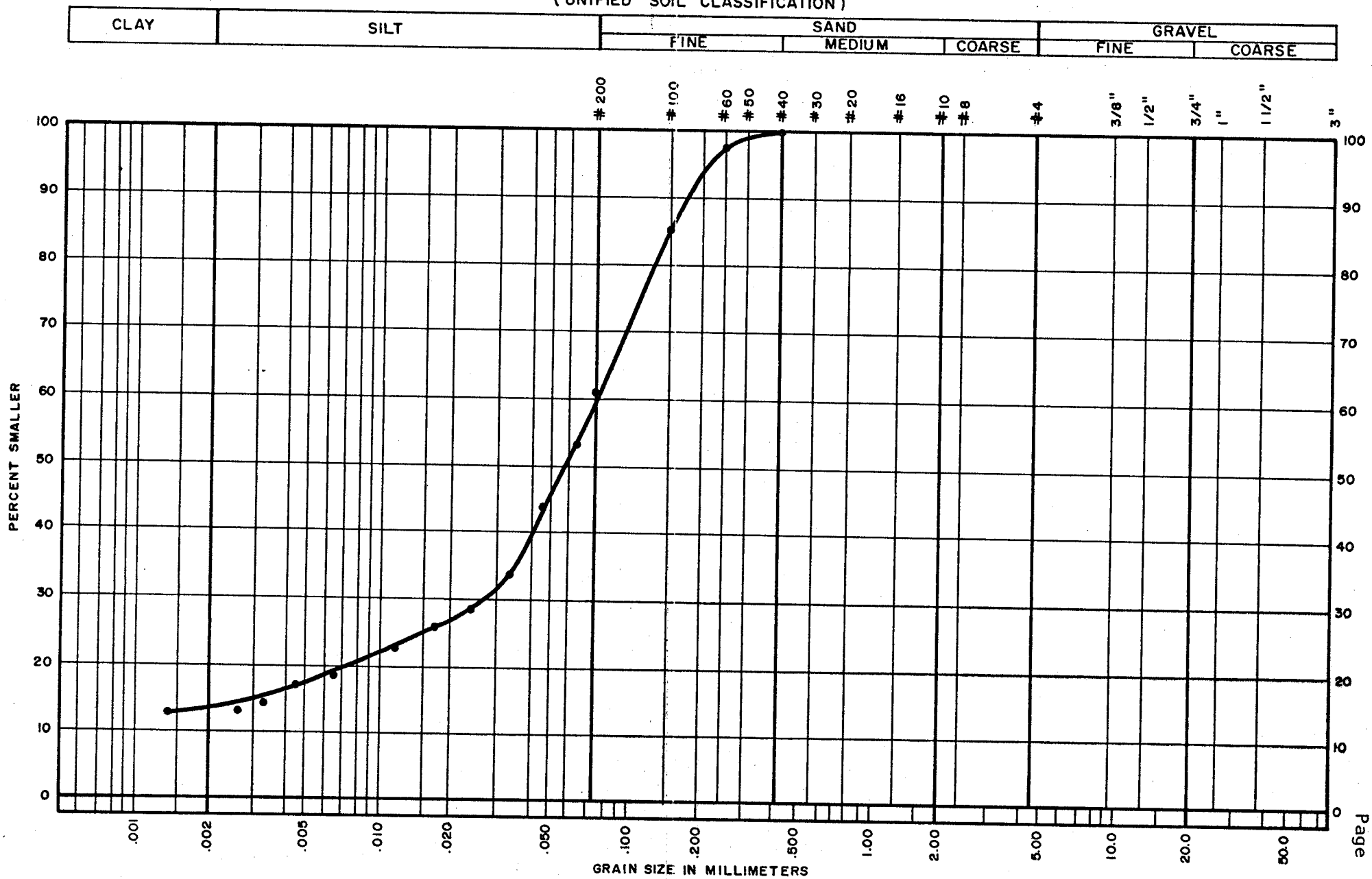


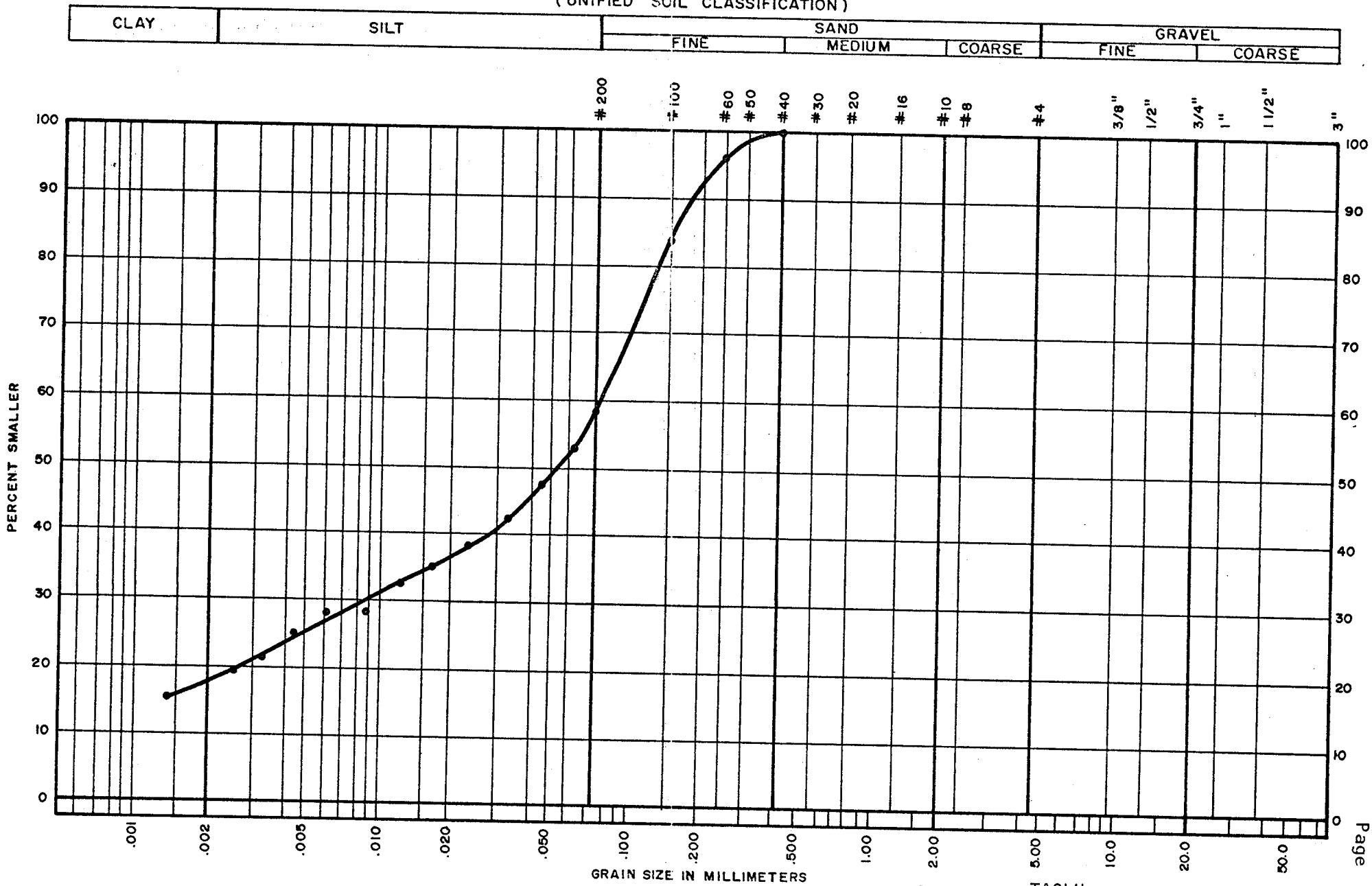
FIGURE ____

SAMPLE DESCRIPTION SILT and FINE SAND
SOME CLAY

EBA Engineering Consultants Ltd.

PROJECT TAGLU
JOB No. E965.1 DATE 14 May, 1975
HOLE No. BHP 10 SAMPLE No.
DEPTH 10'

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



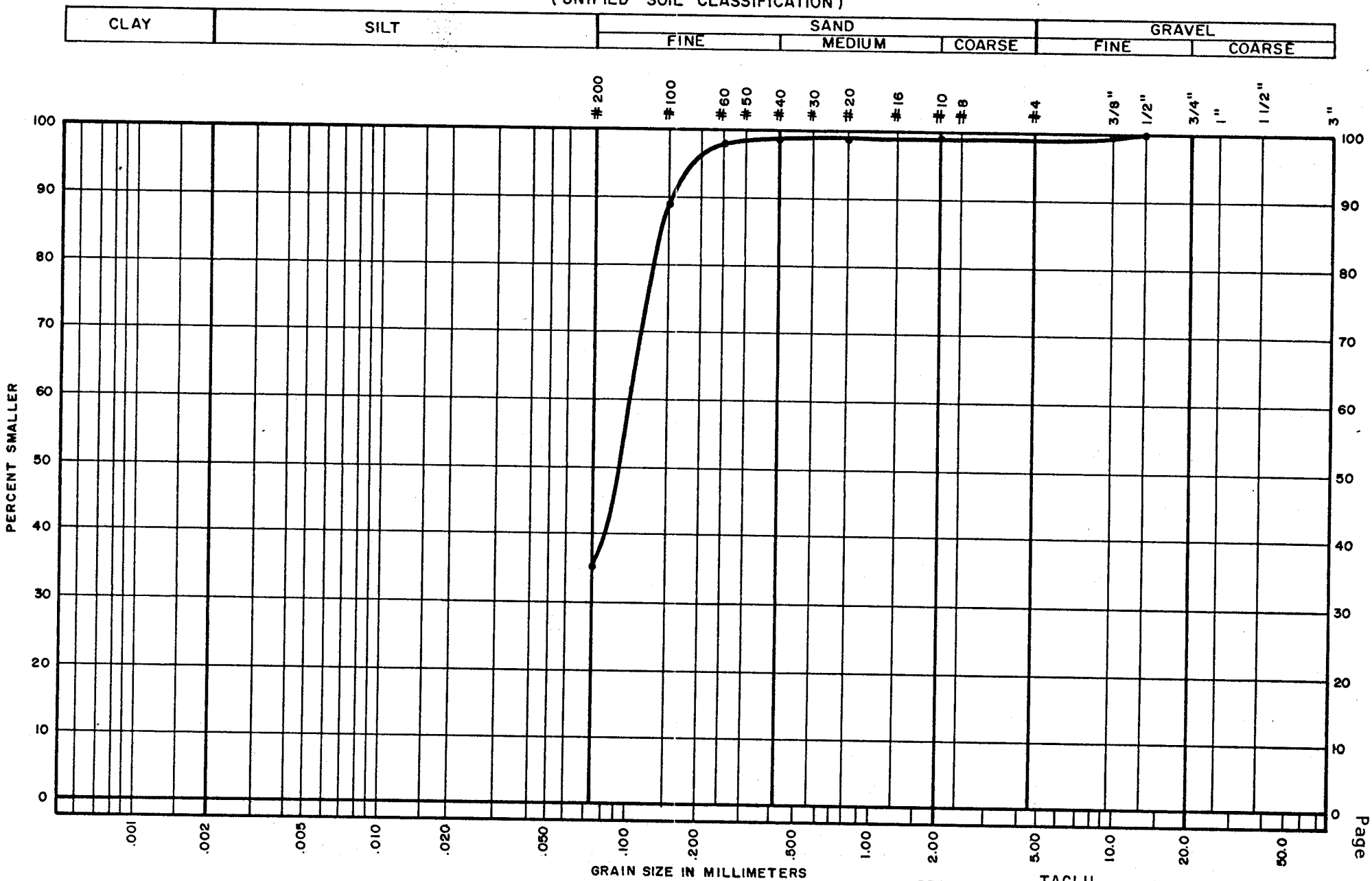
SAMPLE DESCRIPTION SILT and FINE SAND
SOME CLAY

PROJECT TAGLU
JOB No. E965.1 DATE 14 May, 1975
HOLE No. BHP 10 SAMPLE No.
DEPTH 15'

EBA Engineering Consultants Ltd.

