

EXCERPTS FROM

A Draft Report To
 CYPRUS ANVIL MINING CORPORATION
 Concerning
 STAGE 2 GEOTECHNICAL INVESTIGATION
 For The
 PROPOSED VANGORDA RAW ORE TRANSPORT SYSTEM
 (Overland Conveyor Alternative)
 Faro Yukon territory

802-2048

November,

By

Golder Associates
 Consulting Geotechnical Engineers

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alternative ore transport systems, and that further detailed investigation will be necessary after the ore transport system location and layout details have been decided.

5.2 Soil and Groundwater Conditions

Soil and groundwater conditions which are interpreted from the terrain evaluation, air photo interpretation, borehole and test pit information, and laboratory test results are described under the following sections.

5.2.1 Km 0 to Km 2

The proposed conveyor route begins about 0.2 km northeast of Doal Lake at km 0 (refer to Figure 3). The route from km 0 to km 0.4 follows a small creek near km 0.6. Extensive bedrock outcrops and shallow glacial deposits occur along the route from km 0.6 to the escarpment near km 1.5. The route descends the escarpment at km 1.5 along the south side of Rose Creek valley and crosses the valley bottom to Rose Creek at km 2.4. Moss and/or peat, up to about 0.6 m in thickness, and also high groundwater conditions were observed along the lower slope of the escarpment and the valley bottom from about km 1.6 to km 2.2

Test pits 80-29 and 80-30 were excavated on each side of the proposed route near km 0.2 and the peat thickness in the creek was tested by a manual peat sampler.

Peat up to 1.2 m in thickness was measured by a manual peat sampler near km 0. Peat thicknesses along the creek near km 0.6 was typically less than 0.5 m in thickness. At most of the tested locations, the peat was underlain by sand, gravel and cobbles.

Test Pit 80-29 was located on a ridge and south of the route (refer to Figure 3). Silty sand till, 2.2 m in thickness and containing cobbles and boulders, was encountered below a 0.45 m combined thickness of moss,

volcanic ash and sand and gravel. Bedrock was not exposed in this 3.65 m deep test pit and no seepage or frozen soil was observed.

In TP 80-30, a 0.45 m thick stratum of grey silt and sand was encountered below a 0.45 m combined thickness of moss, black organic silt and volcanic ash. The grey silt and sand was underlain by 1.2 m thick silty sand till. Bedrock was not encountered nor was seepage observed in this test pit. However, the soil was frozen below the moss (refer to Figure I-6). The highest ice content was observed to be in the grey silt and sand stratum and the ice content decreased with depth in the glacial till.

Test Pit 80-27 was located about 250 m south of the route and TP 80-28 was located close the route near km 1.1. In TP 80-27, a 0.6 m thick layer of brown sand, gravel and cobbles was encountered below a 0.6 m thickness of moss and volcanic ash (refer to Figure I-7). The sand and gravel stratum graded downward into a 2.4 m thick stratum of silty sand till containing cobbles and boulders. Bedrock was not encountered to the 2.65 m depth of this test pit and no seepage or frozen soil was observed.

Grain size distribution test results for a sample from the 0.3 m thick layer of volcanic ash illustrate the predominantly silt and fine sand texture and the low (3 percent) clay content for this stratum (refer to Figure 5). The volcanic ash is typically in a loose condition. A high 53 percent moisture content test result was obtained for this sample. The predominantly silty texture, the loose condition and high moisture content indicate that the volcanic ash is highly compressible and also susceptible to frost action.

Grain size distribution test results for the fraction passing the No. 38 mm sieve for a till sample from TP 80-27 illustrate the broadly-graded character of the sample (refer to Figure 6). Plasticity test results on the fraction passing the No. 40 sieve for the till sample indicate that this material was non-plastic.

