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**FINAL
REPORT ON**

**DETAILED
FOUNDATION INVESTIGATION AND DESIGN
HIGH EMBANKMENT FILLS
HIGHWAY 11
FROM 9.8 km NORTH OF NORTH BAY
AND TOMIKO RIVER BRIDGE
NORTHERLY 14.5 km
G.W.P 711-92-00
MINISTRY OF TRANSPORTATION, ONTARIO
DISTRICT 54, SUDBURY**

Submitted to:

McCormick Rankin Corporation
1145 Hunt Club Road
Suite No. 300
Ottawa, Ontario
K1V 0Y3

GEOCRES NO. 31L-81

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Mississauga, Ontario

September 2001



001-1168-2

immediately prior to the start of blasting by an independent qualified professional and include the use of video and photographic records to document existing conditions. Groundwater wells in the area should also be measured and tested for general water quality prior to blasting.

Submission of a blast proposal by the blasting contractor or their blast consultant detailing the blast methodology, including drill hole patterns, hole size and depths, size of blasts, explosive and initiation product details, as well as all blast control procedures. Blast control procedures should include details on controlling flyrock, temporary road closures, blast signaling and site clearing procedures, as well as procedures to deal with debris clean-up. This submission would be prior to the commencement of any blasting operations.

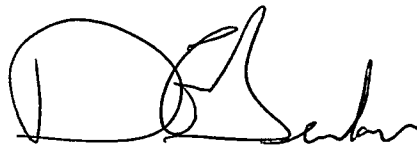
The requirements for ground and air vibration monitoring during blasting operations should comply with OPSS 515. This would include details on instrumentation, number and location of monitoring sites, blast recording and reporting procedures, and procedures to be followed in the event of excessive vibration readings.

It is recommended that the ground vibration levels be limited to a peak particle velocity of 50 mm/s at the nearest service or structure to the blasting area. Continuous monitoring during blasting operations would be performed by a qualified professional who would dictate when changes or adjustments to the blast procedures become necessary to ensure these limits are not exceeded.

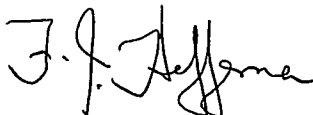
GOLDER ASSOCIATES LTD.



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JPD/DEB/FJH/clg/pds

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LIST OF ABBREVIATIONS

The abbreviations commonly employed on Records of Boreholes, on figures and in the text of the report are as follows:

I. SAMPLE TYPE

AS Auger sample
 BS Block sample
 CS Chunk sample
 SS Split-spoon
 DS Denison type sample
 FS Foil sample
 RC Rock core
 SC Soil core
 ST Slotted tube
 TO Thin-walled, open
 TP Thin-walled, piston
 WS Wash sample

III. SOIL DESCRIPTION

(a) Cohesionless Soils

Density Index (Relative Density)	N Blows/300 mm or Blows/ft.
Very loose	0 to 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very dense	over 50

II. PENETRATION RESISTANCE

Standard Penetration Resistance (SPT), N:

The number of blows by a 63.5 kg. (140 lb.) hammer dropped 760 mm (30 in.) required to drive a 50 mm (2 in.) drive open sampler for a distance of 300 mm (12 in.)

Consistency

	kPa	c_{u,s_u}	psf
Very soft	0 to 12		0 to 250
Soft	12 to 25		250 to 500
Firm	25 to 50		500 to 1,000
Stiff	50 to 100		1,000 to 2,000
Very stiff	100 to 200		2,000 to 4,000
Hard	over 200		over 4,000

Dynamic Cone Penetration Resistance; N_d :

The number of blows by a 63.5 kg (140 lb.) hammer dropped 760 mm (30 in.) to drive uncased a 50 mm (2 in.) diameter, 60° cone attached to "A" size drill rods for a distance of 300 mm (12 in.).

PH: Sampler advanced by hydraulic pressure
PM: Sampler advanced by manual pressure
WH: Sampler advanced by static weight of hammer
WR: Sampler advanced by weight of sampler and rod

Piezo-Cone Penetration Test (CPT)

A electronic cone penetrometer with a 60° conical tip and a project end area of 10 cm² pushed through ground at a penetration rate of 2 cm/s. Measurements of tip resistance (Q_t), porewater pressure (PWP) and friction along a sleeve are recorded electronically at 25 mm penetration intervals.

IV. SOIL TESTS

w water content
 w_p plastic limit
 w_l liquid limit
 C consolidation (oedometer) test
 CHEM chemical analysis (refer to text)
 CID consolidated isotropically drained triaxial test¹
 CIU consolidated isotropically undrained triaxial test with porewater pressure measurement¹
 D_R relative density (specific gravity, G_s)
 DS direct shear test
 M sieve analysis for particle size
 MH combined sieve and hydrometer (H) analysis
 MPC Modified Proctor compaction test
 SPC Standard Proctor compaction test
 OC organic content test
 SO_4 concentration of water-soluble sulphates
 UC unconfined compression test
 UU unconsolidated undrained triaxial test
 V field vane (L.V-laboratory vane test)
 γ unit weight

Note: 1 Tests which are anisotropically consolidated prior to shear are shown as CAD, CAU.

S:\FINALDATA\ABBREV\2000\LOFA-D00.DOC

LIST OF SYMBOLS

Unless otherwise stated, the symbols employed in the report are as follows:

I. GENERAL

π	= 3.1416
$\ln x$,	natural logarithm of x
$\log_{10} x$ or $\log x$,	logarithm of x to base 10
g	acceleration due to gravity
t	time
F	factor of safety
V	volume
W	weight

II. STRESS AND STRAIN

γ	shear strain
Δ	change in, e.g. in stress: $\Delta \sigma$
ϵ	linear strain
ϵ_v	volumetric strain
η	coefficient of viscosity
ν	Poisson's ratio
σ	total stress
σ'	effective stress ($\sigma' = \sigma - u$)
σ'_{vo}	initial effective overburden stress
$\sigma_1, \sigma_2, \sigma_3$	principal stresses (major, intermediate, minor)
σ_{oct}	mean stress or octahedral stress $= (\sigma_1 + \sigma_2 + \sigma_3)/3$
τ	shear stress
u	porewater pressure
E	modulus of deformation
G	shear modulus of deformation
K	bulk modulus of compressibility

III. SOIL PROPERTIES

(a) Index Properties

$\rho(\gamma)$	bulk density (bulk unit weight*)
$\rho_d(\gamma_d)$	dry density (dry unit weight)
$\rho_w(\gamma_w)$	density (unit weight) of water
$\rho_s(\gamma_s)$	density (unit weight) of solid particles
γ'	unit weight of submerged soil ($\gamma' = \gamma - \gamma_w$)
D_R	relative density (specific gravity) of solid particles ($D_R = \rho_s / \rho_w$) (formerly G_s)
e	void ratio
n	porosity
S	degree of saturation
*	Density symbol is ρ . Unit weight symbol is γ where $\gamma = \rho g$ (i.e. mass density x acceleration due to gravity)

(a) Index Properties (con't.)

w	water content
w_l	liquid limit
w_p	plastic limit
I_p	plasticity Index $= (w_l - w_p)$
w_s	shrinkage limit
I_L	liquidity index $= (w - w_p) / I_p$
I_C	consistency index $= (w_l - w) / I_p$
e_{max}	void ratio in loosest state
e_{min}	void ratio in densest state
I_D	density index $= (e_{max} - e) / (e_{max} - e_{min})$ (formerly relative density)

(c) Hydraulic Properties

h	hydraulic head or potential
q	rate of flow
v	velocity of flow
i	hydraulic gradient
k	hydraulic conductivity (coefficient of permeability)
j	seepage force per unit volume

(d) Consolidation (one-dimensional)

C_c	compression index (normally consolidated range)
C_r	recompression index (overconsolidated range)
C_s	swelling index
C_α	coefficient of secondary consolidation
m_v	coefficient of volume change
c_v	coefficient of consolidation
T_v	time factor (vertical direction)
U	degree of consolidation
σ'_p	pre-consolidation pressure
OCR	Overconsolidation ratio $= \sigma'_p / \sigma'_{vo}$

(e) Shear Strength

τ_p, τ_r	peak and residual shear strength
ϕ'	effective angle of internal friction
δ	angle of interface friction
μ	coefficient of friction $= \tan \delta$
c'	effective cohesion
c_u, s_u	undrained shear strength ($\phi = 0$ analysis)
p	mean total stress $(\sigma_1 + \sigma_3)/2$
p'	mean effective stress $(\sigma'_1 + \sigma'_3)/2$
q	$(\sigma_1 - \sigma_3)/2$ or $(\sigma'_1 - \sigma'_3)/2$
q_u	compressive strength $(\sigma_1 - \sigma_3)$
S_t	sensitivity

Notes: 1. $\tau = c' + \sigma' \tan \phi'$

2. Shear strength = (Compressive strength)/2

LITHOLOGICAL AND GEOTECHNICAL ROCK DESCRIPTION TERMINOLOGY

WEATHERING STATE

Fresh: no visible sign of weathering.