FIGURE

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



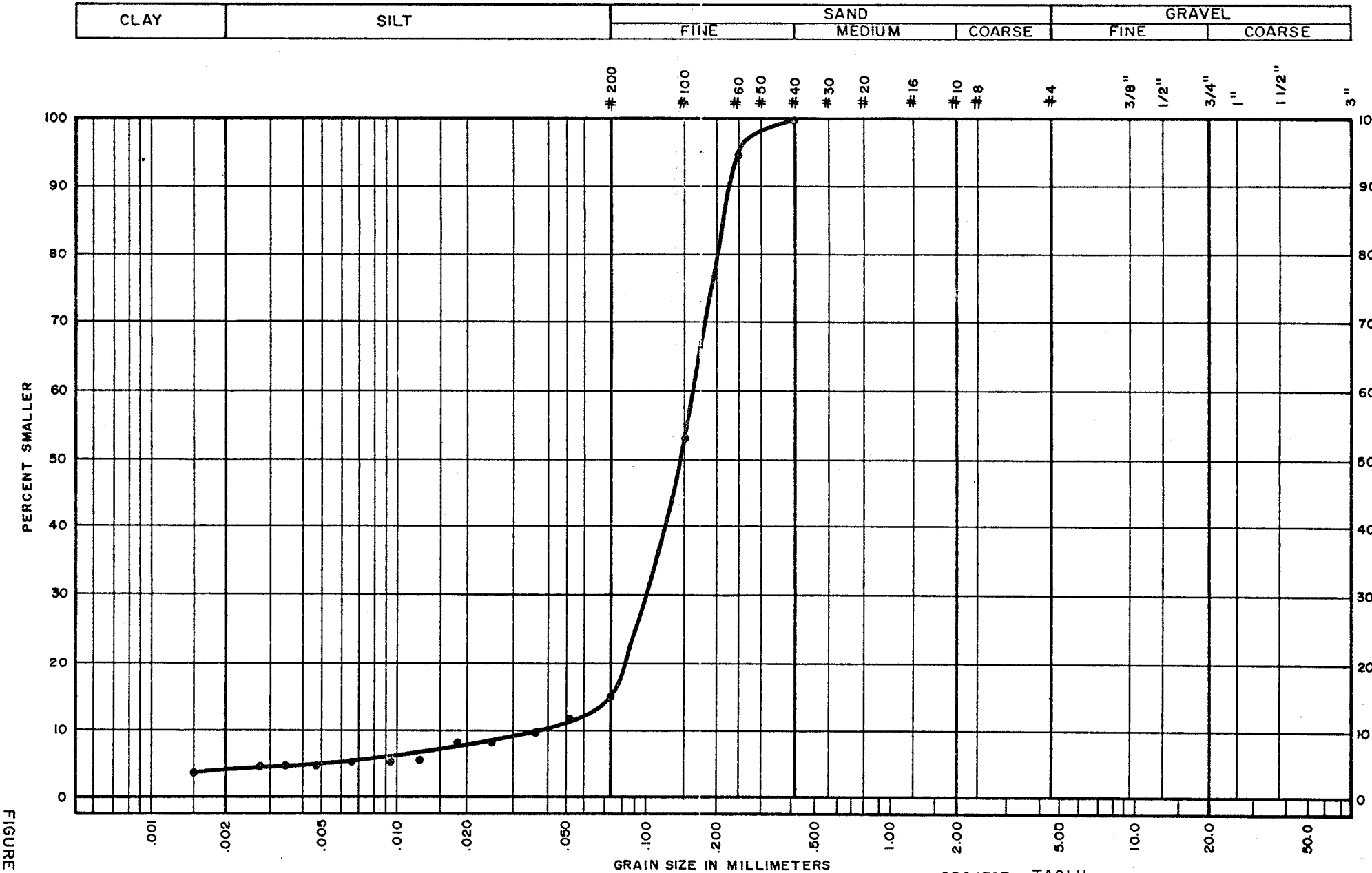
SAMPLE DESCRIPTION FINE SAND and SILT
SILT TRACE FINE GRAVEL

PROJECT TAGLU
JOB No. E965.1 DATE 13 May, 1975
HOLE No. BHP 10 SAMPLE No.
DEPTH 25'

EBA Engineering Consultants Ltd.

FIGURE

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



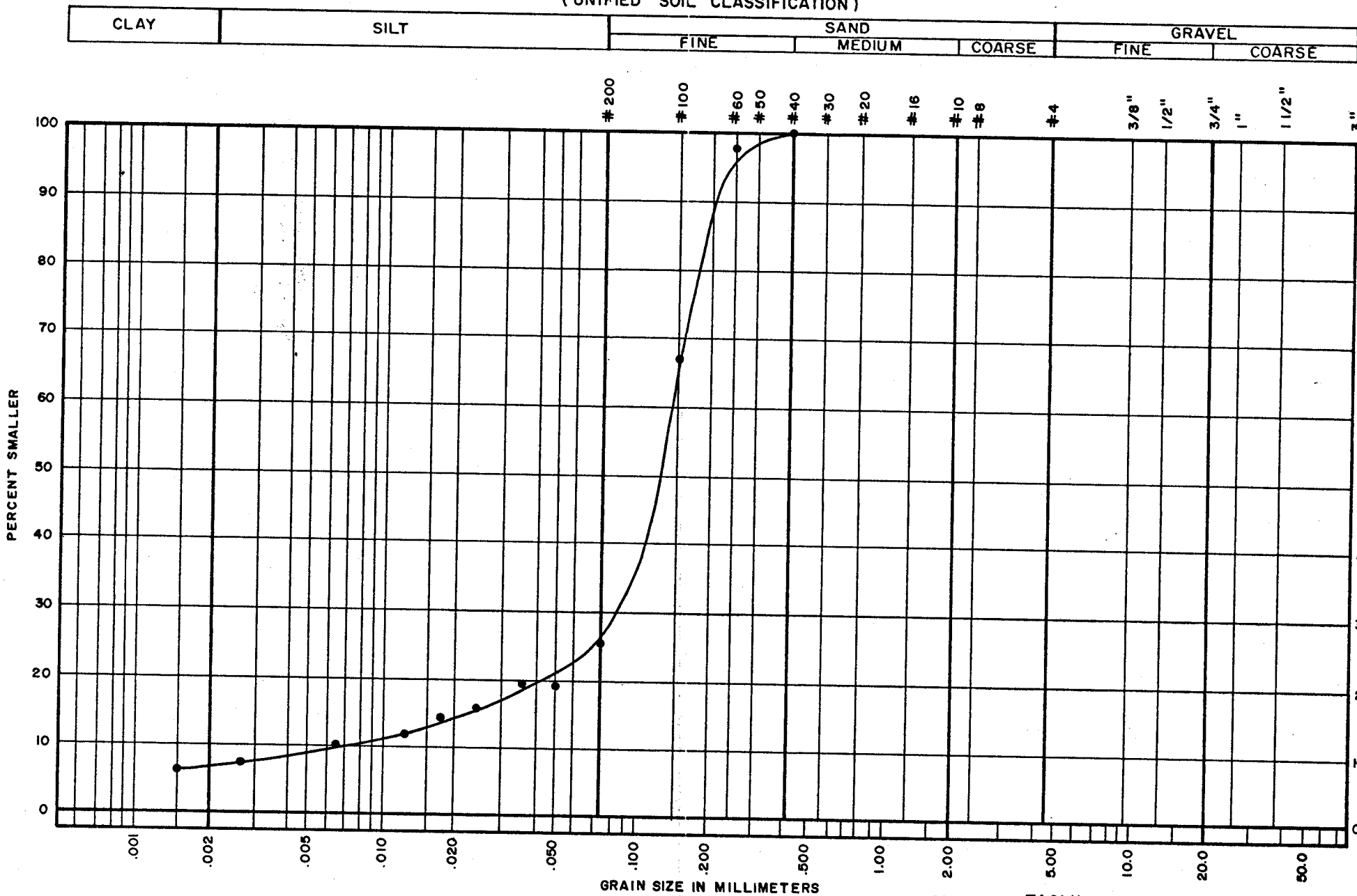
SAMPLE DESCRIPTION SAND
- some silt

PROJECT TAGLU
JOB No. E965.1 DATE 16 MAY, 1975
HOLE No. BHP 10 SAMPLE No.
DEPTH 40'

EBA Engineering Consultants Ltd.

FIGURE

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



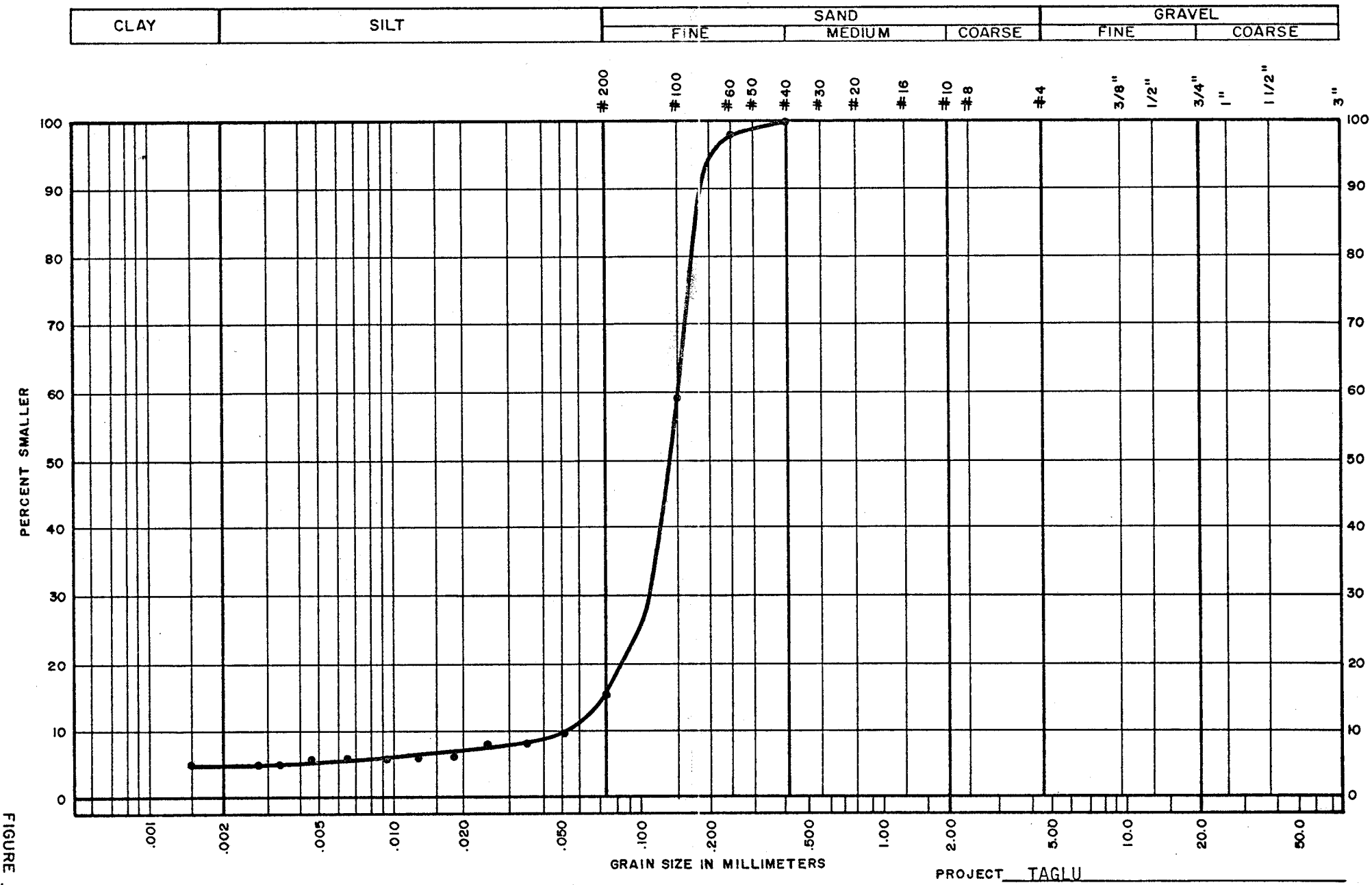
SAMPLE DESCRIPTION SAND
- fine
- silty

PROJECT TAGLU
JOB No. E965.1 DATE 16/5/75
HOLE No. BHP-11 SAMPLE No.
DEPTH 12'

EBA Engineering Consultants Ltd.