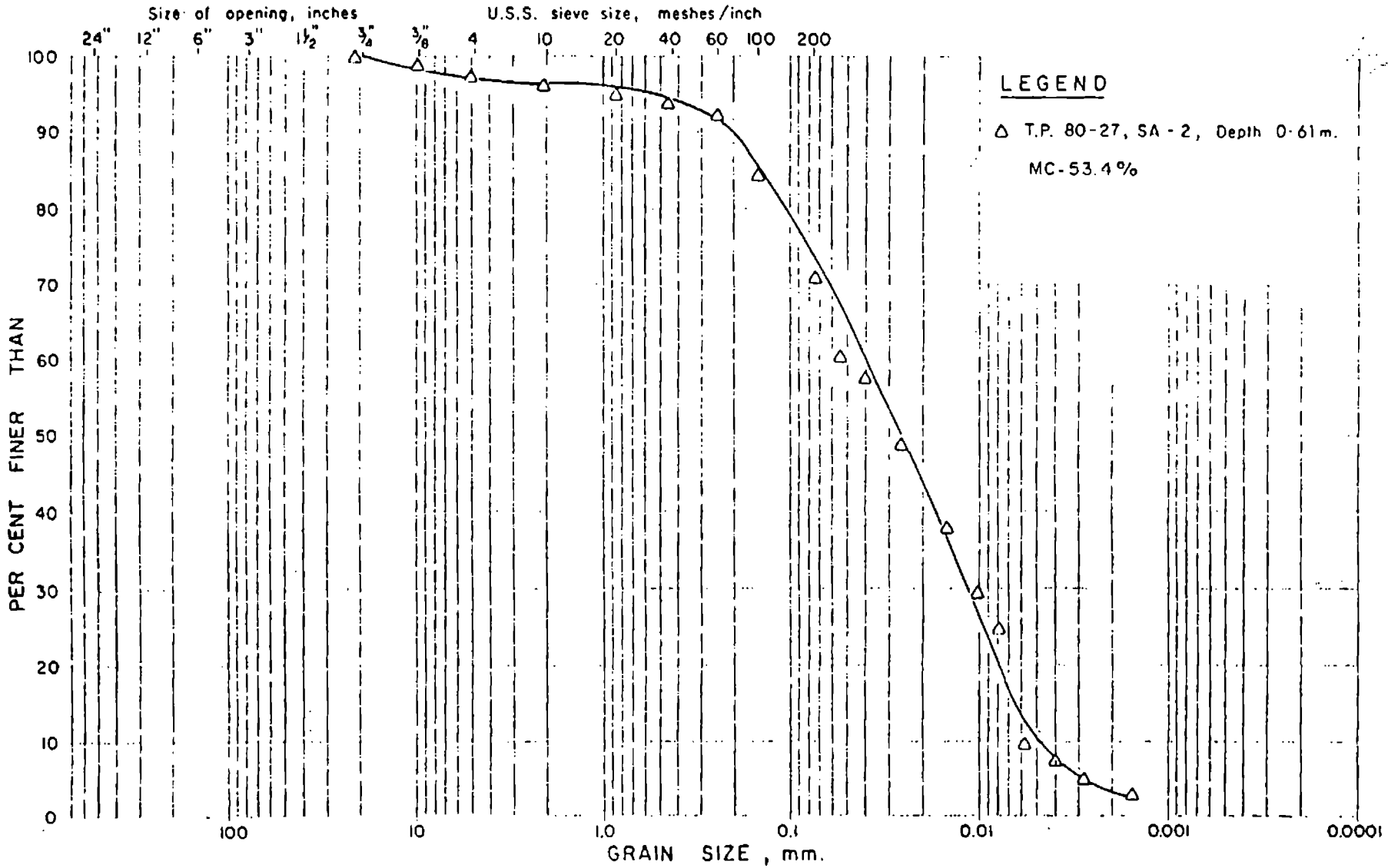
Standard Proctor compaction test results (ASTM D.698 Method A) on the glacial till sample indicate a maximum dry density of 2023 kg/cu.m at an 11 percent optimum moisture content (refer to Figure 6). It is noted that ASTM Test D 698 Method A was performed on the sample fraction passing the No. 4 sieve, and that the glacial till also contains material which is coarser than the No. 4 sieve. A higher standard Proctor density and a lower optimum moisture content would therefore be expected if the compaction test results are adjusted for this coarser material.

Moisture content test results for two till samples from TP 80-27 indicate that the natural moisture contents are close to the estimated optimum moisture content. However, very wet soil conditions were encountered about 30 m west of TP 80-27 (refer to Figure I-7). Grain size distribution test results for a glacial till sample from this wet area are typical of the glacial till encountered elsewhere on the project but the 20.8 percent water content test result is about 10 percent above the estimated 11 percent optimum moisture content (refer to Figures 6 and 7).