Faintly weathered: weathering limited to the surface of major discontinuities.

Slightly weathered: penetrative weathering developed on open discontinuity surfaces but only slight weathering of rock material.

Moderately weathered: weathering extends throughout the rock mass but the rock material is not friable.

Highly weathered: weathering extends throughout rock mass and the rock material is partly friable.

Completely weathered: rock is wholly decomposed and in a friable condition but the rock texture and structure are preserved.

BEDDING THICKNESS

Description	Bedding Plane Spacing
Very thickly bedded	> 2 m
Thickly bedded	0.6 m to 2 m
Medium bedded	0.2 m to 0.6 m
Thinly bedded	60 mm to 0.2 m
Very thinly bedded	20 mm to 60 mm
Laminated	6 mm to 20 mm
Thinly laminated	< 6 mm

JOINT OR FOLIATION SPACING

Description	Spacing
Very wide	> 3 m
Wide	1 - 3 m
Moderately close	0.3 - 1 m
Close	50 - 300 mm
Very close	< 50 mm

GRAIN SIZE

Term	Size*
Very Coarse Grained	> 60 mm
Coarse Grained	2 - 60 mm
Medium Grained	60 microns - 2 mm
Fine Grained	2 - 60 microns
Very Fine Grained	< 2 microns

Note: * Grains > 60 microns diameter are visible to the naked eye.

CORE CONDITION

Total Core Recovery

The percentage of solid drill core recovered regardless of quality or length, measured relative to the length of the total core run.

Solid Core Recovery (SCR)

The percentage of solid drill core, regardless of length, recovered at full diameter, measured relative to the length of the total core run.

Rock Quality Designation (RQD)

The percentage of solid drill core, greater than 100 mm length, recovered at full diameter, measured relative to the length of the total core run. RQD varies from 0% for completely broken core to 100% for core in solid sticks.

DISCONTINUITY DATA

Fracture Index

A count of the number of discontinuities (physical separations) in the rock core, including both naturally occurring fractures and mechanically induced breaks caused by drilling.

Dip with Respect to (W.R.T.) Core Axis

The angle of the discontinuity relative to the axis (length) of the core. In a vertical borehole a discontinuity with a 90° angle is horizontal.

Description and Notes

An abbreviated description of the discontinuities, whether naturally occurring separations such as fractures, bedding planes and foliation planes or mechanically induced features caused by drilling such as ground or shattered core and mechanically separated bedding or foliation surfaces. Additional information concerning the nature of fracture surfaces and infillings are also noted.

Abbreviations

B - Bedding	P - Polished
FO - Foliation/Schistosity	S - Slickensided
CL - Cleavage	SM - Smooth
SH - Shear Plane/Zone	R - Ridged/Rough
VN - Vein	ST - Stepped
F - Fault	PL - Planar
CO - Contact	FL - Flexured
J - Joint	UE - Uneven
FR - Fracture	W - Wavy
MF - Mechanical Fracture	C - Curved
- Parallel To	
⊥ - Perpendicular To	

PROJECT <u>001-1168-2</u>		RECORD OF BOREHOLE No BH 01-07		1 OF 1	METRIC
W.P. <u>711-92-00</u>		LOCATION <u>N 5155412.3; E 299108.8 (AREA 2)</u>		ORIGINATED BY <u>SB</u>	
DIST <u>54</u> HWY <u>11</u>		BOREHOLE TYPE <u>108mm I.D. Hollow Stem Augers</u>		COMPILED BY <u>AZ</u>	
DATUM <u>Geodetic</u>		DATE <u>May 3, 2001</u>		CHECKED BY <u>JPD</u>	

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20 40 60 80 100	20 40 60 80 100	W _p	W	W _L		
360.3	GROUND SURFACE													
0.0	Sand and Gravel to Gravelly Sand, trace silt, occasional cobbles (Fill) Compact Brown Moist		1	SS	17									24 70 (6)
358.8														
1.5	Sand and Gravel with cobbles (Fill) Compact to very dense Brown and grey Moist		2	SS	30									
	Probable Rockfill inferred from resistance to auger advance.		3	SS	22									
			4	SS	125									
356.0														
4.3	Gravelly sand, some silt, trace clay Very dense Brown		5	SS	50/05									
355.4	Wet													
4.9	END OF BOREHOLE (Auger Refusal; Probable Bedrock) Note: 1. Borehole caved to 2.7m depth on completion of drilling operation.													

ON_MOT 00111682.GPJ ON_MOT.GDT 9/7/01

PROJECT 001-1168-2		RECORD OF BOREHOLE No BH 01-08		1 OF 1		METRIC							
W.P. 711-92-00		LOCATION N 5155396.7; E 299136.7 (AREA 2)		ORIGINATED BY SB									
DIST 54 HWY 11		BOREHOLE TYPE 108mm I.D. Hollow Stem Augers		COMPILED BY AZ									
DATUM Geodetic		DATE May 3, 2001		CHECKED BY JPD									
SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			"N" VALUES	20 40 60 80 100					
356.7	GROUND SURFACE												
0.0	Sand and Gravel, trace silt, organics and rootlets, occasional cobbles Very loose		1	SS	3								
356.1	Brown Moist												
0.6	Organic Silt, trace to some sand Soft		2	SS	3							118	
355.2	Black Moist												
1.5	Gravelly Sand, some silt, trace clay, trace organics up to 2.3m depth, pieces of rock at 2.75m depth Dense to very dense		3	SS	32								
	Brown becoming grey at 2.3m depth												
354.0	Moist to wet		4	SS	84								28 50 20 2
2.8	END OF BOREHOLE (Auger Refusal; Probable Bedrock)												
Notes: 1. Open borehole dry upon completion of drilling operation. 2. Piezometer dry on May 3, 2001. 3. Water level in piezometer measured at 1.4m depth (Elev.355.3m) on May 14, 2001, and at 1.5m depth (Elev.355.2m) on June 11, 2001.													

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+³, ×³: Numbers refer to Sensitivity **○³%** STRAIN AT FAILURE

PROJECT 001-1168-2		RECORD OF BOREHOLE No BH 01-09		2 OF 2	METRIC
W.P. 711-92-00	LOCATION N 5159543.9; E 294851.2 (AREA 5)	ORIGINATED BY SB			
DIST 54 HWY 11	BOREHOLE TYPE 108mm I.D. Hollow Stem Augers	COMPILED BY AZ			
DATUM Geodetic	DATE May 9, 2001	CHECKED BY JPD			

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC NATURAL LIQUID LIMIT MOISTURE LIMIT CONTENT			UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa				WATER CONTENT (%)				
								20 40 60 80 100				w _p w w _L				
— CONTINUED FROM PREVIOUS PAGE —																
284.0	Sand, trace gravel, trace silt Numerous cobbles up to 0.2m in size Compact Grey Wet					284									15 76 (9)	
15.3						283										
			5	SS	10	282										
						281										
			R5	RC		280										
			6	SS	16	279										
278.0	Sand and Gravel, trace silt Numerous cobbles and boulders up to 0.25m in size Very dense Grey Wet					278									41 57 (4)	
21.3						277										
			R6	RC		276										
275.4			7	SS	59											
23.9	END OF BOREHOLE															
	Note: 1. Borehole advanced using tricone to 6m depth and 'N' casing to 23.9m depth.															