FIGURE

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



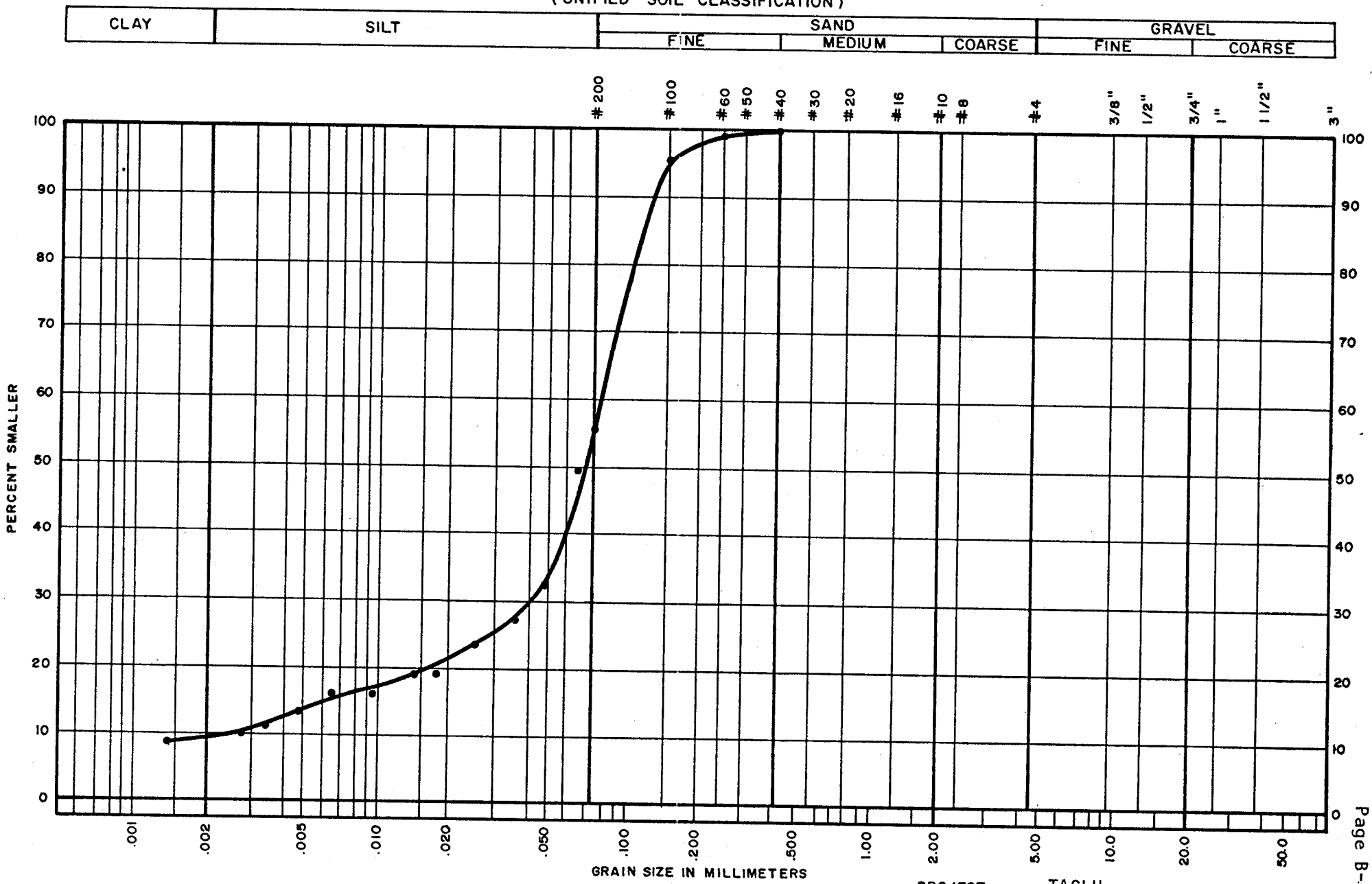
SAMPLE DESCRIPTION SAND
- some silt
- fine

PROJECT TAGLU
JOB No. E965.1 DATE 16 MAY, 1975
HOLE No. BHP 11 SAMPLE No.
DEPTH 37'

EBA Engineering Consultants Ltd.

FIGURE

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



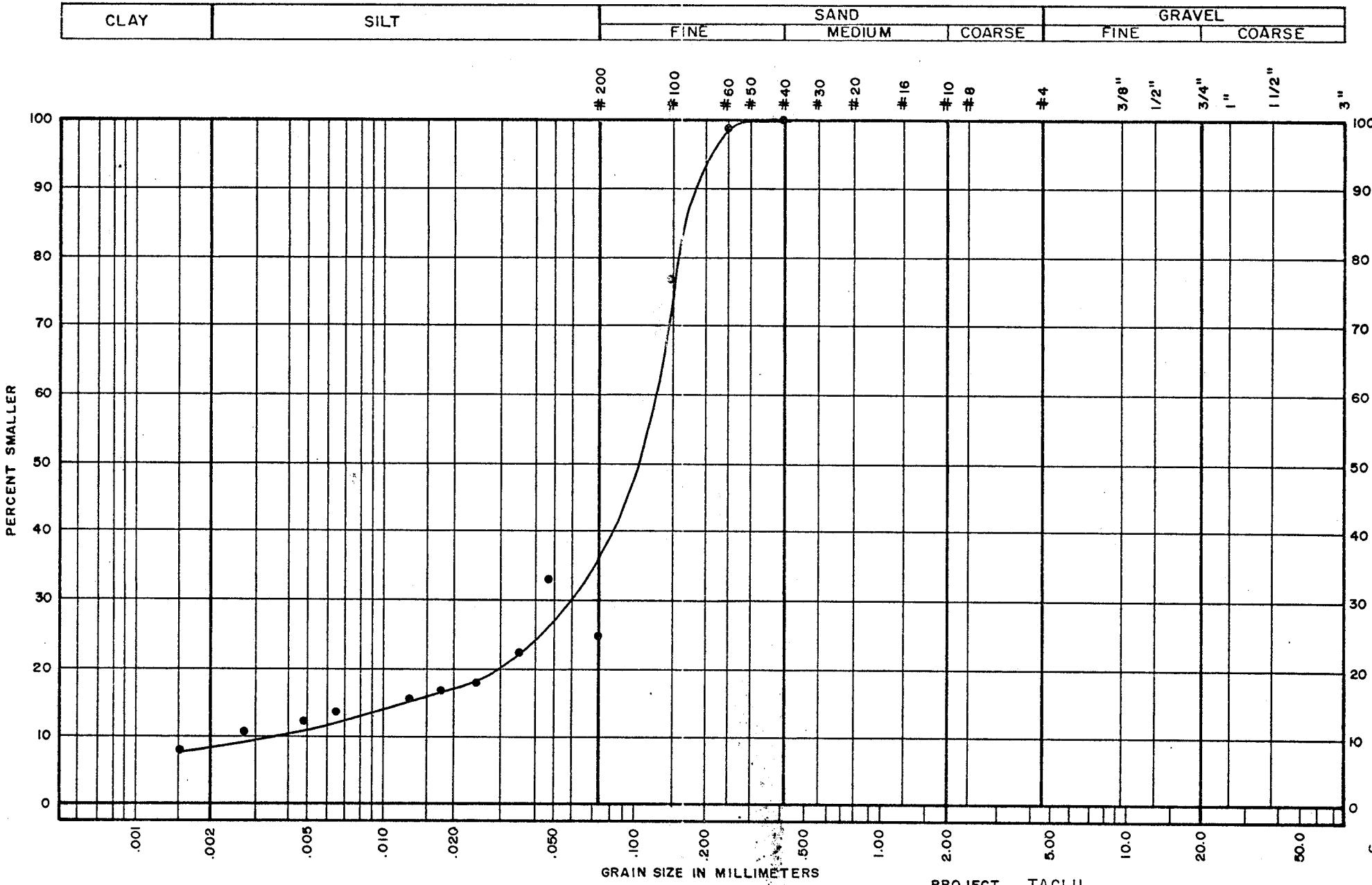
SAMPLE DESCRIPTION FINE SAND AND SILT
TRACE OF CLAY

PROJECT TAGLU
JOB No. E965.1 DATE 14 May, 1975
HOLE No. BHP 12 SAMPLE No.
DEPTH 17'

EBA Engineering Consultants Ltd.

FIGURE

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



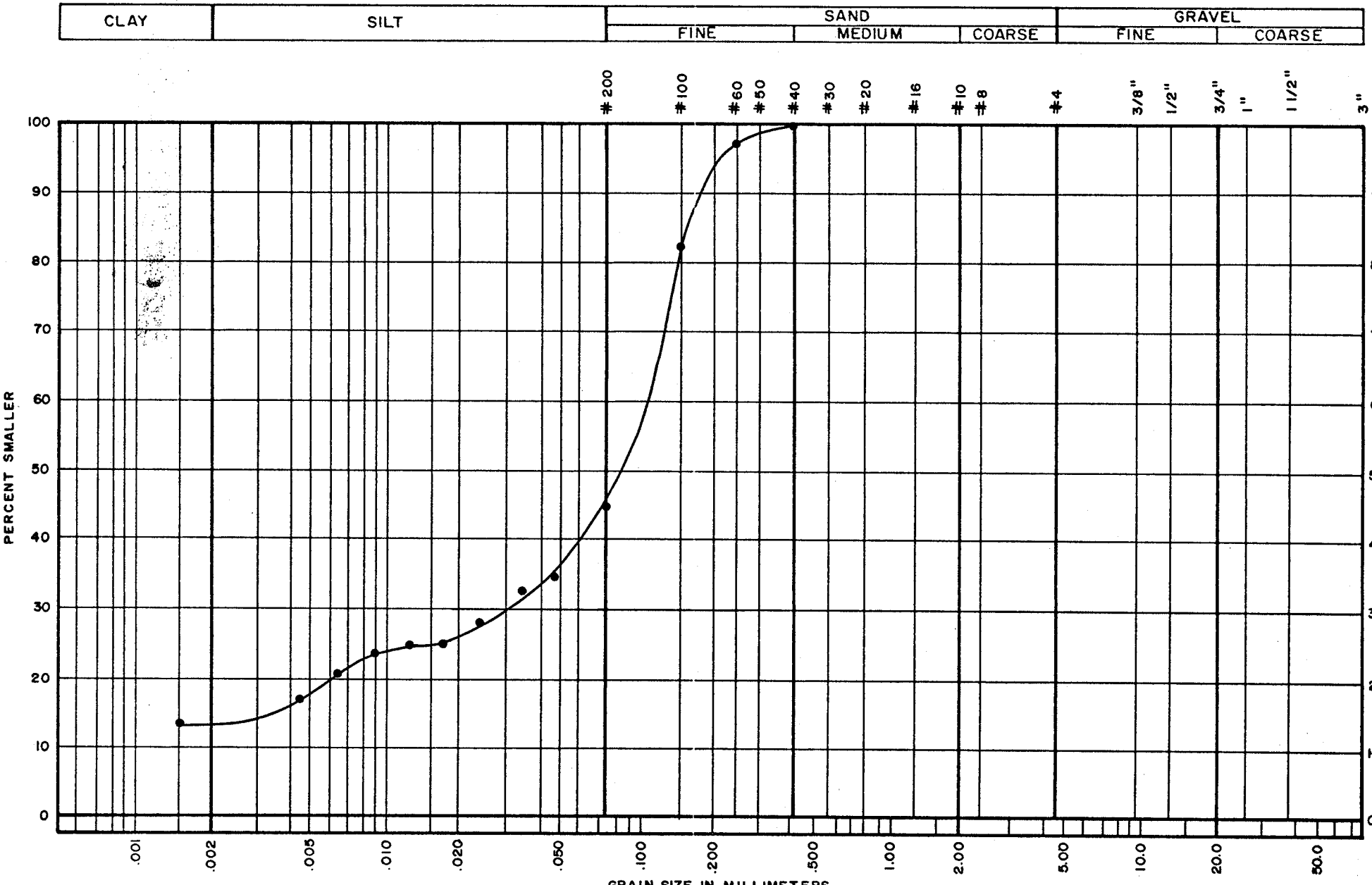
SAMPLE DESCRIPTION SAND
- fine
- silty

PROJECT TAGLU
JOB No. E965.1 DATE 16/5/75
HOLE No. BHP-12 SAMPLE No.
DEPTH 22'

EBA Engineering Consultants Ltd.