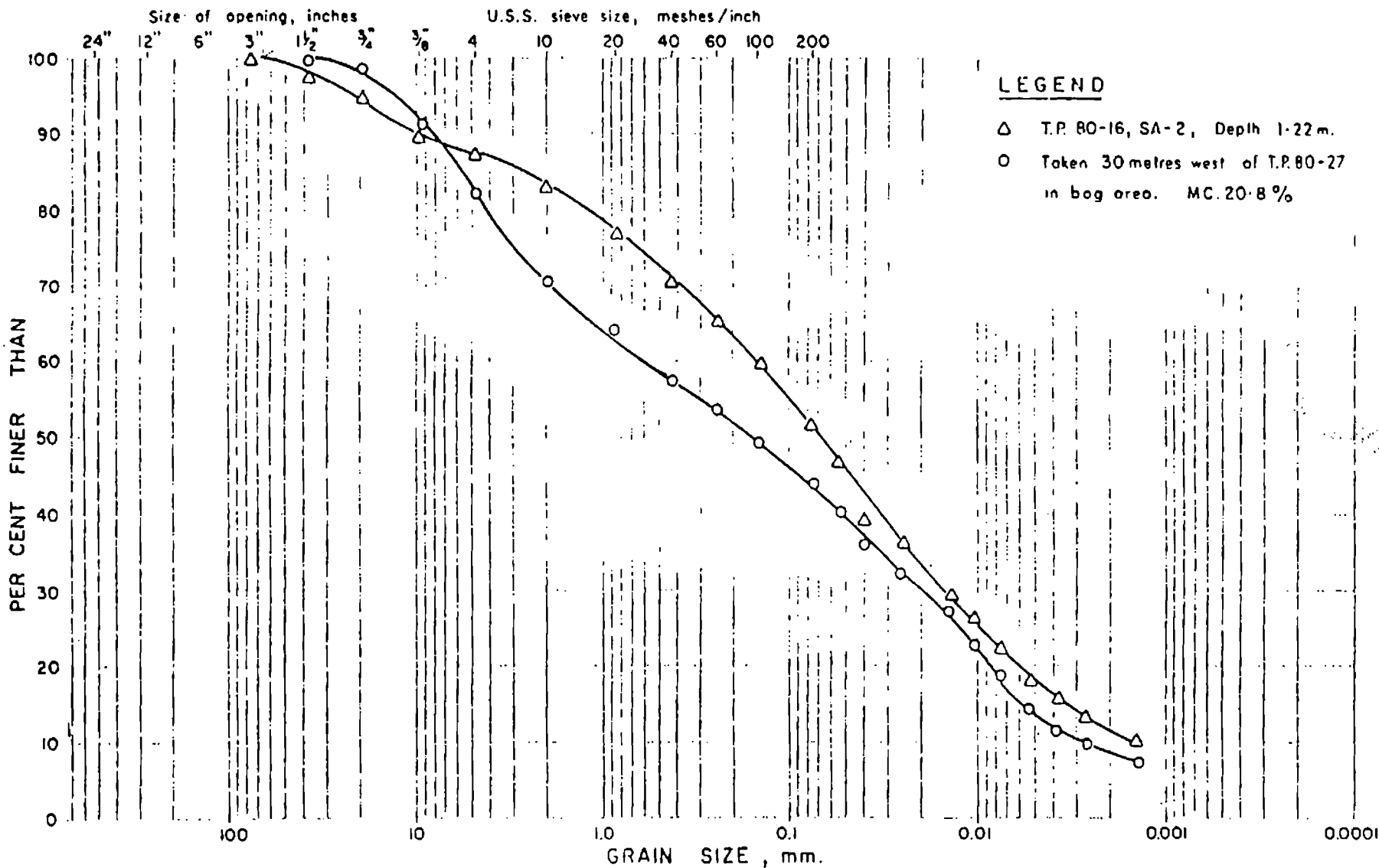
In TP 80-28, a 0.45 m combined thickness of moss, volcanic ash and sand, gravel and cobbles was encountered over a 0.6 m thick stratum of silty sand till. The till was in turn underlain by a 1.8 m thick stratum of sand and gravel containing cobbles and boulders. Grey schist bedrock was exposed at 2.9 m depth. No seepage or frozen soil was observed in this test pit.

The field and laboratory information indicates that widely variable conveyor foundation conditions can be expected from km 0 to km 2, including shallow peat deposits, glacial till, bedrock, scattered permafrost and locally high groundwater table. This information also indicates that glacial till borrow can be obtained for road construction in the TP 80-28 and 80-29 vicinity.