ON_MOT 00111682.GPJ ON_MOT.GDT 9/7/01

PROJECT <u>001-1168-2</u>		RECORD OF BOREHOLE No BH 01-10		1 OF 1	METRIC
W.P. <u>711-92-00</u>	LOCATION <u>N 5159573.9; E 294795.5 (AREA 5)</u>	ORIGINATED BY <u>SB</u>			
DIST <u>54</u> HWY <u>11</u>	BOREHOLE TYPE <u>Wet Rotary Using 'B' Size Casing with Portable Equipment</u>	COMPILED BY <u>AZ</u>			
DATUM <u>Geodetic</u>	DATE <u>May 10, 2001</u>	CHECKED BY <u>JPD</u>			

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa		WATER CONTENT (%)					
								20 40 60 80 100		W _p W W _L					
								○ UNCONFINED + FIELD VANE							
								● QUICK TRIAXIAL × REMOULDED							
292.2	GROUND SURFACE							20 40 60 80 100		25 50 75		kN/m³	GR SA SI CL		
0.0	Organic Silt, trace sand and gravel and rootlets Very soft to soft Black Wet		1	SS	2		292								
291.6	Silt and Sand, trace gravel and clay Very loose to very dense Brown Wet		2	SS	60									6	38 52 4
291.2	Sand and Gravel, trace silt, numerous conglomerate and granite cobbles and boulders Compact to very dense Brown Wet		R1	RC			291								
1.0			3	SS	22		290								
			R2	RC											
288.9	Cobbles up to 0.25m and boulders up to 0.36m in size						289								
3.4	END OF BOREHOLE (Refusal to further advance)														
	Notes: 1. Water level at ground surface prior to start of drilling operation. 2. Casing refusal at 3m depth; Core barrel refusal at 3.4m depth.														

ON_MOT 00111682.GPJ ON_MOT.GDT 25/9/01

PROJECT <u>001-1168-2</u>		RECORD OF BOREHOLE No BH 01-11		1 OF 1	METRIC
W.P. <u>711-92-00</u>		LOCATION <u>N 5159549.1; E 294818.7 (AREA 5)</u>		ORIGINATED BY <u>SB</u>	
DIST <u>54</u> HWY <u>11</u>		BOREHOLE TYPE <u>Wet Rotary Using 'B' Size Casing with Portable Equipment</u>		COMPILED BY <u>AZ</u>	
DATUM <u>Geodetic</u>		DATE <u>May 12, 2001</u>		CHECKED BY <u>JPD</u>	

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC NATURAL LIQUID LIMIT MOISTURE LIMIT CONTENT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20 40 60 80 100	20 40 60 80 100	W _p	W	W _L		
289.4	GROUND SURFACE													
0.0	Fibrous Peat, trace to some sand, trace gravel; rootlets and wood fragments		1	SS	2									
288.8	Very soft to soft Black Wet		2	SS	33									
0.6	Sand and Gravel, trace to some silt, trace clay and organics up to 1.2m depth		R1	RC										
	Numerous quartzite and granite cobbles and boulders up to 0.4m in size		R2	RC										
	Dense to very dense Brown Wet		R3	RC										
			9	SS	50/08									
			R4	RC										
285.4														
4.0	Sand, trace to some gravel, trace silt Loose to compact Grey Wet		4	SS	9									
282.7			5	SS	23									
6.7	END OF BOREHOLE (Refusal to further advance)													
	Notes: 1. Water level at ground surface prior to start of drilling operation. 2. Water level in piezometer measured at 0.7m depth (Elev.288.7m) and 0.1m depth (Elev.289.3m) on May 12 and June 11, 2001, respectively. 3. Casing refusal at 6.7m depth.													

ON_MOT 00111682.GPJ ON_MOT.GDT 9/7/01

PROJECT 001-1168-2				RECORD OF BOREHOLE No BH 01-12				1 OF 1		METRIC						
W.P. 711-92-00				LOCATION N 5159514.9; E 294844.1 (AREA 5)				ORIGINATED BY AZ								
DIST 54 HWY 11				BOREHOLE TYPE Wet Rotary Using 'B' Size Casing with Portable Equipment				COMPILED BY AZ								
DATUM Geodetic				DATE May 13 and 14, 2001				CHECKED BY JPD								
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC NATURAL LIQUID LIMIT MOISTURE CONTENT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x REMOULDED				W _p	W	W _L		
289.6	GROUND SURFACE															
0.0	Sand, trace gravel, trace silt, trace to some organics Very loose to compact Grey Wet		1	SS	1											
			2	SS	1											
288.1			3	SS	13											
1.5	Bedrock Cored from 1.5m to 4.1m For bedrock coring details refer to Record of Drillhole 01-12															
285.5																
4.1	END OF BOREHOLE Note: 1. Water level at ground surface prior to start of drilling operation.															

PROJECT: 001-1168-2

RECORD OF DRILLHOLE: BH 01-12

SHEET 1 OF 1

LOCATION: N 5159514.9; E 294844.1 (AREA 5)

DRILLING DATE: May 14, 2001

DATUM: Geodetic

INCLINATION: -90°

AZIMUTH: ---

DRILL RIG: Hiiti DD-250 E; Portable

DRILLING CONTRACTOR: Marathon Drilling Co.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	PENETRATION RATE (mm/min)	FLUSH % RETURN	FR-FRACTURE CL-CLEAVAGE SH-SHEAR VN-VEIN	F-FAULT J-JOINT P-POLISHED S-SLICKENSIDED	SM-SMOOTH R-ROUGH ST-STEPPED PL-PLANAR	FL-FLEXURED UE-UNEVEN W-WAVY C-CURVED	BC-BROKEN CORE MB-MECH. BREAK B-BEDDING	DIAMETRAL POINT LOAD INDEX (MPa)	NOTES WATER LEVELS INSTRUMENTATION
								RECOVERY	R.Q.D. %	FRACT. INDEX PER 0.3 m	DISCONTINUITY DATA DIP w.r.t. CORE AXIS	TYPE AND SURFACE DESCRIPTION	HYDRAULIC CONDUCTIVITY K, cm/sec	
								TOTAL CORE %						
								8 8 8 8	8 8 8 8	8 8 8 8	8 8 8 8	8 8 8 8	10 ⁻⁸ 10 ⁻⁶ 10 ⁻⁴ 10 ⁻²	2 4 6
		Continued from Record of Borehole		288.10										
		Fresh, foliated, very strong, grey to pink GNEISS. (Bedrock)		1.50										
2					1							J,PL-R J,PL-R,UE		
					2							J,PL-R J,PL-R Fo,PL,R Fo,PL,R		
3					3							J,PL-R Fo,PL,R Fo,PL,R		
					4							J,PL-R Fo,PL,R Fo,PL,R Fo,PL,R		
					5							Fo,PL,R Fo,PL,R Fo,PL,R Fo,PL,R		
4					6							J,PL-R J,PL-R BC J,PL-R,UE Fo,PL-R		
		END OF BOREHOLE		288.50										
				4.10										
5														
6														
7														
8														
9														
10														
11														

DEPTH SCALE

1 : 50





LOGGED: AZ

CHECKED: AZ

DRILLHOLE RK1168-2.GPJ GLDR_CAN.GDT 97/01 MMZ

PROJECT <u>001-1168-2</u>		RECORD OF BOREHOLE No BH 01-13		1 OF 1	METRIC
W.P. <u>711-92-00</u>		LOCATION <u>N 5159606.1; E 294795.5 (AREA 5)</u>		ORIGINATED BY <u>AZ</u>	
DIST <u>54</u> HWY <u>11</u>		BOREHOLE TYPE <u>Wet Rotary Using 'B' Size Casing with Portable Equipment</u>		COMPILED BY <u>AZ</u>	
DATUM <u>Geodetic</u>		DATE <u>May 28, 2001</u>		CHECKED BY <u>JPD</u>	

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT w _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)			
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa										WATER CONTENT (%)		
								<div><div></div><div>20406080100</div></div>										<div><div></div><div>255075</div></div>		
294.6	GROUND SURFACE																			
0.0	Topsoil and organics																			
0.2	Sand, trace gravel, trace silt, occasional cobbles Granite, quartzite and gneiss cobbles, up to 0.1m in size		R1	RC			294													
			R2	RC																
			R3	RC			293													
							292													
291.6			1	SS	12/15							c				7 90 (3)				
3.1	END OF BOREHOLE (Refusal to further advance) Notes: 1. Casing refusal at 1m depth. 2. Borehole terminated at 3.1m depth due to core barrel refusal.																			