FIGURE

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



SAMPLE DESCRIPTION SILT and SAND

PROJECT TAGLU

JOB No. E965.1 DATE 16/5/75

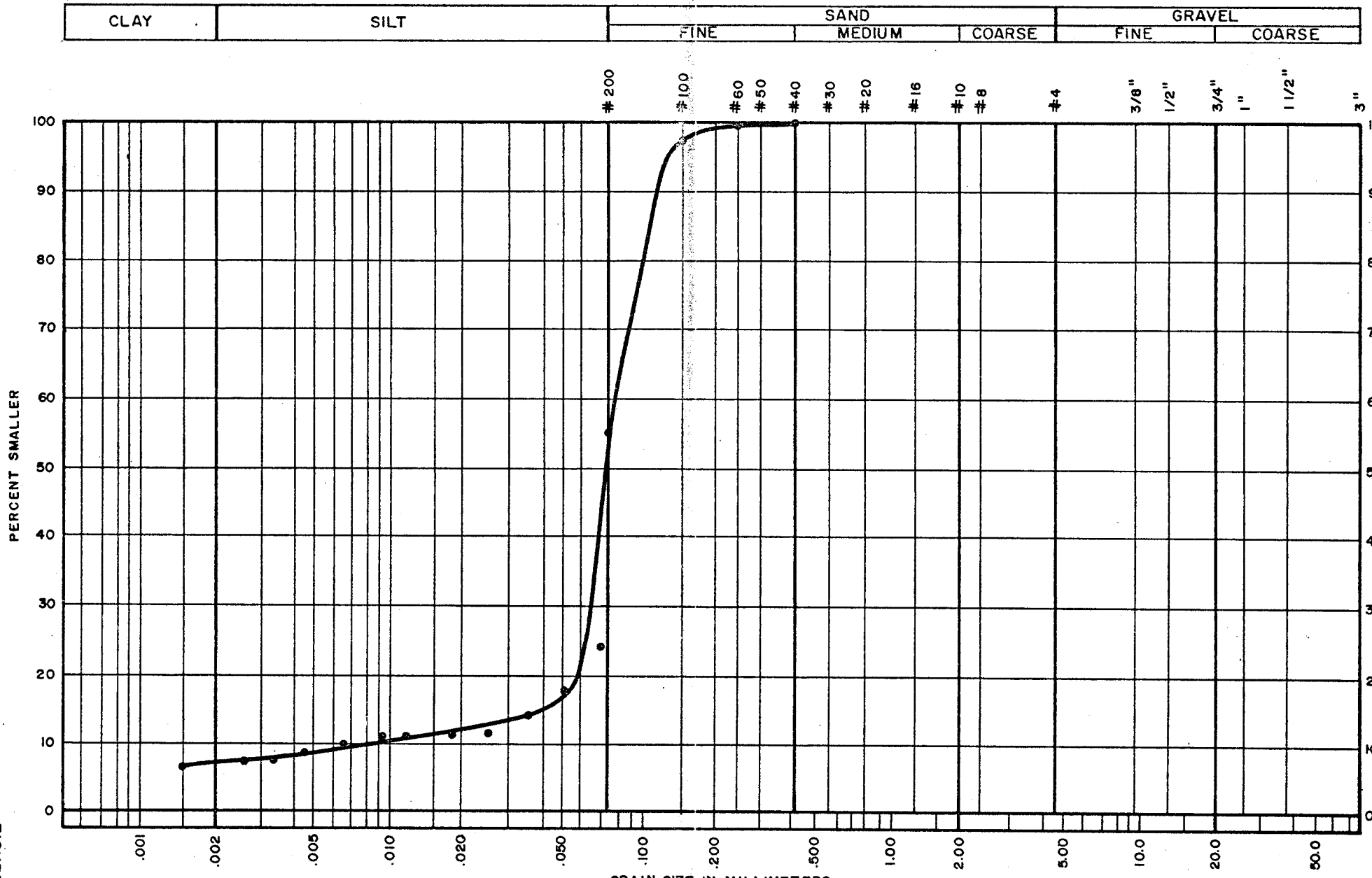
HOLE No. BHP 13 SAMPLE No.

DEPTH 22'

EBA Engineering Consultants Ltd.

FIGURE

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



SAMPLE DESCRIPTION SAND and SILT

PROJECT TAGLU

JOB No. E965.1 DATE 16 MAY, 1975

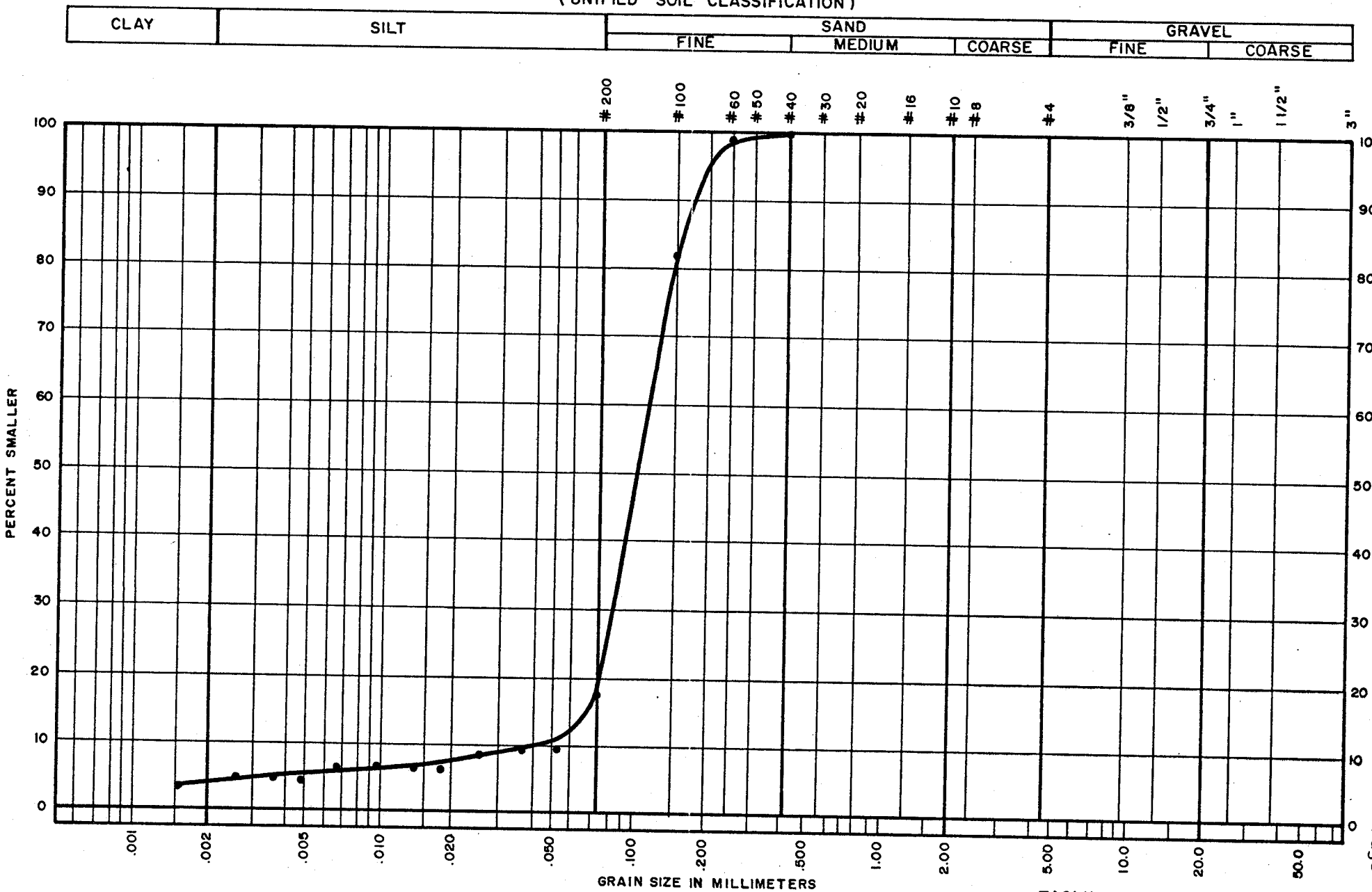
HOLE No. BHP 13 SAMPLE No.

DEPTH 32'

EBA Engineering Consultants Ltd.

FIGURE

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



SAMPLE DESCRIPTION FINE SAND, SILTY, TRACE CLAY

PROJECT TAGLU

JOB No. E965.1 DATE 14 May 1975

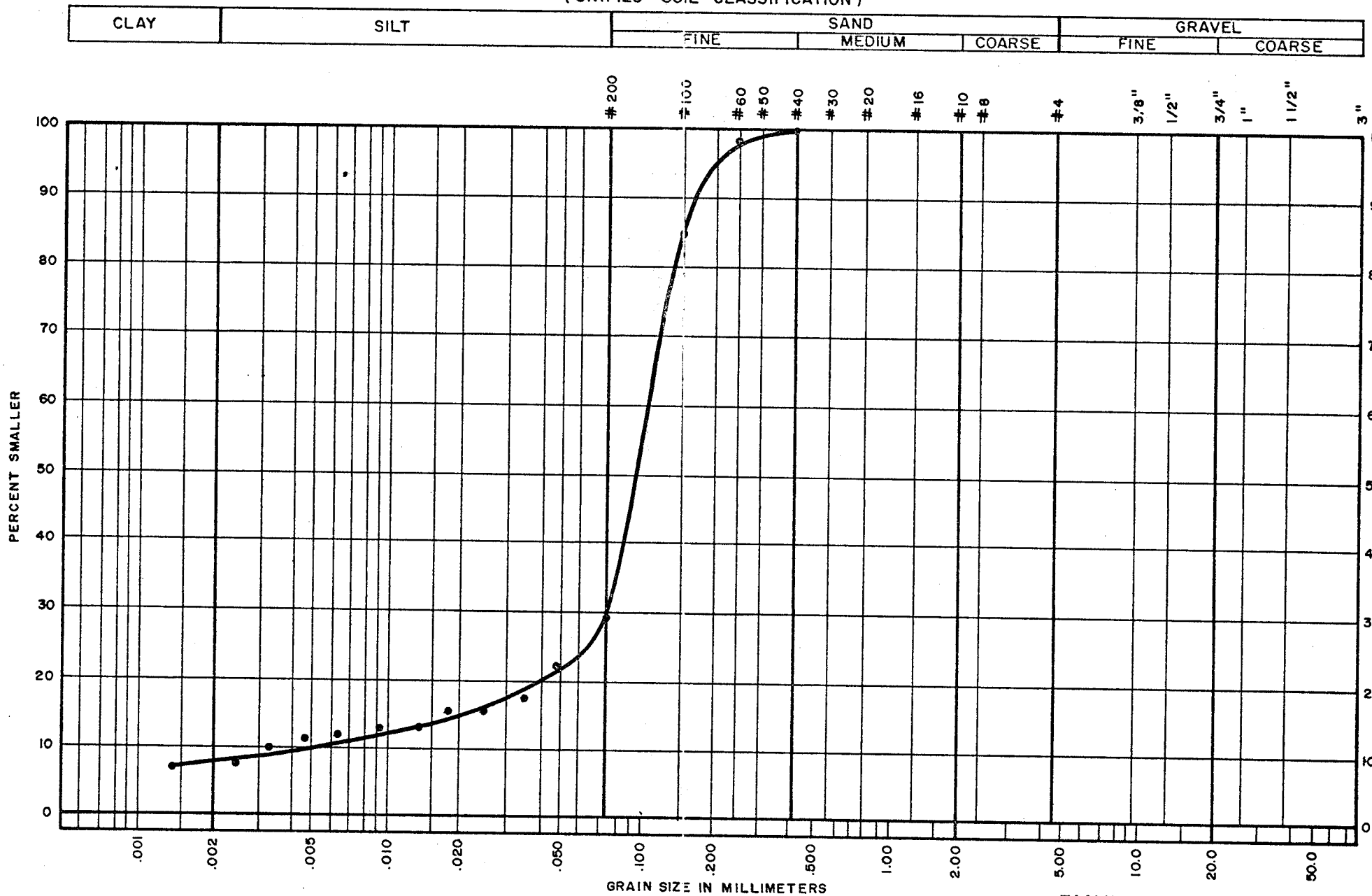
HOLE No. BHP 14 SAMPLE No.

DEPTH 22'

EBA Engineering Consultants Ltd.

FIGURE

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



SAMPLE DESCRIPTION FINE SAND, SOME SILT, TRACE CLAY

PROJECT TAGLU

JOB No. E965.1 DATE 14 May, 1975

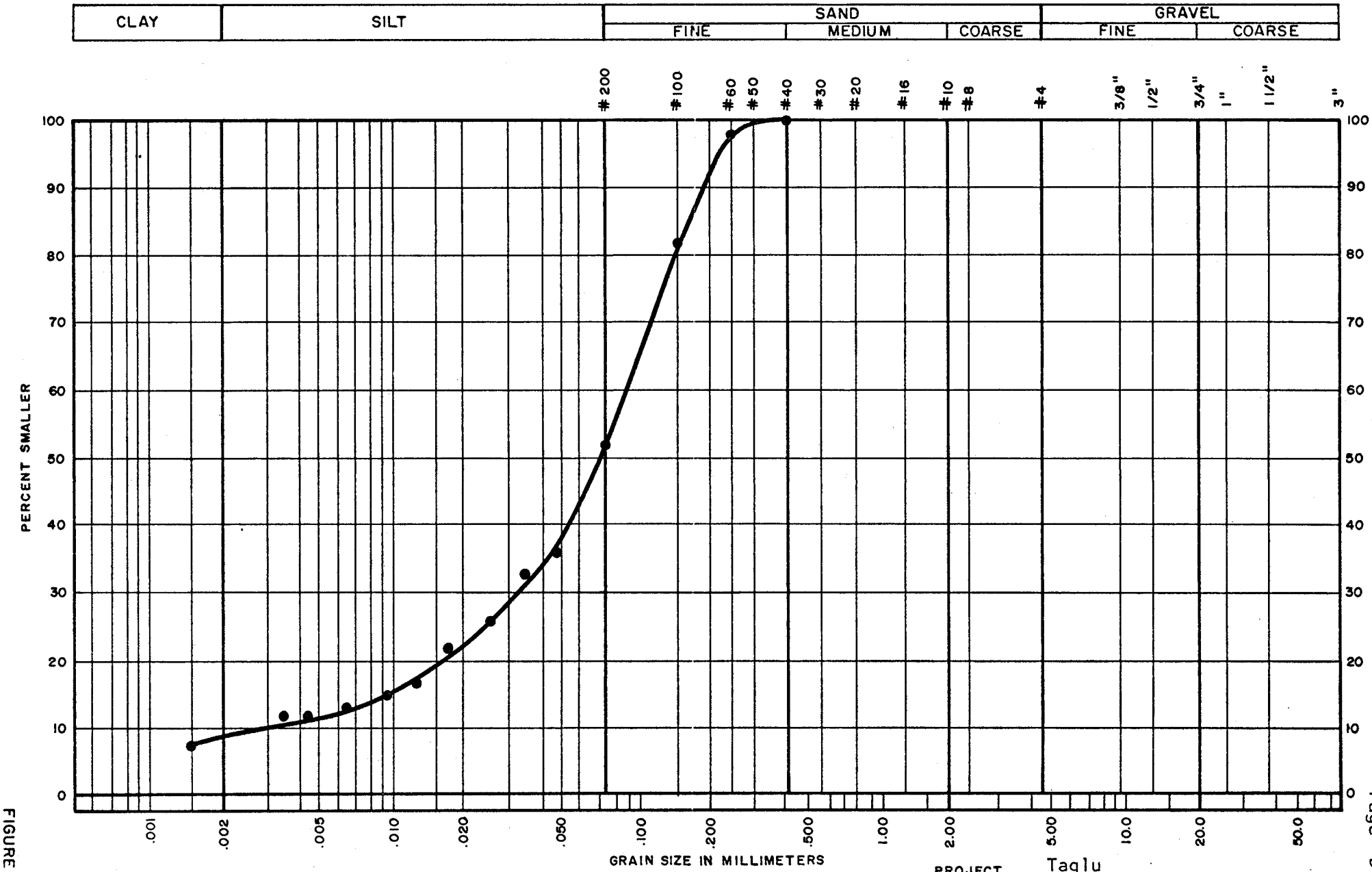
HOLE No. BHP 14 SAMPLE No.