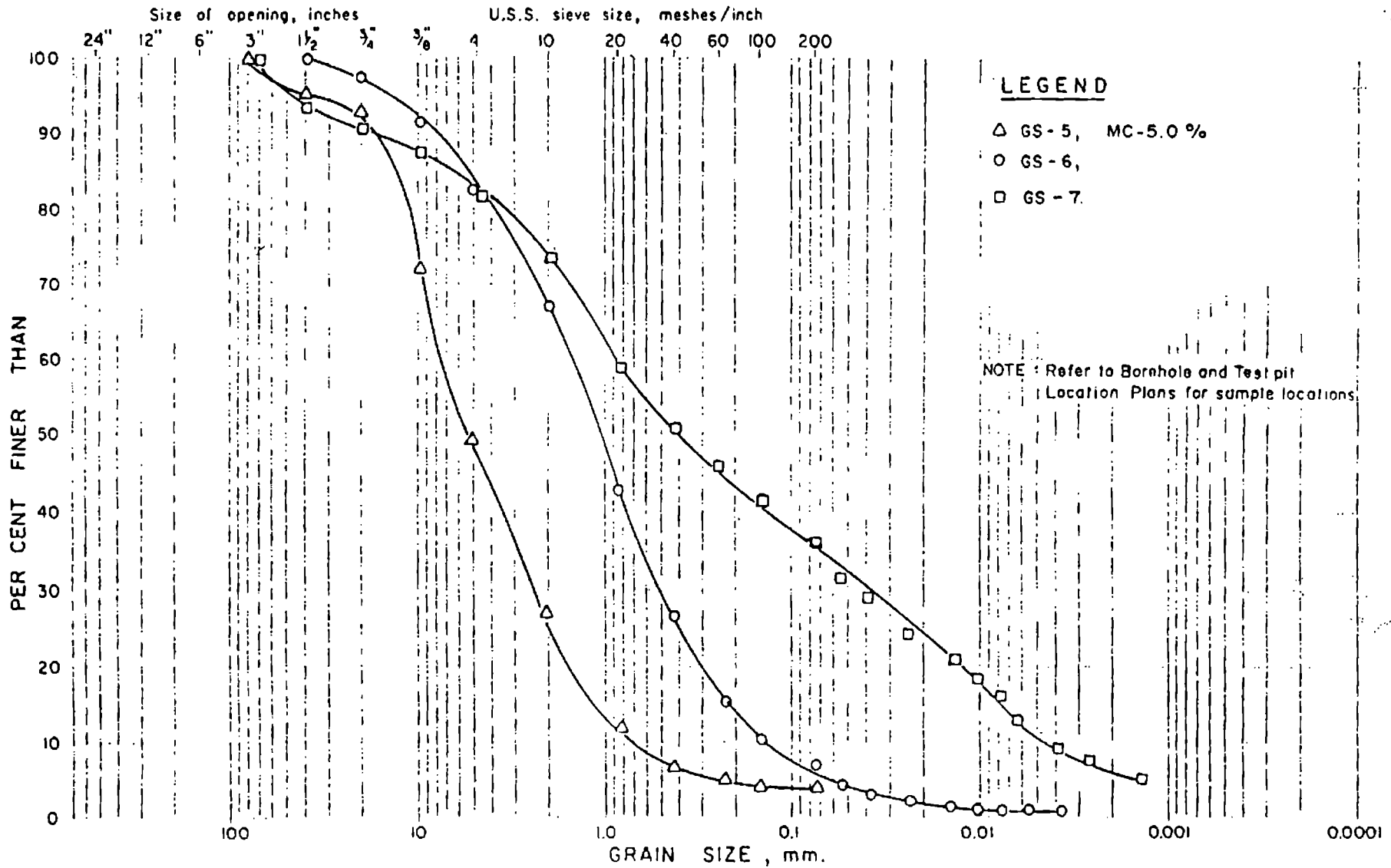
M.I.T. GRAIN SIZE SCALE



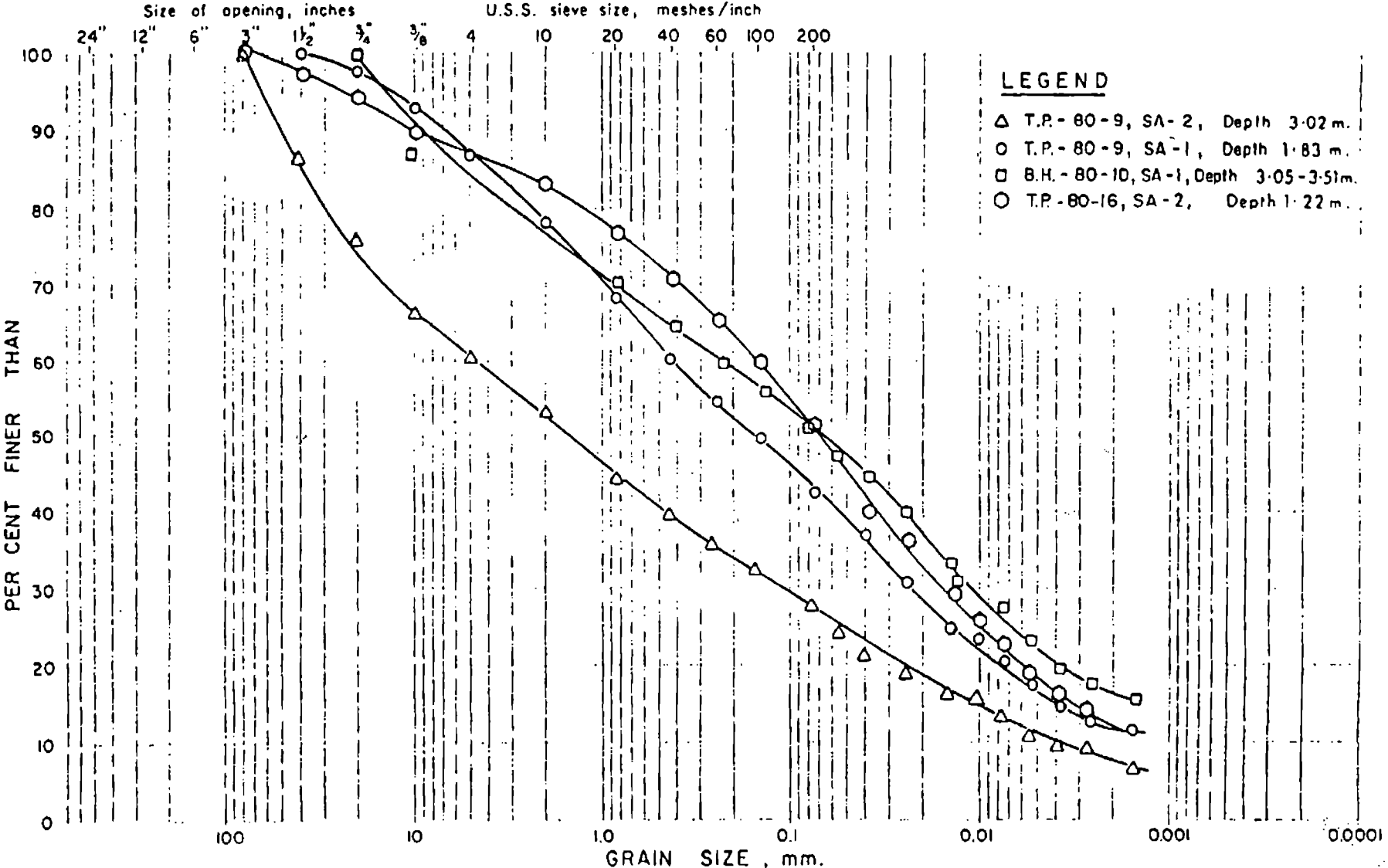
M.I.T. GRAIN SIZE SCALE