ON MOT 00111682.GPJ ON MOT.GDT 9/7/01

PROJECT 001-1168-2		RECORD OF BOREHOLE No BH 01-14				1 OF 1		METRIC							
W.P. 711-92-00		LOCATION N 5159627.3; E 294752.5 (AREA 5)				ORIGINATED BY AZ									
DIST 54 HWY 11		BOREHOLE TYPE Wet Rotary Using 'B' Size Casing with Portable Equipment				COMPILED BY AZ									
DATUM Geodetic		DATE May 29, 2001				CHECKED BY JPD									
SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC NATURAL LIQUID LIMIT MOISTURE CONTENT LIMIT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			"N" VALUES	SHEAR STRENGTH kPa 20 40 60 80 100 ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x REMOULDED				WATER CONTENT (%) 25 50 75			
291.8	GROUND SURFACE														
0.0	Topsoil and organics														
291.4															
0.5	Sand and Gravel, trace silt Numerous granitic cobbles ranging from 0.08m to 0.2m in size Boulders up to 0.25m in size		R1	RC											
			R2	RC											
			R3	RC											
			R4	RC											
289.6			R5	RC											
2.2	END OF BOREHOLE (Refusal to further advance)														
	Notes: 1. Water level in open borehole at 0.4m depth before start of coring. 2. Casing refusal at 1.0m depth. 3. Borehole terminated at 2.2m depth due to core barrel refusal. 4. Stratigraphy inferred from wash samples retained in core barrel between 0.5m to 2.2m depth.														

ON_MOT 00111682.GPJ ON_MOT.GDT 8/7/01

PROJECT 001-1168-2		RECORD OF BOREHOLE No BH 01-15				1 OF 1		METRIC									
W.P. 711-92-00		LOCATION N 5159665.0; E 294749.1 (AREA 5)				ORIGINATED BY AZ											
DIST 54 HWY 11		BOREHOLE TYPE Wet Rotary Using 'B' Size Casing with Portable Equipment				COMPILED BY AZ											
DATUM Geodetic		DATE May 30, 2001				CHECKED BY JPD											
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa 20 40 60 80 100 ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × REMOULDED									
291.6	GROUND SURFACE																
0.0	Topsoil and organics																
291.3																	
0.3	Sand and Gravel, trace silt and organics Numerous cobbles up to 0.1m in size		R1	RC													
			1	WS													
289.2			R2	RC													
2.4	END OF BOREHOLE (Refusal to further advance) Notes: 1. Water level in open borehole at 0.3m depth prior to start of coring. 2. Casing refusal at 0.8m depth. 3. Borehole terminated at 2.4m depth due to core barrel refusal. 4. Stratigraphy inferred from wash sample obtained between 1.8m to 2.1m depth and material retained in core barrel.																

ON_MOT 00111682.GPJ ON_WOT 1.3.DT 9/7/01

PROJECT 001-1168-2		RECORD OF BOREHOLE No BH 01-16				1 OF 1		METRIC						
W.P. 711-92-00		LOCATION N 5159682.5; E 294732.1 (AREA 5)				ORIGINATED BY AZ								
DIST 54 HWY 11		BOREHOLE TYPE Wet Rotary Using 'B' Size Casing with Portable Equipment				COMPILED BY AZ								
DATUM Geodetic		DATE May 28, 2001				CHECKED BY JPD								
SOIL PROFILE			SAMPLES			DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC NATURAL LIQUID UNIT			REMARKS & GRAIN SIZE DISTRIBUTION (%)		
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	20 40 60 80 100	W _p W W _L	WATER CONTENT (%)	25 50 75	γ	GR SA SI CL	
290.2	GROUND SURFACE						290							
0.0	Fibrous Peat, some sand, trace gravel													
289.8														
0.4	Sand and Gravel, trace silt and organics Numerous granitic cobbles up to 0.2m in size and granitic boulders up to 0.8m in size		R1	RC			289							
			R2	RC										
287.9							288							
2.3	END OF BOREHOLE (Refusal to further advance; Probable bedrock)													
Notes: 1. Water level in open hole measured at 0.2m depth prior to start of coring. 2. Casing refusal at 1m depth. 3. Stratigraphy inferred from test pit excavation adjacent to borehole location. 4. A number of probeholes were put down in close proximity to the borehole location to confirm the stratigraphy and depth to probable bedrock.														

ON_MOT_00111682.GPJ ON_MOT.GDT 9/7/01

PROJECT 001-1168-2		RECORD OF BOREHOLE No BH 01-17		1 OF 1	METRIC
W.P. 711-92-00	LOCATION N 5159747.2; E 294682.6 (AREA 5)	ORIGINATED BY AZ			
DIST 54 HWY 11	BOREHOLE TYPE Wet Rotary Using 'B' Size Casing with Portable Equipment	COMPILED BY AZ			
DATUM Geodetic	DATE May 27, 2001	CHECKED BY JPD			

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	*N* VALUES			20 40 60 80 100	20 40 60 80 100	W _p W W _L				
288.8	GROUND SURFACE													
0.0	Topsoil and organics													
288.4														
0.4	Sand and Gravel and cobbles													
287.9	Cobbles up to 0.2m in size													
0.9	Silt, trace sand, trace clay Compact Grey Wet		1	SS	25									0 8 86 6
			2	SS	15									
286.5														
286.2	Bedrock cored from 2.3m to 2.6m													
2.6	For bedrock coring details refer to Record of Drillhole 01-17 END OF BOREHOLE													
	Notes: 1. A test pit was excavated near borehole location; water level at 0.15m depth. 2. Water level in piezometer measured at 0.1m depth (Elev.288.7m) on June 11, 2001. 3. Casing refusal at 2.3m depth.													

ON MOT 00111682.GPJ ON MOT.GDT 9/7/01

PROJECT: 001-1168-2

RECORD OF DRILLHOLE: BH 01-17

SHEET 1 OF 1

LOCATION: N 5159747.2; E 294682.6 (AREA 5)

DRILLING DATE: May 27, 2001

DATUM: Geodetic

INCLINATION: -90°

AZIMUTH: ---

DRILL RIG: Hilli DD-250 E; Portable

DRILLING CONTRACTOR: Marathon Drilling Co.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	PENETRATION RATE (mm/min)	FLUSH % RETURN	FR-FRACTURE		F-FAULT		SM-SMOOTH		FL-FLEXURED		BC-BROKEN CORE		DIAMETRAL POST LOAD INDEX (MPa)	NOTES WATER LEVELS INSTRUMENTATION
								CL-CLEAVAGE		J-JOINT		R-ROUGH		UE-UNEVEN		MB-MECH. BREAK			
								SH-SHEAR		P-POLISHED		ST-STEPPED		W-WAVY		B-BEDDING			
								VN-VEIN		S-SLICKENSIDED		PL-PLANAR		C-CURVED					
		Continued from Record of Borehole		286.50															
	B Casing BORC	Fresh, foliated, very strong, grey, Gneiss (Bedrock)		2.30	1														
				286.20															
		END OF BOREHOLE		2.60															
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			
11																			
12																			