DEPTH 37'

EBA Engineering Consultants Ltd.

FIGURE

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



SAMPLE DESCRIPTION Sand, Fine Silty

PROJECT Taglu

JOB No. E965.1 DATE 27/5/75

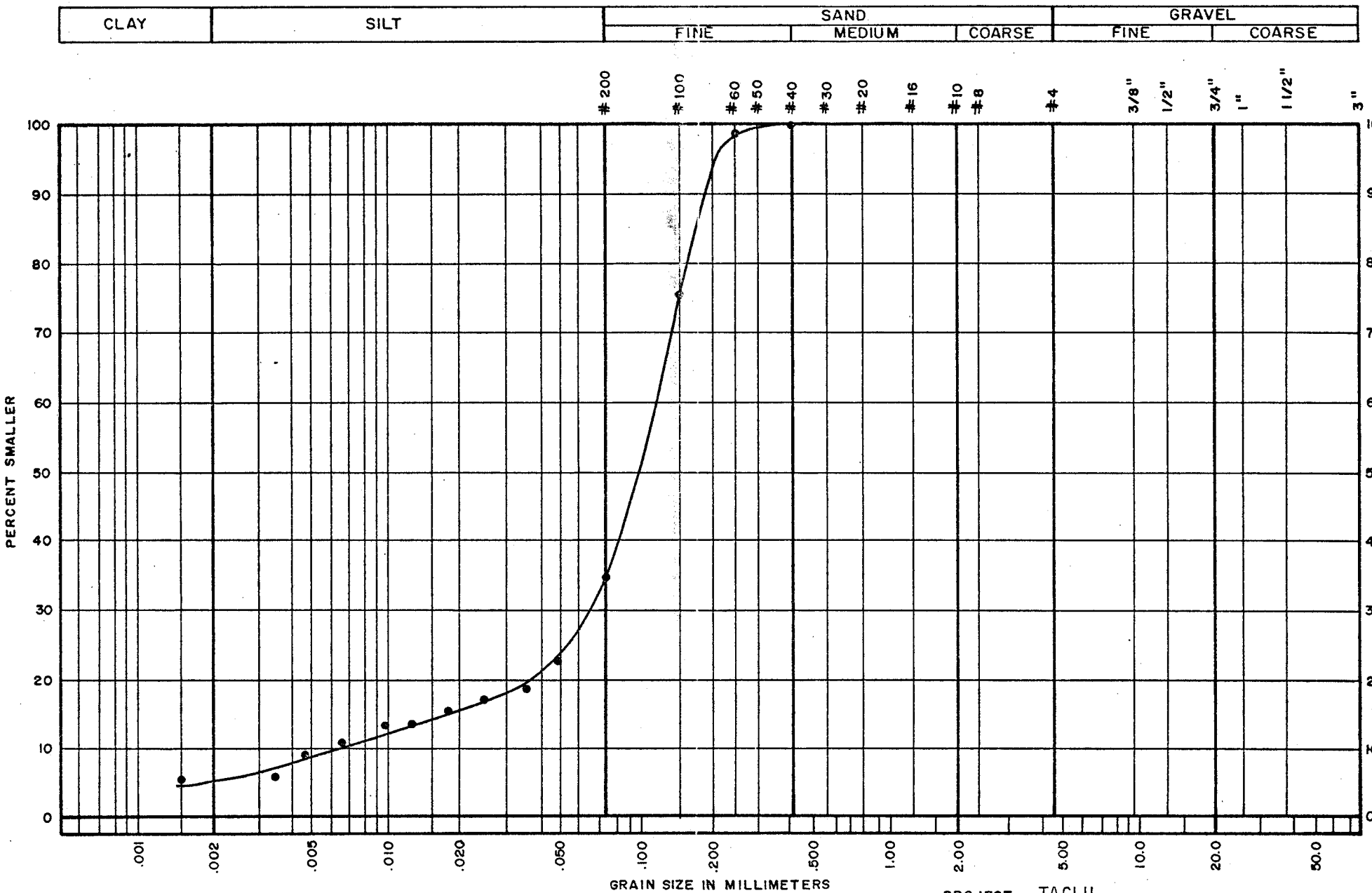
HOLE No. BHP 15 SAMPLE No.

DEPTH 28 Feet

EBA Engineering Consultants Ltd.

FIGURE

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



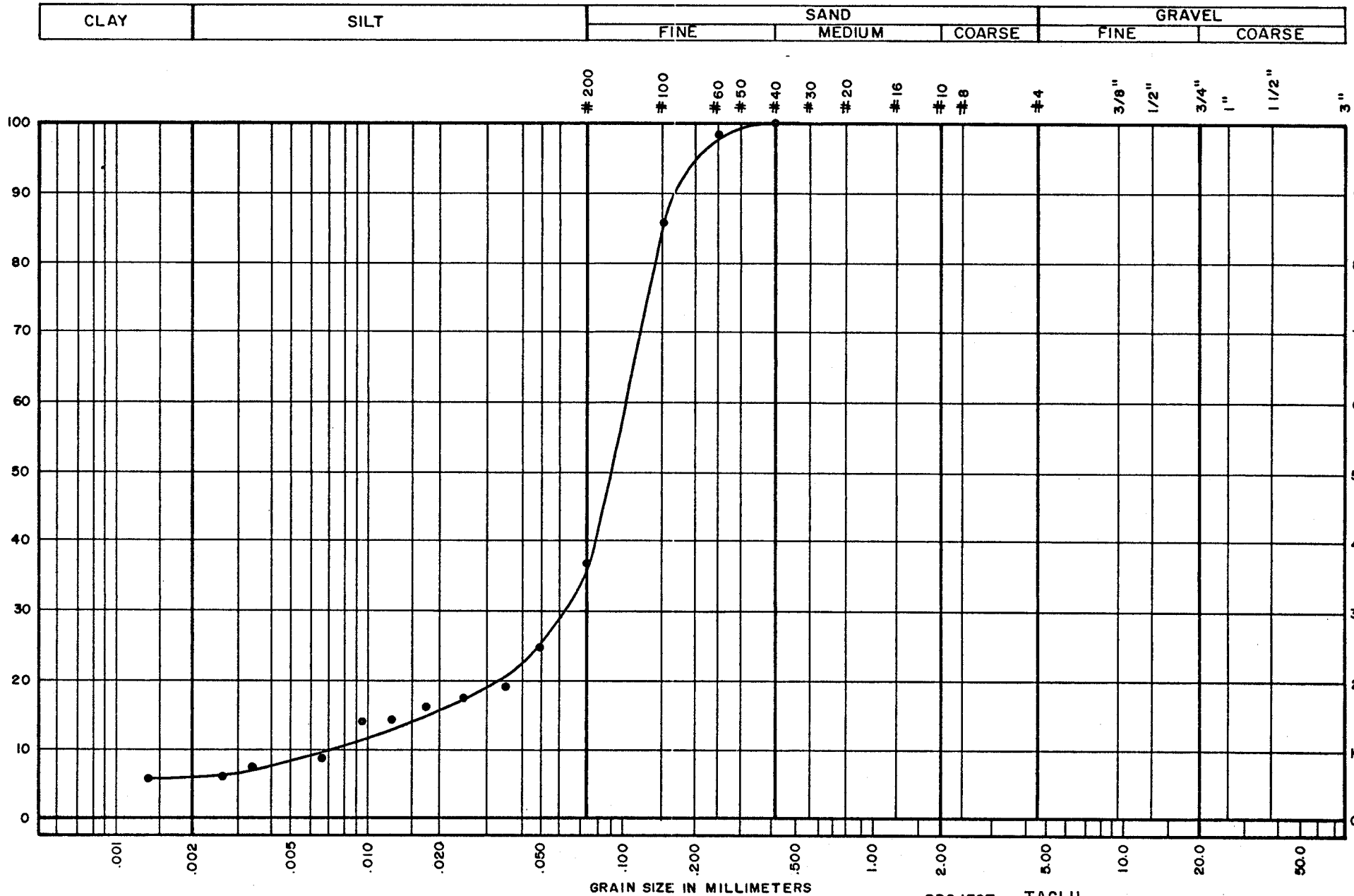
SAMPLE DESCRIPTION SAND
- fine
- silty

PROJECT TAGLU
JOB No. E965.1 DATE 23/5/75
HOLE No. BHP 15 SAMPLE No.
DEPTH 52'

EBA Engineering Consultants Ltd.

FIGURE

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



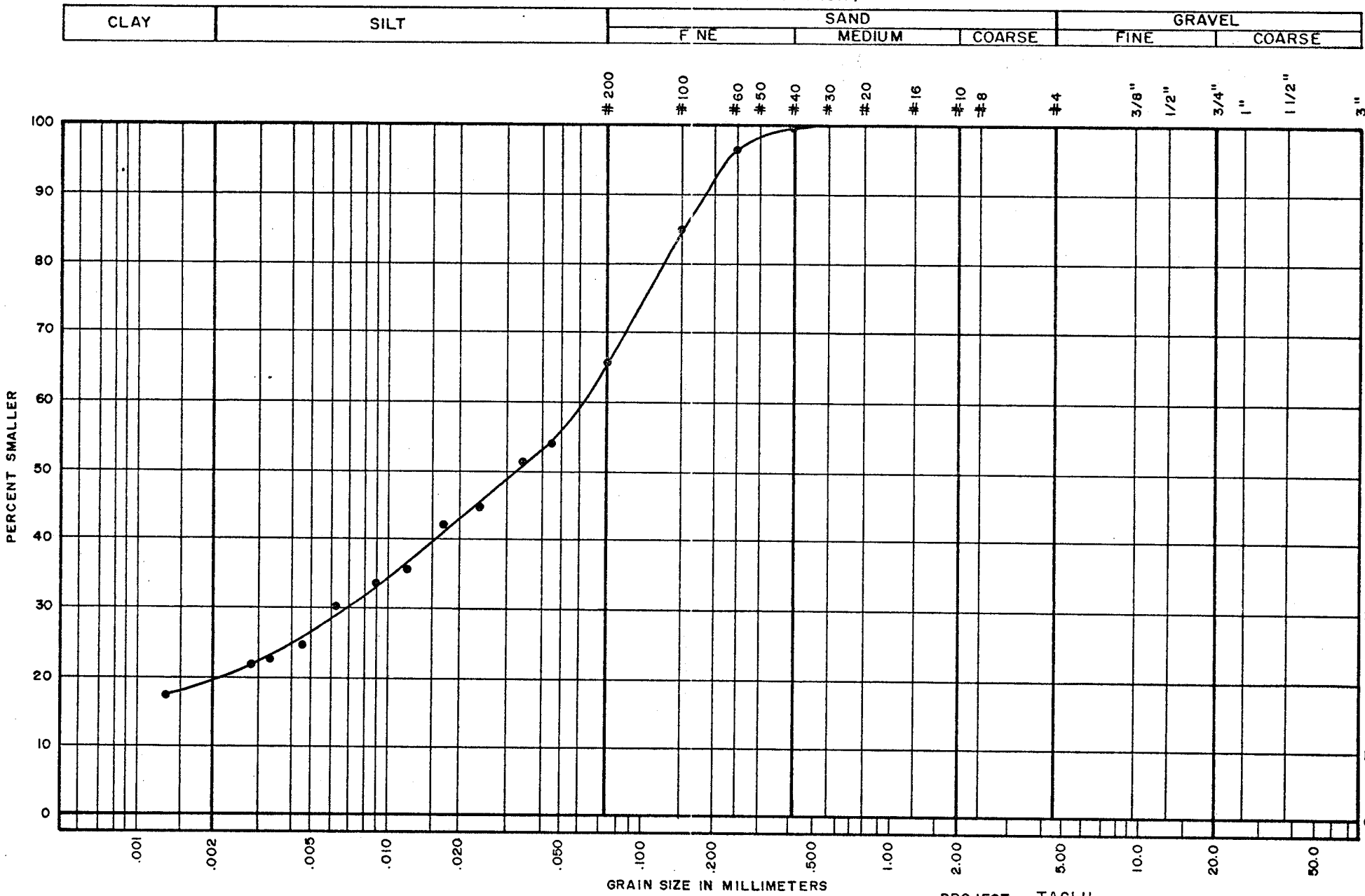
SAMPLE DESCRIPTION SAND
- fine
- silty

PROJECT TAGLU
JOB No. E965.1 DATE 23/5/75
HOLE No. BHP-16 SAMPLE No.
DEPTH 30'

EBA Engineering Consultants Ltd.