M.I.T. GRAIN SIZE SCALE



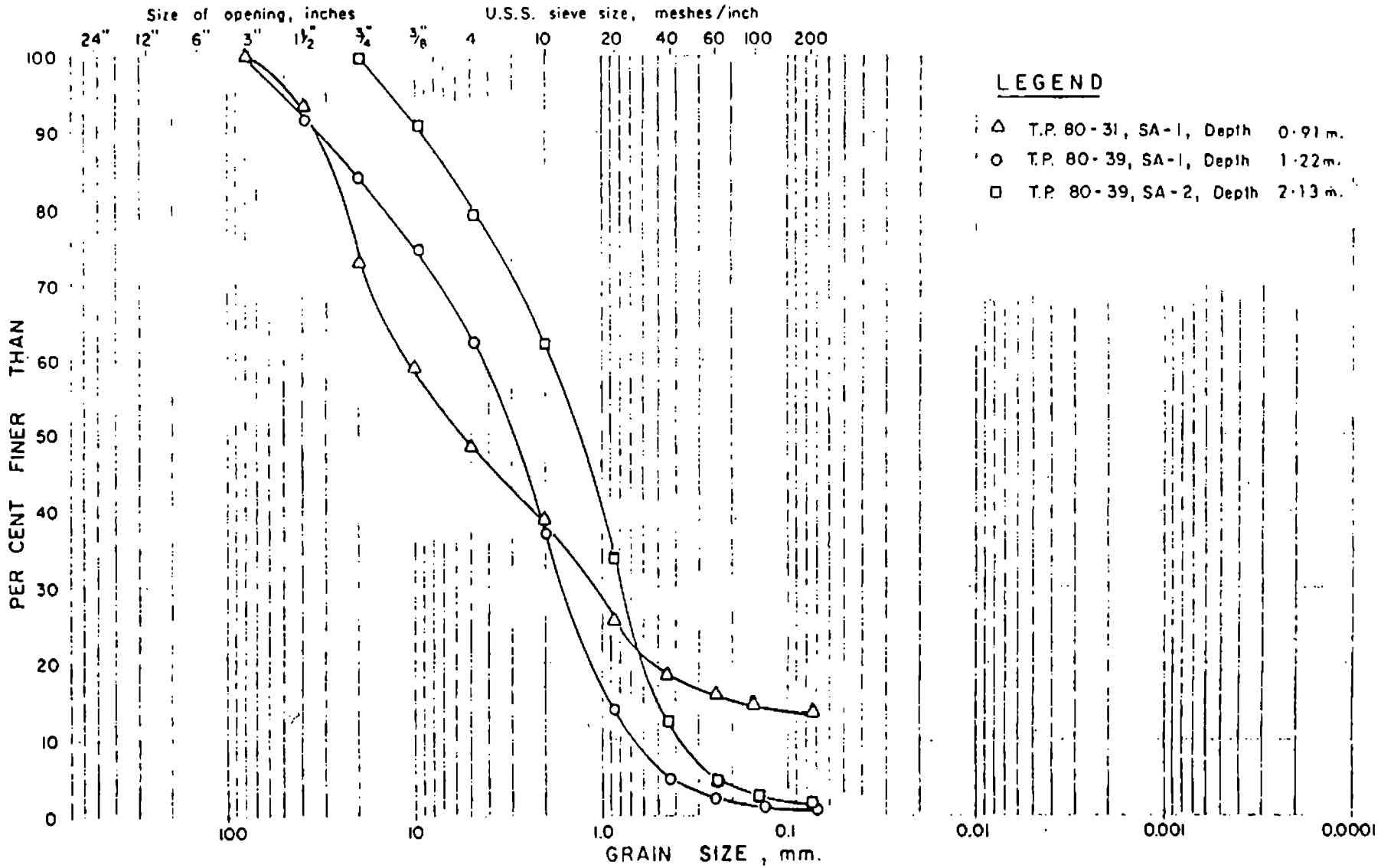
M.I.T. GRAIN SIZE SCALE



GRAIN SIZE DISTRIBUTION
SILTY SAND TILL

Figure 10

BOULDER SIZE	COBBLE SIZE	coarse	medium	fine	coarse	medium	fine	fine grained	
		GRAVEL SIZE			SAND SIZE			SILT SIZE	