DEPTH SCALE

1:50



LOGGED: DE

CHECKED: AZ

DRILLHOLE RK1168-2.GPJ GLDR CAN GDT 97/01 MMZ

RECORD OF BOREHOLE No BH 01-18

1 OF 1

METRIC

PROJECT 001-1168-2

W.P. 711-92-00

LOCATION N 5161106.5; E 294066.0 (AREA 6)

ORIGINATED BY AZ

DIST 54

HWY 11

BOREHOLE TYPE Wet Rotary Using 'B' Size Casing with Portable Equipment

COMPILED BY AZ

DATUM Geodetic

DATE May 25, 2001

CHECKED BY JPD

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT w _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	*N* VALUES			20 40 60 80 100	20 40 60 80 100					
289.0	GROUND SURFACE													
0.0	Fibrous Peat, trace to some sand, trace gravel Very soft Black Wet		1	SS	1									
288.4			R1	RC										
0.6	Gravelly Sand, trace silt Numerous granitic cobbles up to 0.2m in size Loose Brown Wet		2	WS			288							
			R2	RC			287							
			3	SS	5		286						28 69 (3)	
			4	SS	8									
284.8			R3	RC			285							
284.4	Bedrock cored from 4.2m to 4.6m For bedrock coring details refer to Record of Drillhole BH01-18													
4.6	END OF BOREHOLE													
Notes: 1. Water level at ground surface at start of drilling operation. 2. Water level in piezometer measured at 0.8m depth (Elev.288.2m) on May 30, 2001 and at 0.4m depth (Elev.288.6m) on June 11, 2001. 3. Casing refusal at 2.4m depth.														

PROJECT: 001-1168-2

RECORD OF DRILLHOLE: BH 01-18

SHEET 1 OF 1

LOCATION: N 5161106.5; E 294066.0 (AREA 6)

DRILLING DATE: May 25, 2001

DATUM: Geodetic

INCLINATION: -90°

AZIMUTH: ---

DRILL RIG: CME 55 Bombardier

DRILLING CONTRACTOR: Marathon Drilling Co.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	PENETRATION RATE (m/min)	FLUSH	COLOUR & RETURN	DISCONTINUITY DATA												DIAMETRAL POINT LOAD INDEX (MPa)	NOTES WATER LEVELS INSTRUMENTATION
									FR-FRACTURE		F-FAULT		SM-SMOOTH		FL-FLEXURED		BC-BROKEN CORE		HYDRAULIC CONDUCTIVITY			
									CL-CLEAVAGE		J-JOINT		R-ROUGH		UE-UNEVEN		MB-MECH. BREAK					
									SH-SHEAR		P-POLISHED		ST-STEPPED		W-WAVY		B-BEDDING					
									VN-VEIN		S-SLICKENSIDED		PL-PLANAR		C-CURVED							
RECOVERY		R.Q.D. %		FRACT. INDEX PER 0.3		DIP w.r.t. CORE AXIS		TYPE AND SURFACE DESCRIPTION														
TOTAL CORE %		SOLID CORE %																				
0 0																						

DEPTH SCALE

1 : 50



LOGGED: DE

CHECKED: AZ

DRILLHOLE RK1168-2.GPJ GLDR_CAN.GDT 97/01 MMZ

PROJECT <u>001-1168-2</u>		RECORD OF BOREHOLE No BH 01-19		1 OF 1	METRIC
W.P. <u>711-92-00</u>		LOCATION <u>N 5161135.2; E 294054.9 (AREA 6)</u>		ORIGINATED BY <u>AZ</u>	
DIST <u>54</u> HWY <u>11</u>		BOREHOLE TYPE <u>Wet Rotary Using 'B' Size Casing with Portable Equipment</u>		COMPILED BY <u>AZ</u>	
DATUM <u>Geodetic</u>		DATE <u>May 26, 2001</u>		CHECKED BY <u>JPD</u>	

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT w _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w _L	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL			
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa										WATER CONTENT (%)		
								○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × REMOULDED												
289.7	GROUND SURFACE							20	40	60	80	100								
0.0	Fibrous Peat		1	SS	1	▽	289										1 89 (10)			
289.2	Very soft Black Moist																			
0.5	Sand, trace gravel and silt		2	SS	9			288												
	Cobbles below 2.1m depth up to 0.2m in size		3	SS	17															
	Loose to very dense Brown Wet		R1	RC					287											
286.2		4	SS	30/25																
3.5	END OF BOREHOLE (Refusal to further advance; Probable Bedrock)																			
	Notes: 1. Water level in open borehole at 0.75m depth. 2. Borehole advanced from 2.1m to 3m by coring through cobbles. 3. Casing refusal at 3.5m depth.																			

ON_MOT 00111682.GPJ ON_MOT.GDT 9/7/01

PROJECT <u>001-1168-2</u>		RECORD OF BOREHOLE No BH 01-20		1 OF 1	METRIC
W.P. <u>711-92-00</u>		LOCATION <u>N 5161185.6; E 294061.3 (AREA 6)</u>		ORIGINATED BY <u>AZ</u>	
DIST <u>54</u> HWY <u>11</u>		BOREHOLE TYPE <u>Wet Rotary Using 'B' Size Casing with Portable Equipment</u>		COMPILED BY <u>AZ</u>	
DATUM <u>Geodetic</u>		DATE <u>May 26, 2001</u>		CHECKED BY <u>JPD</u>	

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa					WATER CONTENT (%)				
								20	40	60	80	100	20	40	60		
289.1	GROUND SURFACE																
0.0	Gravelly Sand, trace to some silt, organics up to 0.6m depth, cobbles below 0.7m depth Very loose to compact Brown Wet Borehole advanced from 0.7m to 1.5m depths by coring through cobbles		1	SS	2												
			R1	RC													
287.3			2	SS	20												
1.8	Bedrock cored from 1.8m to 2.8m For bedrock coring details refer to Record of Drillhole BH01-20																
286.3																	
2.8	END OF BOREHOLE Note: 1. Water level at ground surface at start of drilling operation.																

ON_MOT 00111682.GPJ ON_MOT.GDT 9/7/01

PROJECT: 001-1168-2

RECORD OF DRILLHOLE: BH 01-20

SHEET 1 OF 1

LOCATION: N 5161185.6; E 294061.3 (AREA 6)

DRILLING DATE: May 26, 2001

DATUM: Geodetic

INCLINATION: -90°

AZIMUTH: ---

DRILL RIG: Hilti DD-250 E; Portable

DRILLING CONTRACTOR: Marathon Drilling Co.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	PENETRATION RATE (mm/min)	FLUSH % RETURN	FR-FRACTURE		F-FAULT		SM-SMOOTH		FL-FLEXURED		BC-BROKEN CORE		DIAMETRAL POINT LOAD INDEX (MPa)	NOTES WATER LEVELS INSTRUMENTATION
								CL-CLEAVAGE		J-JOINT		R-ROUGH		UE-UNEVEN		MB-MECH. BREAK			
								SH-SHEAR		P-POLISHED		ST-STEPPED		W-WAVY		B-BEDDING			
		Continued from Record of Borehole		287.30															
2	B' Casing BORC	Fresh, foliated, very strong, grey GNEISS (Bedrock)		1.80	1														
3		END OF BOREHOLE		286.30	3														
				2.80															

DEPTH SCALE

1 : 50



LOGGED: AZ

CHECKED: AZ

DRILLHOLE RK1168-2.GPJ GLDR_CAN.GDT 97/01 MMZ

PROJECT 001-1168-2		RECORD OF BOREHOLE No BH 01-21		1 OF 1	METRIC
W.P. 711-92-00		LOCATION N 5161481.4; E 294038.6 (AREA 7)		ORIGINATED BY AZ	
DIST 54 HWY 11		BOREHOLE TYPE Wet Rotary Using 'B' Size Casing with Portable Equipment		COMPILED BY AZ	
DATUM Geodetic		DATE May 23, 2001		CHECKED BY JPD	

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20	40	60	80	100					
297.0	GROUND SURFACE																
0.0	Fibrous Peat, some silt, trace sand Very soft Black Wet		1	SS	WH												
296.2			2	SS	WH												
0.9	Sand and Gravel, trace silt, occasional cobbles		R1	RC													
	Stratigraphy inferred from wash samples between 1.7m and 2m depth		R2	RC													
294.6																	
2.4	Bedrock cored from 2.4m to 3.5m For bedrock coring details refer to Record of Drillhole BH01-21																
293.5																	
3.5	END OF BOREHOLE																
	Notes: 1. Water level at ground surface at start of drilling. 2. Casing refusal at 1.5m depth.																