FIGURE

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



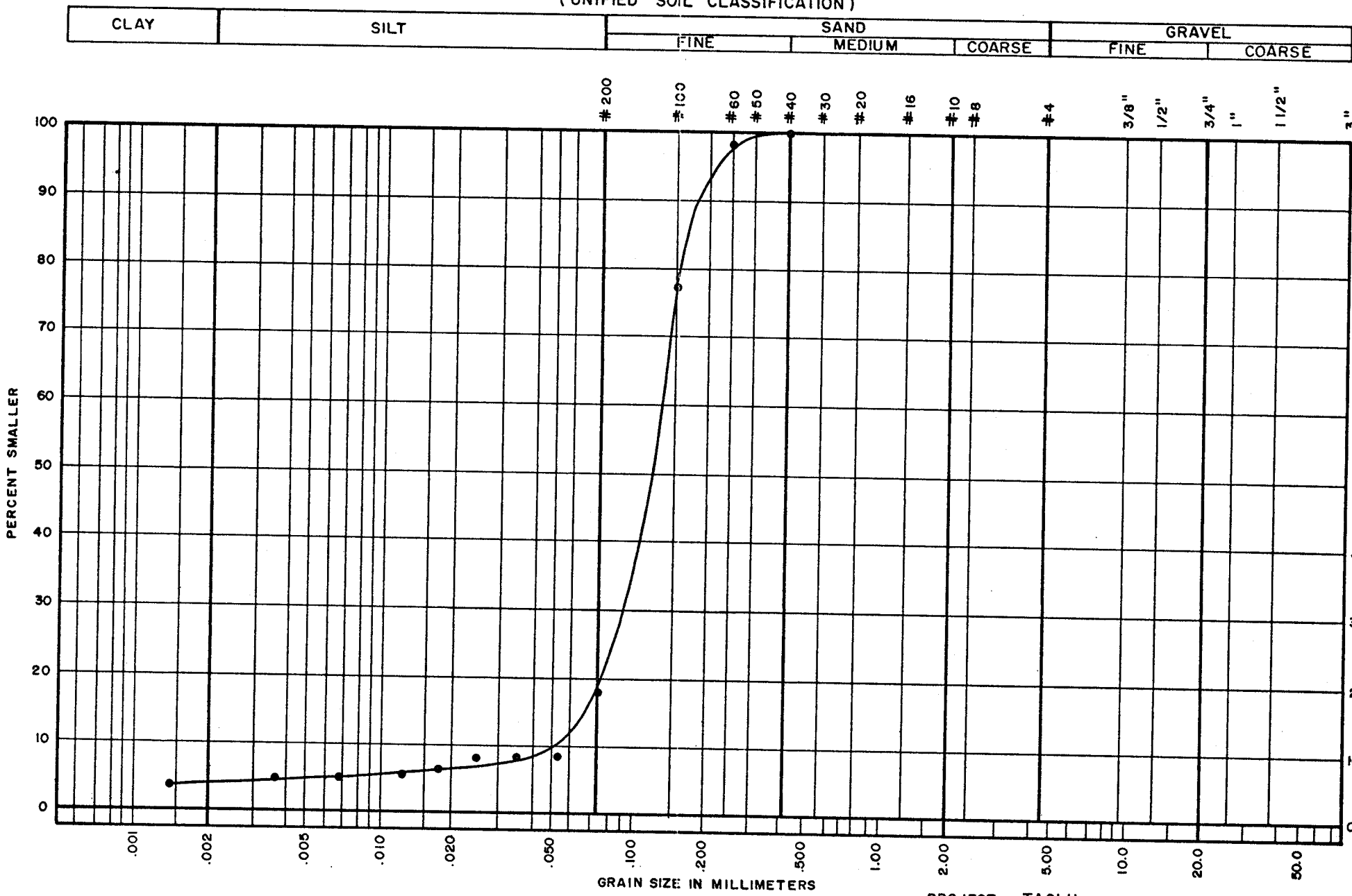
SAMPLE DESCRIPTION SILT
- sandy

PROJECT TAGLU
JOB No. E965.1 DATE 25/5/75
HOLE No. BHP 17 SAMPLE No.
DEPTH 22'

EBA Engineering Consultants Ltd.

FIGURE

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



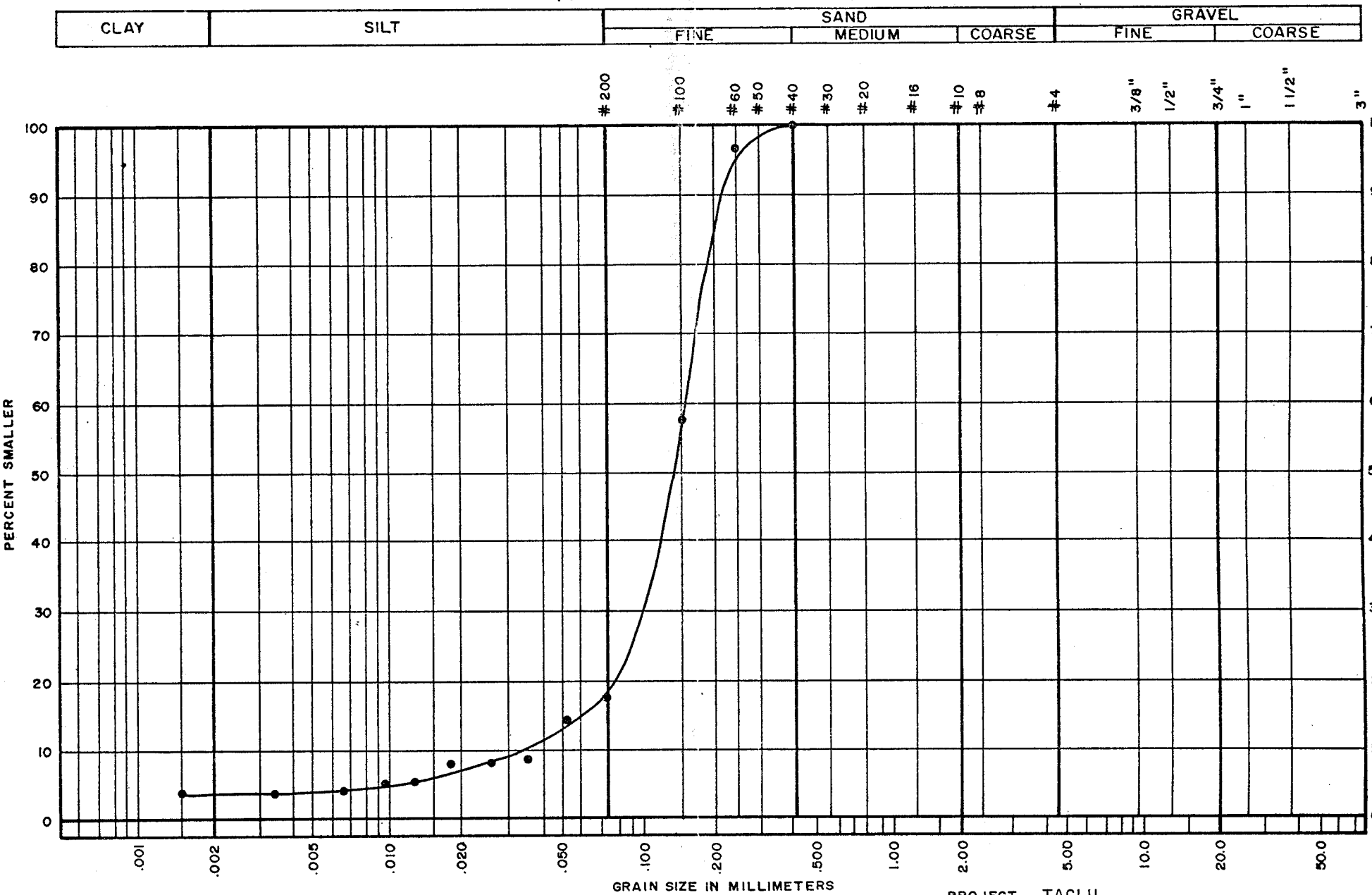
SAMPLE DESCRIPTION SAND
- fine
- some silt

PROJECT TAGLU
JOB No. E965.1 DATE 22/5/75
HOLE No. BHP 18 SAMPLE No.
DEPTH 17'

EBA Engineering Consultants Ltd.

FIGURE

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



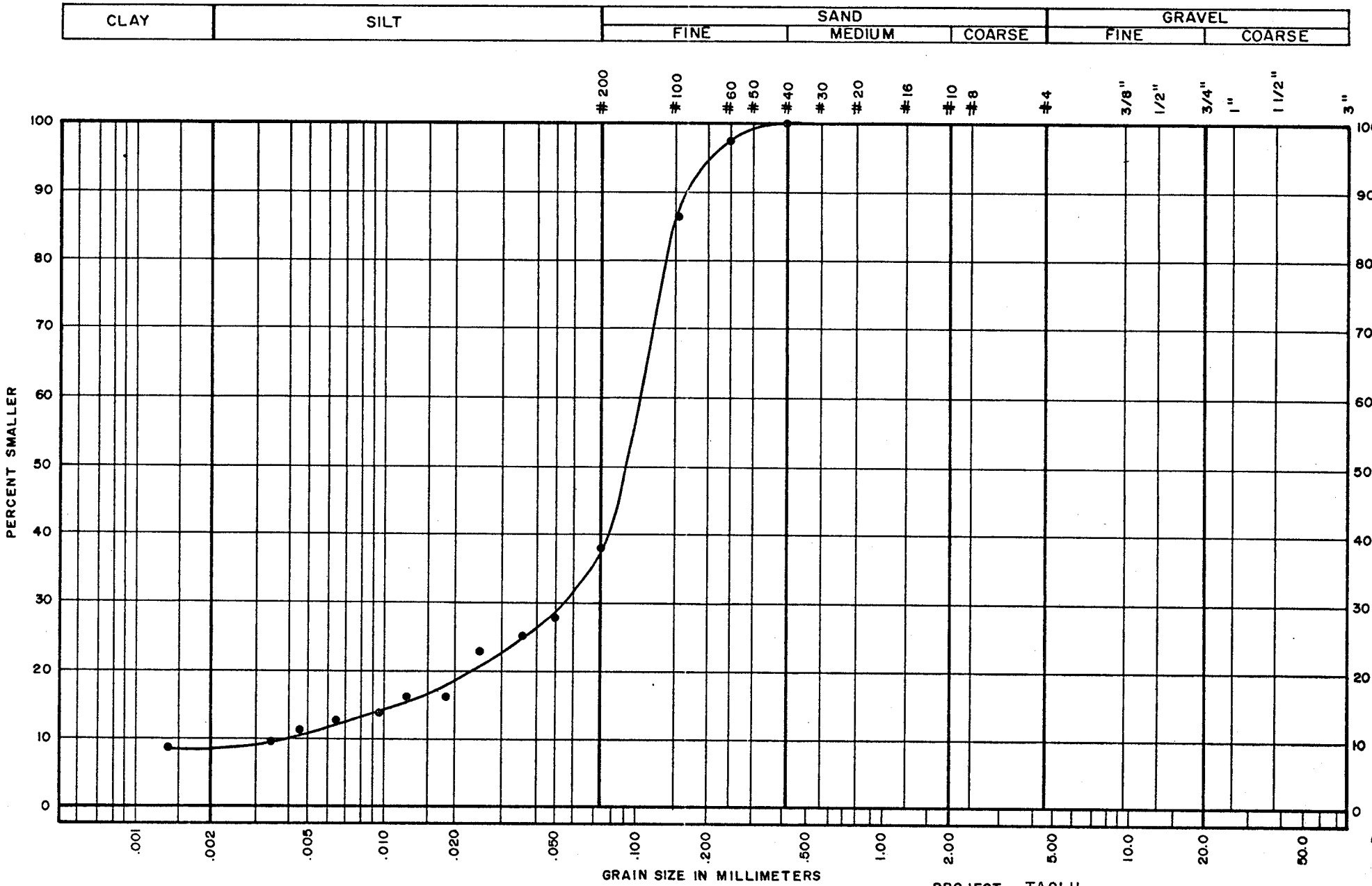
SAMPLE DESCRIPTION SAND
- fine
- some silt

PROJECT TAGLU
JOB No. E965.1 DATE 22/5/75
HOLE No. BHP 18 SAMPLE No.
DEPTH 62'

EBA Engineering Consultants Ltd.