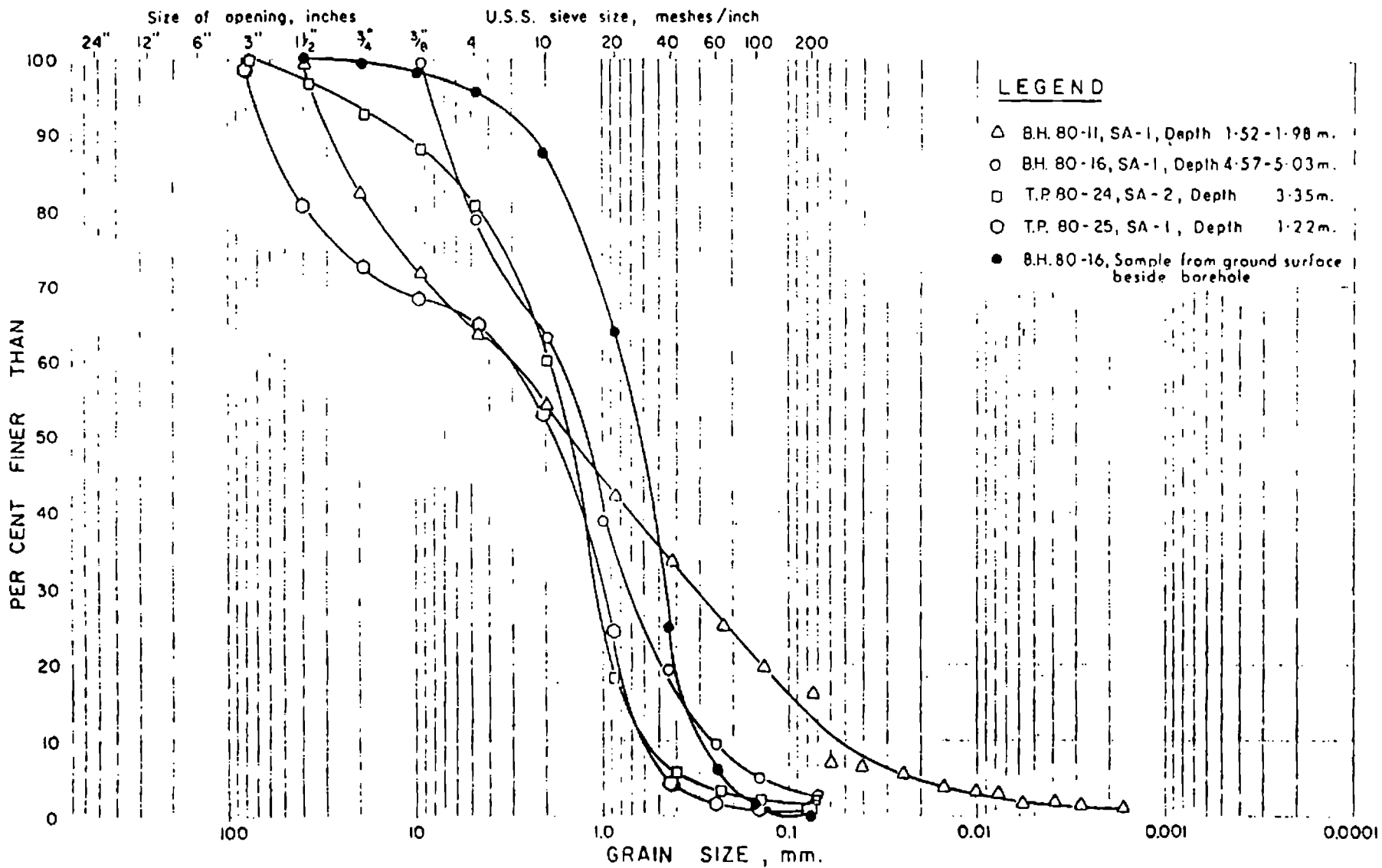


Caldar Accretion

GRAIN SIZE DISTRIBUTION
SAND AND GRAVEL

Figure 11

M.I.T. GRAIN SIZE SCALE



LEGEND

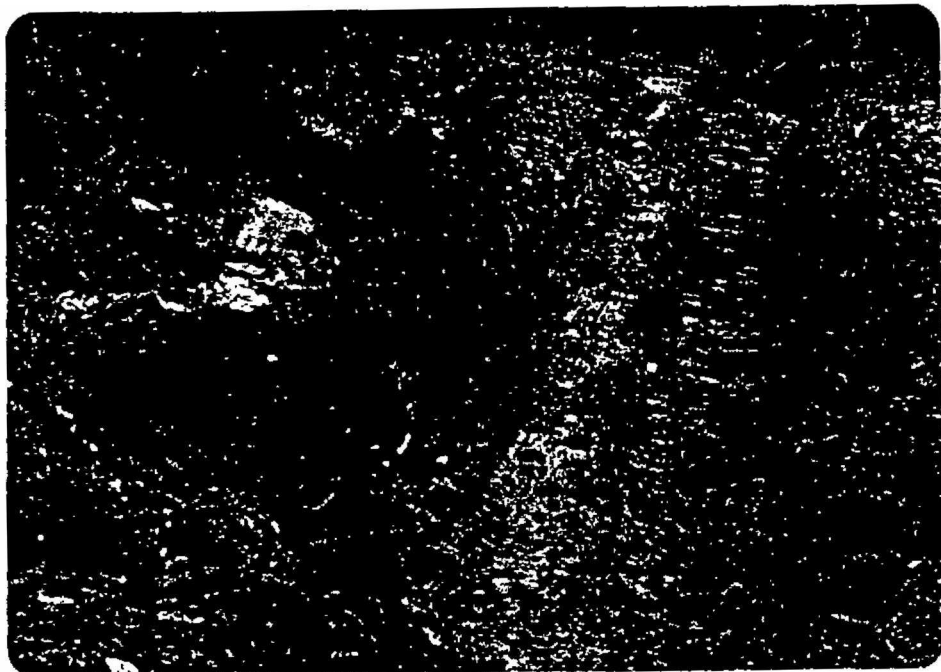
- △ B.H. 80-11, SA-1, Depth 1-52-1-98 m.
- B.H. 80-16, SA-1, Depth 4-57-5-03 m.
- T.P. 80-24, SA-2, Depth 3-35 m.
- T.P. 80-25, SA-1, Depth 1-22 m.
- B.H. 80-16, Sample from ground surface beside borehole

GRAIN SIZE DISTRIBUTION SAND AND GRAVEL

Figure 13

BOULDER SIZE	COBBLE SIZE	coarse	medium	fine	coarse	medium	fine	fine grained	
		GRAVEL SIZE			SAND SIZE			SILT SIZE	CLAY SIZE

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T.P. 80-30 located about 0.4 km north of Doal Lake, where frozen soil was encountered in glacial till.