ON_MOT_00111682.GPJ ON_MOT.GDT 10/7/01

PROJECT: 001-1168-2

RECORD OF DRILLHOLE: BH 01-21

SHEET 1 OF 1

LOCATION: N 5161481.4; E 294038.6 (AREA 7)

DRILLING DATE: May 23, 2001

DATUM: Geodetic

INCLINATION: -90°

AZIMUTH: ---

DRILL RIG: Hilti DD-250 E; Portable

DRILLING CONTRACTOR: Marathon Drilling Co.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	PENETRATION RATE (mm/min)	FLUSH % RETURN	COLOUR % RETURN	FR-FRACTURE CL-CLEAVAGE SH-SHEAR VN-VEIN	F-FAULT J-JOINT P-POLISHED S-SLICKENSIDED	SM-SMOOTH R-ROUGH ST-STEPPED PL-PLANAR	FL-FLEXURED UE-UNEVEN W-WAVY C-CURVED	BC-BROKEN CORE MB-MECH. BREAK B-BEDDING	DIAMETRAL POINT LOAD INDEX (MPa)	NOTES WATER LEVELS INSTRUMENTATION
		Continued from Record of Borehole		294.60											
		Fresh, foliated, very strong, grey GNEISS (Bedrock)		2.40	1										
					2										
					3										
				293.50											
		END OF BOREHOLE		3.50											
3															
4															
5															
6															
7															
8															
9															
10															
11															
12															

DEPTH SCALE

1:50





LOGGED: AZ

CHECKED: AZ

DRILLHOLE RK1168-2.GPJ GLDR_CAN.GDT 97/01 MMZ

PROJECT <u>001-1168-2</u>		RECORD OF BOREHOLE No BH 01-22		1 OF 1	METRIC
W.P. <u>711-92-00</u>		LOCATION <u>N 5161503.7; E 294024.2 (AREA 7)</u>		ORIGINATED BY <u>AZ</u>	
DIST <u>54</u> HWY <u>11</u>		BOREHOLE TYPE <u>Wet Rotary Using 'B' Size Casing with Portable Equipment</u>		COMPILED BY <u>AZ</u>	
DATUM <u>Geodetic</u>		DATE <u>May 23, 2001</u>		CHECKED BY <u>JPD</u>	

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC NATURAL LIQUID LIMIT MOISTURE CONTENT LIMIT			UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20 40 60 80 100	20 40 60 80 100	W _p W W _L	25 50 75			
297.6	GROUND SURFACE													
0.0	Topsoil and organics													
297.2														
0.4	Bedrock cored from 0.4m to 1.5m For bedrock coring details refer to Record of Drillhole BH01-22						297							
296.1														
1.5	END OF BOREHOLE Note: 1. Casing refusal at 0.45m depth.													

ON_MOT 00111682.GPJ ON_MOT.GDT 9/7/01

PROJECT: 001-1168-2

RECORD OF DRILLHOLE: BH 01-22

SHEET 1 OF 1

LOCATION: N 5161503.7; E 294024.2 (AREA 7)

DRILLING DATE: May 23, 2001

DATUM: Geodetic

INCLINATION: -90°

AZIMUTH: ---

DRILL RIG: Hilti DD-250 E; Portable

DRILLING CONTRACTOR: Marathon Drilling Co.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	PENETRATION RATE (m/min)	FLUSH	COLOUR % RETURN	FR-FRACTURE	F-FAULT	SM-SMOOTH	FL-FLEXURED	BC-BROKEN CORE	DIAMETRAL POINT LOAD INDEX (MPa)	NOTES WATER LEVELS INSTRUMENTATION
									CL-CLEAVAGE	J-JOINT	R-ROUGH	UE-UNEVEN	MB-MECH. BREAK		
									SH-SHEAR	P-POLISHED	ST-STEPPED	W-WAVY	B-BEDDING		
									VN-VEIN	S-SLICKENSIDED	PL-PLANAR	C-CURVED			
									RECOVERY	R.Q.D. %	FRACT. INDEX PER 0.3	DISCONTINUITY DATA DIP w.r.t. CORE AXIS	TYPE AND SURFACE DESCRIPTION	HYDRAULIC CONDUCTIVITY K, cm/sec	
									TOTAL CORE %	SOLID CORE %				10 ⁻⁸	10 ⁻⁷
									0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0		10 ⁻⁶	10 ⁻⁵
		Continued from Record of Borehole		297.20											
		Fresh, foliated, very strong, grey GNEISS (Bedrock)		0.40	1								Fo, PL-R, blot Fo, PL-R, blot Fo, PL-R, blot MB		
1	B' Casing BQRC				2								Fo, PL-R Fo, PL-R Fo, PL-R MB		
					3								MB MB BC J, PL-R MB MB		
		END OF BOREHOLE		296.10											
				1.50											
2															
3															
4															
5															
6															
7															
8															
9															
10															

DRILLHOLE RK1168-2.GPJ GLDR CAN.GDT 10/7/01 MMZ

DEPTH SCALE

1 : 50



LOGGED: AZ

CHECKED: AZ

PROJECT <u>001-1168-2</u>		RECORD OF BOREHOLE No BH 01-23		1 OF 1	METRIC
W.P. <u>711-92-00</u>		LOCATION <u>N 5161553.3; E 294002.0 (AREA 7)</u>		ORIGINATED BY <u>AZ</u>	
DIST <u>54</u> HWY <u>11</u>		BOREHOLE TYPE <u>Wet Rotary Using 'B' Size Casing with Portable Equipment</u>		COMPILED BY <u>AZ</u>	
DATUM <u>Geodetic</u>		DATE <u>May 24, 2001</u>		CHECKED BY <u>JPD</u>	

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC NATURAL LIQUID LIMIT MOISTURE CONTENT LIMIT			UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa		w _p	w	w _L		
								○ UNCONFINED	+ FIELD VANE					
296.7	GROUND SURFACE													
0.0 296.4 0.3	Fibrous Peat, some silt, trace sand Very soft Black Wet		1	SS										
	Sand and Gravel, trace silt Numerous granitic cobbles up to 0.15m in size		R1	RC										
295.0	Borehole advanced to 1.7m depth by coring through cobbles													
1.7	Bedrock cored from 1.7m to 2.9m For bedrock coring details refer to Record of Drillhole BH01-23													
293.9 2.9	END OF BOREHOLE													
Notes: 1. Water level at ground surface at start of drilling. 2. Casing refusal at 1.7m depth. 3. Stratigraphy inferred from wash samples obtained between 0.9m and 1.2m depth.														