FIGURE

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



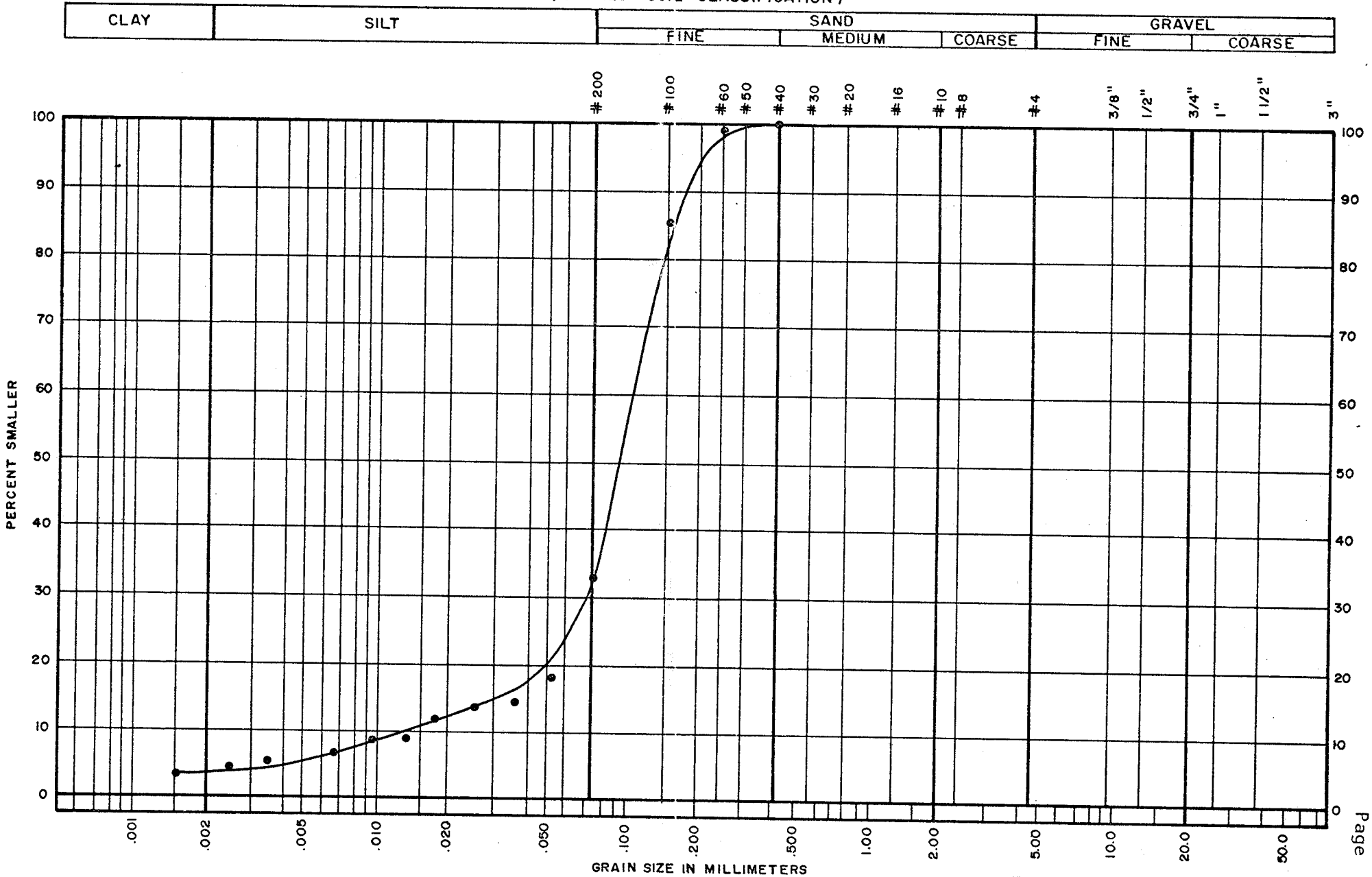
SAMPLE DESCRIPTION SAND
- very silty

PROJECT TAGLU
JOB No. E965.1 DATE 23/5/75
HOLE No. BHP 19 SAMPLE No.
DEPTH 22'

EBA Engineering Consultants Ltd.

FIGURE

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



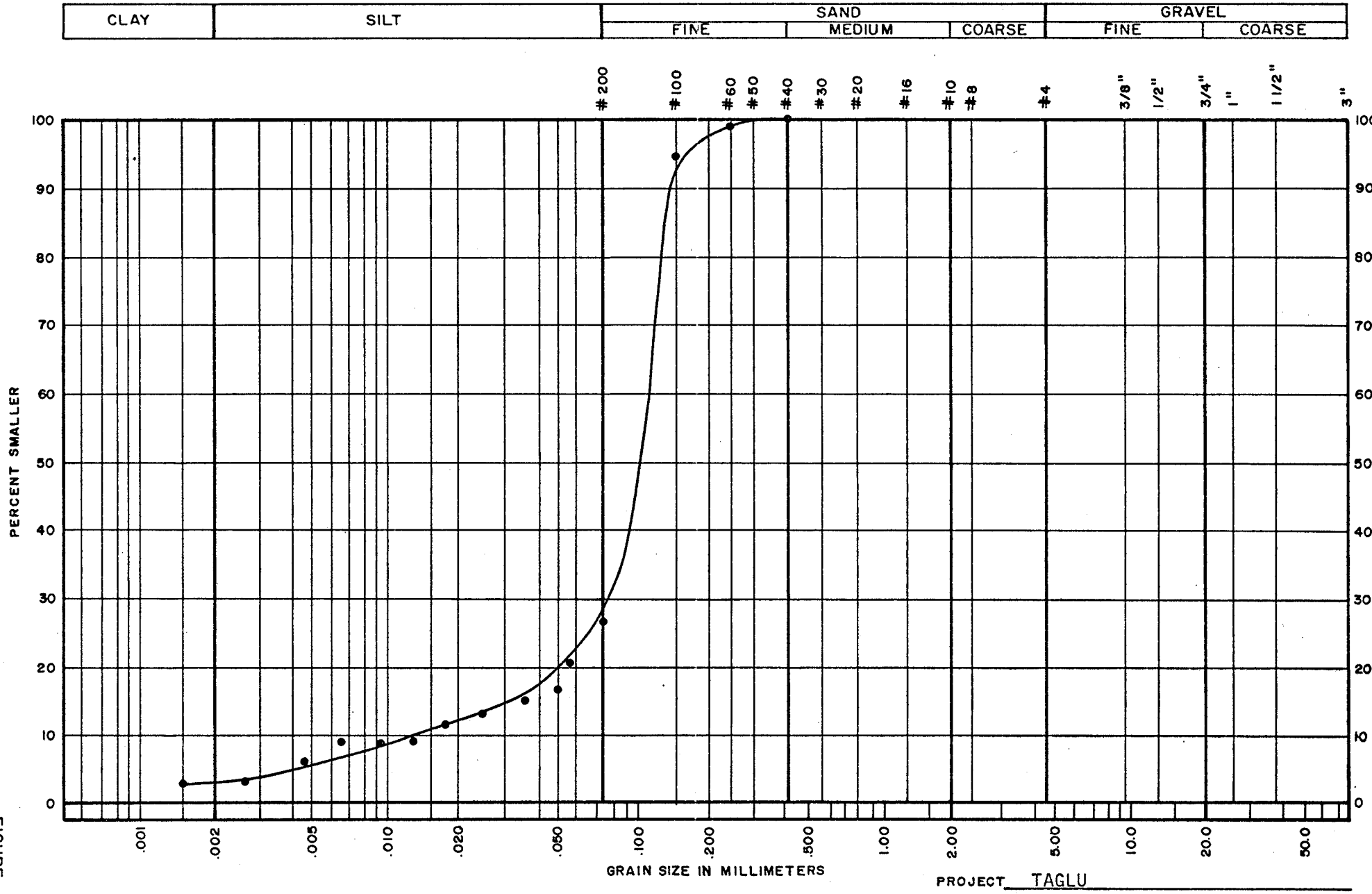
FIGURE

SAMPLE DESCRIPTION SAND
- fine
- silty

PROJECT TAGLU
JOB No. E965.1 DATE 23/5/75
HOLE No. BHP 19 SAMPLE No.
DEPTH 28'

EBA Engineering Consultants Ltd.

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



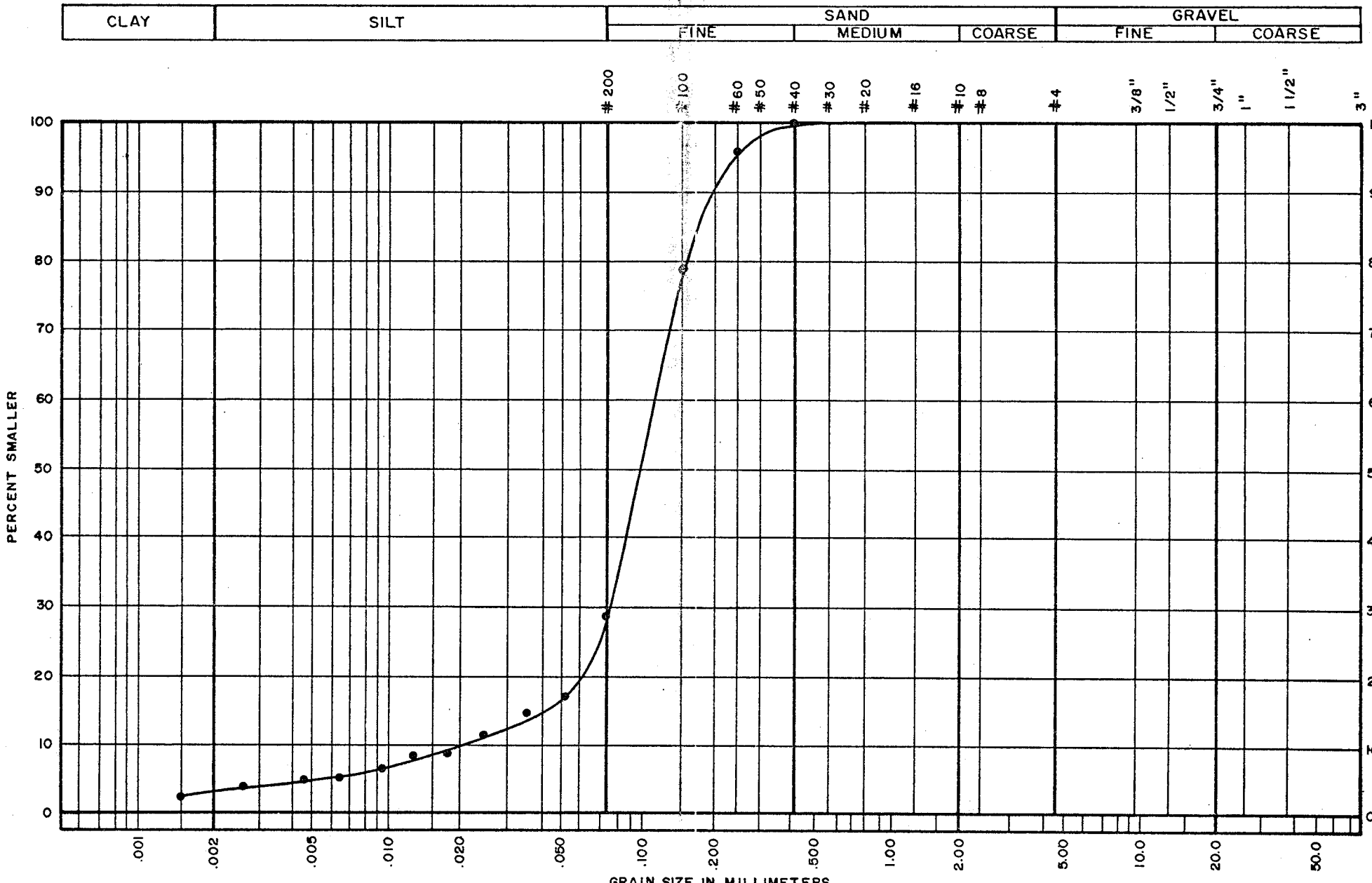
SAMPLE DESCRIPTION SAND
- fine
- silty

PROJECT TAGLU
JOB No. E965.1 DATE 23/5/75
HOLE No. BHP 19 SAMPLE No.
DEPTH 35'

EBA Engineering Consultants Ltd.