Ice lenses exposed in glacial till in T.P. 80-30.

Date Oct. 7/80

Project No. 802-2048



Viewing North at T.P. 80-27 which was located north of AEX Road and west of Doal Lake. Glacial till exposed in this pit.



Viewing west at wet soil conditions in depression about 30 m. west of T.P. 80-27.

RECORD OF BOREHOLE BH 80-12

LOCATION (See Figure 3)

BORING DATE July 25, 1980

BOREHOLE TYPE Rotary with air

BOREHOLE DIAMETER 114 mm

SAMPLER HAMMER WEIGHT 63.5 kg DROP 760 mm. DATUM

Project No. 80-2048

SOIL PROFILE		STRATIGRAPHY PLOT	SAMPLE NUMBER	SAMPLE TYPE	BLOWS / 300 mm.	ELEVATION SCALE	WATER CONTENT PERCENT				PIEZOMETER OR STANDPIPE INSTALLATION	ADDITIONAL LAB. TESTING
ELEV. DEPTH (m)	DESCRIPTION						W _p	W	W _L	W _L		
0.00	Cleared Ground Surface											
	Brown SILTY SAND (TILL) occ. cobbles (Fissured below) 3.05 m		1	75 mm DO	18		○					
			2	75 mm DO	29		○					
5.18	Green SCHIST (BEDROCK)		3	WS								
7.92	End of Borehole No frozen soil observed											

No groundwater encountered during drilling
 30 July 80

VERTICAL SCALE
1: 50

Golder Associates BH 80-12 DRAWN K.M.

RECORD OF TEST PIT 80-29.

LOCATION (See Figure 3)

DATE Aug. 24, 1980

DATUM Ground Surface

METHOD OF EXCAVATION D8 - k

PROJECT VANGORDA

Project No. 802-2048

SOIL PROFILE		STRATIGRAPHY PLOT	SAMPLE NUMBER	SAMPLE TYPE	ELEVATION SCALE	WATER CONTENT, PERCENT				ADDITIONAL LAB. TESTING	GROUNDWATER CONDITIONS
ELEV. DEPTH (m)	DESCRIPTION					W _p	W	W _L			
	Ground Surface ↘										
0.00	MOSS										
0.15	WHITE VOLCANIC ASH										
0.30	Brown Sand and Gravel										
0.45	Olive brown SILTY SAND (TILL) occ. cobbles and boulders higher schist content near bottom of Test Pit.		1	CS		○					
			2	CS		○					
3.65	End of Test Pit ↘ No frozen soil observed										No groundwater observed in Test Pit

 VERTICAL SCALE
1:25

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DRAWN K. M.

RECORD OF TEST PIT 80-30

LOCATION (See Figure 3)

DATE Aug. 24, 1980

DATUM Ground Surface

METHOD OF EXCAVATION DB - k

PROJECT VANGORDA

Project No. 802-2048

SOIL PROFILE		STRATIGRAPHY PLOT	SAMPLE NUMBER	SAMPLE TYPE	ELEVATION SCALE	WATER CONTENT, PERCENT <div style="display: flex; justify-content: space-around; width: 100px;"> W_p W W_L </div>			ADDITIONAL LAB. TESTING	GROUNDWATER CONDITIONS
ELEVN. DEPTH (m)	DESCRIPTION									
	Ground Surface									
0.00	MOSS									
0.15	Black Silt and organics									
0.30	WHITE VOLCANIC ASH									
0.45	Grey SILT and SAND (high ice content)		1	CS						
0.91	Olive green SILTY SAND (TILL) (Ice content decreasing with depth)		2	CS						
			3	CS						
			4	CS						
			5	CS						
2.13	End of Test Pit (Frozen below Moss)								No groundwater observed in Test Pit	

 VERTICAL SCALE
1:25

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 DRAWN K.M.
CHECKED *[Signature]*