ON_MOT 00111682.GPJ ON MOT.GDT 9/7/01

PROJECT: 001-1168-2

RECORD OF DRILLHOLE: BH 01-23

SHEET 1 OF 1

LOCATION: N 5161553.3, E 294002.0 (AREA 7)

DRILLING DATE: May 24, 2001

DATUM: Geodetic

INCLINATION: -90°

AZIMUTH: ---

DRILL RIG: Hilti DD-250 E; Portable

DRILLING CONTRACTOR: Marathon Drilling Co.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	PENETRATION RATE (mm/min)	FLUSH	COLOUR % RETURN	FR-FRACTURE CL-CLEAVAGE SH-SHEAR VN-VEIN	F-FAULT J-JOINT P-POLISHED S-SLICKENSIDED	SM-SMOOTH R-ROUGH ST-STEPPED PL-PLANAR	FL-FLEXURED UE-UNEVEN W-WAVY C-CURVED	BC-BROKEN CORE MB-MECH. BREAK B-BEDDING	HYDRAULIC CONDUCTIVITY K _f cm/sec	DIAMETRAL POINT LOAD INDEX (MPa)	NOTES WATER LEVELS INSTRUMENTATION
		Continued from Record of Borehole		295.00												
2	18" Casing BORC	Fresh, foliated, very strong, grey GNEISS (Bedrock)		1.70	1											
					2											
					3											
3		END OF BOREHOLE		293.80 2.90												
4																
5																
6																
7																
8																
9																
10																
11																

DEPTH SCALE

1:50

Golder
Associates

LOGGED: AZ

CHECKED: AZ

DRILLHOLE: RK1168-2.GPJ GLDR_CAN.GDT 10/7/01 MMZ

PROJECT 001-1168-2		RECORD OF BOREHOLE No BH 01-24				1 OF 1		METRIC							
W.P. 711-92-00		LOCATION N 5161571.4; E 293988.9 (AREA 7)				ORIGINATED BY AZ									
DIST 54 HWY 11		BOREHOLE TYPE Wet Rotary Using 'B' Size Casing with Portable Equipment				COMPILED BY AZ									
DATUM Geodetic		DATE May 24, 2001				CHECKED BY JPD									
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa							
297.5	GROUND SURFACE														
0.0	Topsoil														
0.2	Sand, some gravel, trace organics up to 0.7m depth Numerous granitic cobbles and boulders up to 0.3m in size Loose to dense Brown		1	SS	3										
			2	SS	40.1										
			R1	RC											
			R2	RC											
295.2															
2.3	Bedrock cored from 2.3m to 2.8m For bedrock coring details refer to Record of Drillhole BH01-24														
294.8															
2.8	END OF BOREHOLE														
Notes: 1. Water level in piezometer at 1.0m depth (Elev.296.5m) on June 11, 2001. 2. Casing refusal at 1.6m depth.															

ON_MOT_00111682.GPJ ON_MOT.GDT 9/7/01

PROJECT: 001-1168-2

RECORD OF DRILLHOLE: BH 01-24

SHEET 1 OF 1

LOCATION: N 5161571.4; E 293988.9 (AREA 7)

DRILLING DATE: May 24, 2001

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: Hilti DD-250 E; Portable

DRILLING CONTRACTOR: Marathon Drilling Co.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	PENETRATION RATE (mm/min)	FLUSH	COLOUR % RETURN	FR-FRACTURE		F-FAULT		SM-SMOOTH		FL-FLEXURED		BC-BROKEN CORE		DIAMETRAL INDEX (MPa)	NOTES WATER LEVELS INSTRUMENTATION								
									CL-CLEAVAGE	J-JOINT	R-ROUGH	UE-UNEVEN	MB-MECH. BREAK	B-BEDDING	SH-SHEAR	P-POLISHED	ST-STEPPED	W-WAVY			SH-SHEAR	P-POLISHED	ST-STEPPED	W-WAVY	SH-SHEAR	P-POLISHED	ST-STEPPED	W-WAVY
									SH-SHEAR	P-POLISHED	ST-STEPPED	W-WAVY	SH-SHEAR	P-POLISHED	ST-STEPPED	W-WAVY	SH-SHEAR	P-POLISHED			ST-STEPPED	W-WAVY	SH-SHEAR	P-POLISHED	ST-STEPPED	W-WAVY	SH-SHEAR	P-POLISHED
		Continued from Record of Borehole		295.20																								
	B' Coating BORC	Fresh, foliated, very strong, grey GNEISS (Bedrock)		2.30	1																							
				2																								
				3																								
		END OF BOREHOLE		294.70 2.80																								

DRILLHOLE RK1188-2.GPJ GLDR CAN.GDT 10/7/01 MMZ

DEPTH SCALE

1 : 50



LOGGED: AZ

CHECKED: AZ

PROJECT 001-1168-2		RECORD OF BOREHOLE No BH 01-25				1 OF 1		METRIC								
W.P. 711-92-00		LOCATION N 5161746.2; E 293885.0 (AREA 8)				ORIGINATED BY AZ										
DIST 54 HWY 11		BOREHOLE TYPE Wet Rotary Using 'B' Size Casing with Portable Equipment				COMPILED BY AZ										
DATUM Geodetic		DATE May 16, 2001				CHECKED BY JPD										
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20	40	60						80
299.3	GROUND SURFACE															
0.0	Fibrous Peat, some silt, trace sand and gravel Very soft Black Wet		1	SS	PM											
			2	SS	PM											
297.9	Silty Sand, trace to some gravel Numerous cobbles up to 0.2m in size															
1.4	Borehole advanced from 1.6m to 3.0m depth by coring through cobbles															
	Stratigraphy inferred from wash samples from 1.6m to 2.1m depth		R1	RC												
296.3	Bedrock cored from 3.0m to 3.7m For bedrock coring details refer to Record of Drillhole BH01-25															
3.0																
295.6																
3.7	END OF BOREHOLE															
	Note: 1. Water level in open borehole at 0.6m depth (Elev.298.7m) before start of coring. 2. Water level in piezometer measured at ground surface (Elev.299.3m) on June 11, 2001. 3. Casing refusal at 1.6m depth.															

ON_MOT 00111682.GPJ ON_MOT.GDT 9/7/01

DATUM: Geodetic

DRILL RIG: Hilti DD-250 E; Portable

DRILLING CONTRACTOR: Marathon Drilling Co.

[illegible]

DRILLHOLE RK1168-2.GPJ GLDR_CAN.GDT 9/7/01 MMZ

DEPTH SCALE

1 : 50

LOGGED: AZ

CHECKED: AZ

PROJECT <u>001-1168-2</u>		RECORD OF BOREHOLE No BH 01-26		1 OF 1	METRIC
W.P. <u>711-92-00</u>		LOCATION <u>N 5154332.7; E 300226.9 (AREA 1)</u>		ORIGINATED BY <u>DE</u>	
DIST <u>54</u> HWY <u>11</u>		BOREHOLE TYPE <u>108mm I.D. Hollow Stem Augers</u>		COMPILED BY <u>AZ</u>	
DATUM <u>Geodetic</u>		DATE <u>June 4, 2001</u>		CHECKED BY <u>JPD</u>	

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa					WATER CONTENT (%)				
361.8	GROUND SURFACE																
0.0	Asphalt																
0.2	Gravelly sand to sand, some gravel, trace silt (Fill) Very loose to dense Brown to grey Moist		1	SS	35											26 66 (8)	
			2	SS	21											17 75 (8)	
			3	SS	3												
			4	SS	8												
			5	SS	5												
			6	SS	5												
	Pieces of wood up to 0.15m in size at 4.6m depth.		7	SS	5												
356.2	Organic Silt, trace to some sand, trace gravel, occasional pieces of wood Stiff Black Moist		8	SS	10										134.6		
354.8	Sand, trace to some gravel, silt and organics Compact Brown to grey Moist to wet		9	SS	16												
7.0			10	SS	28											2 90 (8)	
351.1	END OF BOREHOLE																
10.7	Note: 1. Water level in open borehole measured at 5m depth (Elev.356.8m) upon completion of drilling operation.																