FIGURE

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



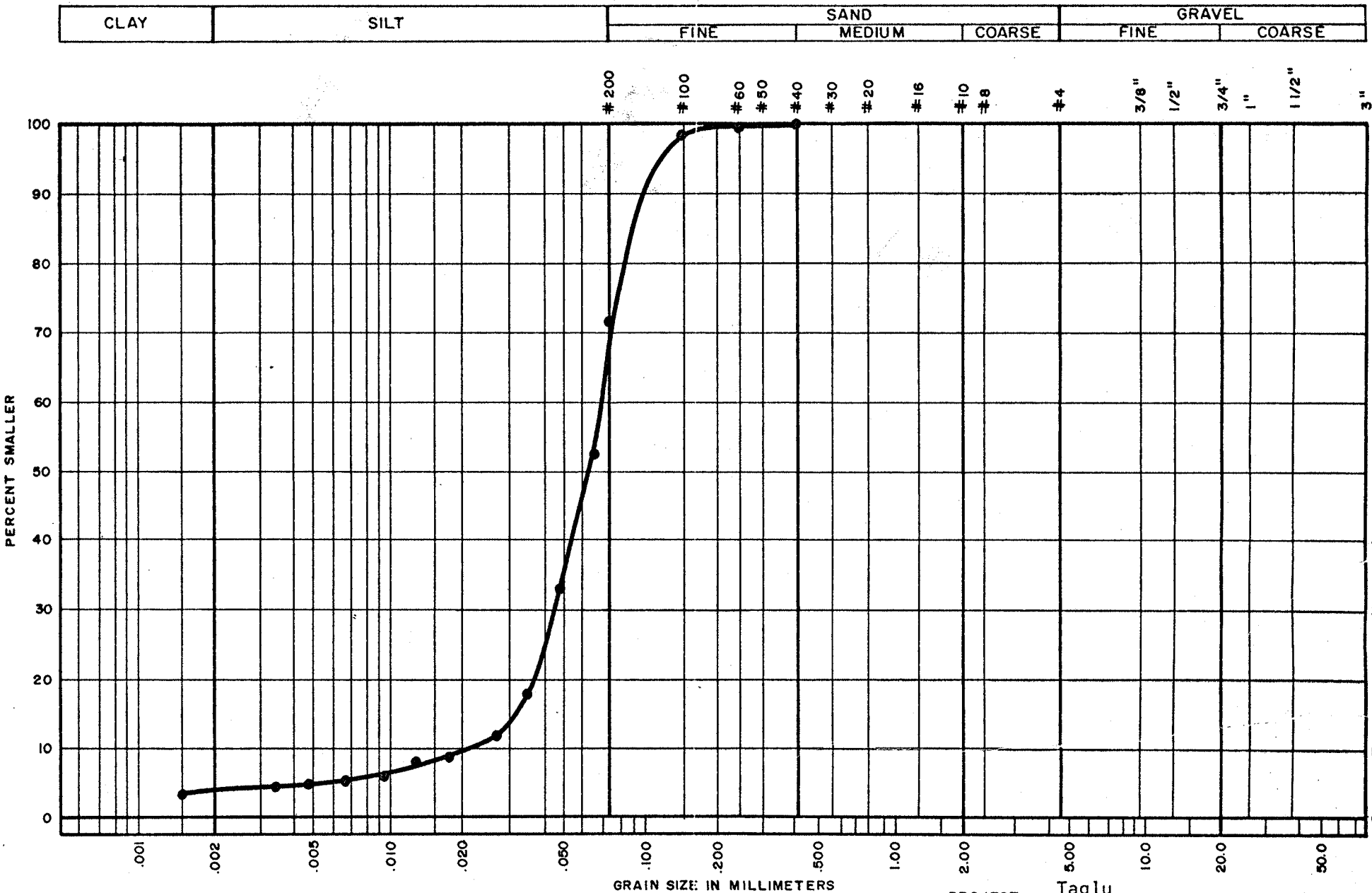
SAMPLE DESCRIPTION SAND
- fine
- silty

PROJECT TAGLU
JOB No. E965.1 DATE 23/5/75
HOLE No. BHP 19 SAMPLE No.
DEPTH 40'

EBA Engineering Consultants Ltd.

FIGURE

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



SAMPLE DESCRIPTION Silt & Sand

PROJECT Taglu

JOB No. E-965.1 DATE 27/5/75

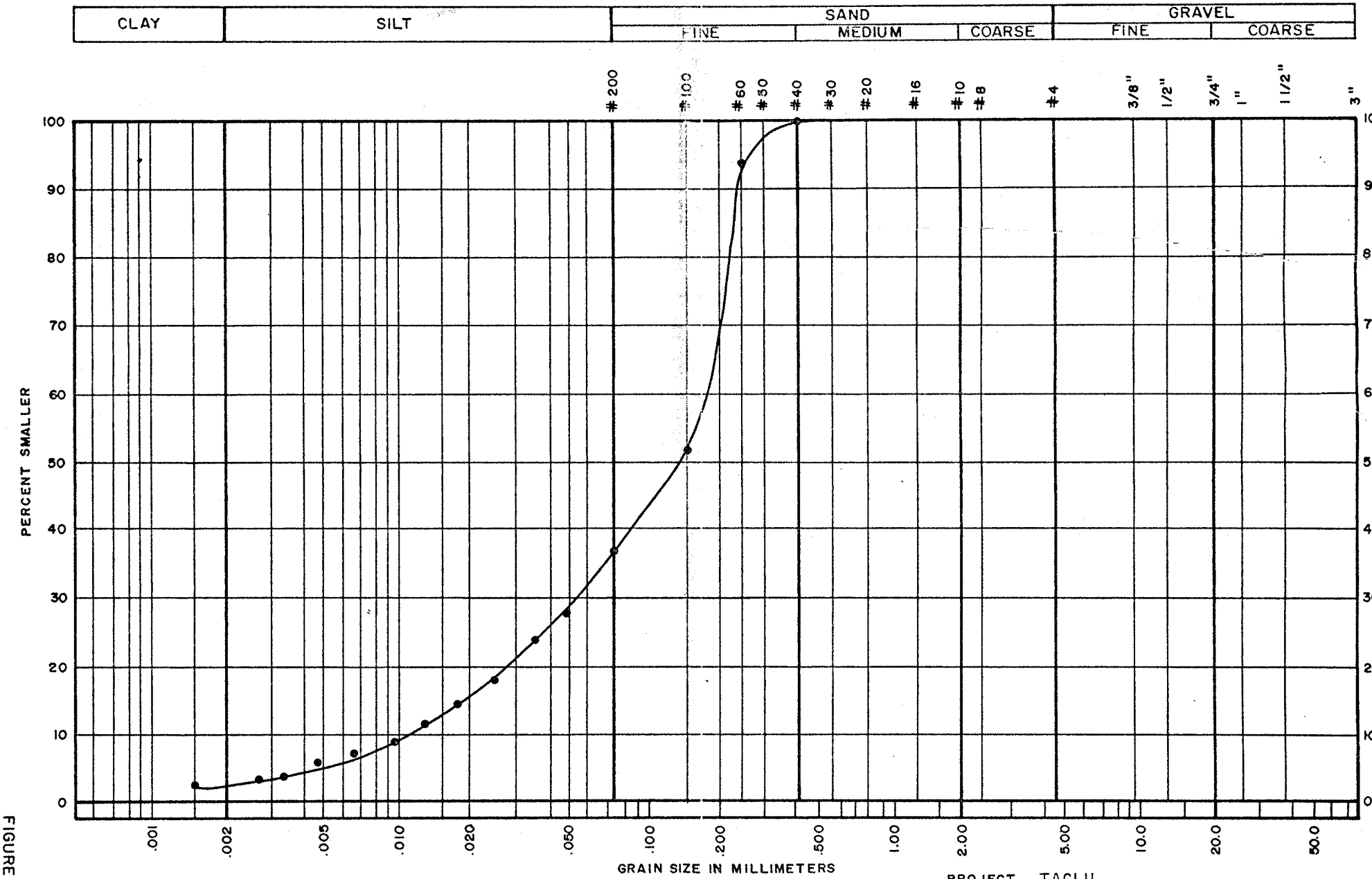
HOLE No. BHP 20 SAMPLE No.

DEPTH 38 Feet

EBA Engineering Consultants Ltd.

FIGURE

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



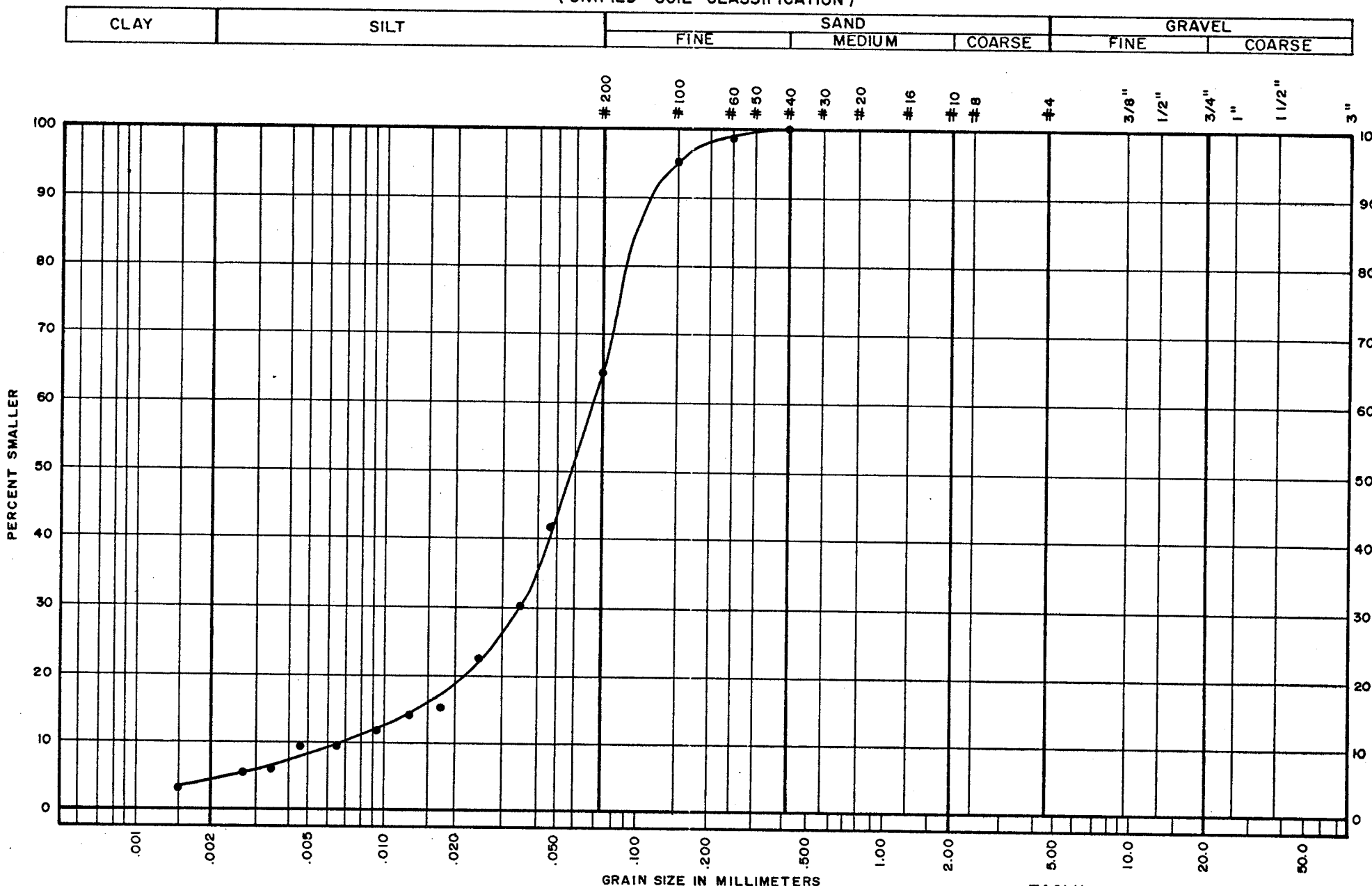
SAMPLE DESCRIPTION SAND
- fine
- silty

PROJECT TAGLU
JOB No. E965.1 DATE 23/5/75
HOLE No. BHP 20 SAMPLE No.
DEPTH 50'

EBA Engineering Consultants Ltd.

FIGURE

GRAIN SIZE DISTRIBUTION
(UNIFIED SOIL CLASSIFICATION)



SAMPLE DESCRIPTION SILT
- sandy

PROJECT TAGLU
JOB No. E965.1 DATE 23/5/75
HOLE No. BHP 21 SAMPLE No.
DEPTH 44'

EBA Engineering Consultants Ltd.

FIGURE