ON_MOT_0011682.GPJ ON_MOT.GDT 25/9/01

PROJECT 001-1168-2		RECORD OF BOREHOLE No BH 01-27				1 OF 1		METRIC						
W.P. 711-92-00		LOCATION N 5154309.5; E 300272.6 (AREA 1)				ORIGINATED BY DE								
DIST 54 HWY 11		BOREHOLE TYPE 108mm I.D. Hollow Stem Augers				COMPILED BY AZ								
DATUM Geodetic		DATE June 4, 2001				CHECKED BY JPD								
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT w _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa						
359.3	GROUND SURFACE													
0.0	Topsoil													
0.1	Sandy Silt, trace to some organics, trace clay		1	SS	2									
358.7	Very loose													
0.6	Brown													
	Moist													
	Sand and Gravel, trace to some silt, trace organics and clay, occasional cobbles		2	SS	63									
357.4	Very dense													
	Brown		3	SS	168									
357.4	Moist													
1.9	Bedrock cored from 1.9m to 3.0m For bedrock coring details refer to Record of Drillhole BH01-27													
356.3														
3.0	END OF BOREHOLE													
	Note: 1. Open borehole dry prior to start of bedrock coring operation.													

ON_MOT 00111682.GPJ ON_MOT.GDT 9/7/01

PROJECT: 001-1168-2

RECORD OF DRILLHOLE: BH 01-27

SHEET 1 OF 1

LOCATION: N 5154309.5; E 300272.6 (AREA 1)

DRILLING DATE: June 4, 2001

DATUM: Geodetic

INCLINATION: -90°

AZIMUTH: ---

DRILL RIG: CME 55 Bombardier

DRILLING CONTRACTOR: Marathon Drilling Co.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	PENETRATION RATE (mm/min)	FLUSH	COLOUR % RETURN	FR-FRACTURE CL-CLEAVAGE SH-SHEAR VN-VEIN	F-FAULT J-JOINT P-POLISHED S-SLICKENSIDED	SM-SMOOTH R-ROUGH ST-STEPPED PL-PLANAR	FL-FLEXURED UE-UNEVEN W-WAVY C-CURVED	BC-BROKEN CORE MB-MECH. BREAK B-BEDDING	HYDRAULIC CONDUCTIVITY K, cm/sec	DIP w.r.t. CORE AXIS	FRACT. INDEX PER 0.3	DISCONTINUITY DATA TYPE AND SURFACE DESCRIPTION	DIAMETRAL POINT LOAD INDEX (MPa)	NOTES WATER LEVELS INSTRUMENTATION
2	N' Casing NQRC	Continued from Record of Borehole		357.40															
		Fresh, foliated, very strong, pink to grey, GNEISS (Bedrock)		1.90															
3				356.30															
		END OF BOREHOLE		3.00															
4																			
5																			
6																			
7																			
8																			
9																			
10																			
11																			

DRILLHOLE RK1168-2.GPJ GLDR CAN.GDT 97/01 MMZ

DEPTH SCALE

1 : 50



LOGGED: DE

CHECKED: AZ

PROJECT 001-1168-2		RECORD OF BOREHOLE No BH 01-28				1 OF 1		METRIC								
W.P. 711-92-00		LOCATION N 5154325.4; E 300253.3 (AREA 1)				ORIGINATED BY DE										
DIST 54 HWY 11		BOREHOLE TYPE 108mm I.D. Hollow Stem Augers				COMPILED BY AZ										
DATUM Geodetic		DATE June 4, 2001				CHECKED BY JPD										
SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT w _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			"N" VALUES	SHEAR STRENGTH kPa								
358.4	GROUND SURFACE						20	40	60	80	100					
0.9	Topsoil		1	SS	2								o			
	Sand and Gravel, trace to some silt and clay		2	SS	10								o			
	Very loose to very dense															
	Brown															
	Wet															
356.6			3	SS	60/0.2							o				
1.8	END OF BOREHOLE (Auger Refusal; Probable Bedrock)															
	Notes:															
	1. Water level in open borehole measured at 0.2m depth (Elev.356.2m) upon completion of drilling operation.															
	2. Water level in piezometer measured at 0.7m depth (Elev.357.7m) on June 11, 2001.															

ON_MOT 00111682.GPJ ON_MOT.GDT 9/7/01

PROJECT 001-1168-2			RECORD OF BOREHOLE No BH 01-29			1 OF 1			METRIC				
W.P. 711-92-00			LOCATION N 5155976.2; E 298540.1 (AREA 3)			ORIGINATED BY DE							
DIST 54 HWY 11			BOREHOLE TYPE 108mm I.D. Hollow Stem Augers			COMPILED BY AZ							
DATUM Geodetic			DATE June 5, 2001			CHECKED BY JPD							
SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT w _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			"N" VALUES	SHEAR STRENGTH kPa					
							20 40 60 80 100						
349.4	GROUND SURFACE						20 40 60 80 100						
0.0	Asphalt		1	SS	25								
	Sand and Gravel, trace to some silt, trace clay (Fill) Loose to compact Brown Moist		2	SS	15								
			3	SS	7								
347.1													
2.3	Cobbles with Sand and Gravel, trace to some silt (Rockfill) Dense to very dense Grey Moist becoming wet at 4.5m depth		4	SS	43								
			5	SS	90/15								
			R1	RC									
344.5			6	SS	122/2								
4.9	Bedrock cored from 4.9m to 7.4m For bedrock coring details refer to Record of Drillhole BH01-29												
342.0													
7.4	END OF BOREHOLE												
	Note: 1. Water level in open borehole at about 4.5m depth (Elev. 344.9) prior to start of Rock Coring.												

ON_MOT 00111682.GPJ ON_MOT.GDT 9/7/01

PROJECT: 001-1168-2

RECORD OF DRILLHOLE: BH 01-29

SHEET 1 OF 1

LOCATION: N 5155976.2; E 298540.1 (AREA 3)

DRILLING DATE: June 5, 2001

DATUM: Geodetic

INCLINATION: -90°

AZIMUTH: ---

DRILL RIG: CME 55 Bombardier

DRILLING CONTRACTOR: Marathon Drilling Co.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV.		RUN No.	PENETRATION RATE (m/min)	FLUSH	COLOUR % RETURN	FR-FRACTURE F-FAULT SM-SMOOTH FL-FLEXURED BC-BROKEN CORE CL-CLEAVAGE J-JOINT R-ROUGH UE-UNEVEN MB-MECH. BREAK SH-SHEAR P-POLISHED ST-STEPPED W-WAVY B-BEDDING VN-VEIN S-SLICKENSIDED PL-PLANAR C-CURVED										DIAMETRAL POINT LOAD INDEX (MPa)	NOTES WATER LEVELS INSTRUMENTATION																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
				DEPTH (m)	RECOVERY					R.Q.D. %	FRACT. INDEX PER 0.3	DISCONTINUITY DATA		HYDRAULIC CONDUCTIVITY																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
												TOTAL CORE %	SOLID CORE %	DIP w.r.t. CORE AXIS	TYPE AND SURFACE DESCRIPTION	10 ⁻⁸	10 ⁻⁵	10 ⁻²																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
5	N Casing NORC	Continued from Record of Borehole		344.50																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									

DEPTH SCALE

1:50



LOGGED: DE

CHECKED: AZ

DRILLHOLE RK1168-2.GPJ GLDR_CAN.GDT 9/7/01 MMZ

RECORD OF BOREHOLE No BH 01-30										1 OF 1		METRIC				
PROJECT 001-1168-2			LOCATION N 5155957.9; E 298571.9 (AREA 3)			ORIGINATED BY DE										
W.P. 711-92-00			BOREHOLE TYPE 108mm I.D. Hollow Stem Augers			COMPILED BY AZ										
DIST 54 HWY 11			DATE June 5, 2001			CHECKED BY JPD										
DATUM Geodetic																
SOIL PROFILE			SAMPLES			DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT		REMARKS & GRAIN SIZE DISTRIBUTION (%)		
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	20 40 60 80 100			W _p	W	W _L	γ	GR SA SI CL	
346.3	GROUND SURFACE															
0.0 346.0 0.3	Fibrous Peat, trace to some sand and silt Very soft to soft Black Moist		1	SS	2		346							124		
345.1 1.2	Silty Sand, trace gravel, clay and organics Very loose to very dense Brown and grey Wet END OF BOREHOLE (Auger Refusal; Probable Bedrock)		2	SS	88/0.2						o				6 57 35 2	
<p>Note:</p> <p>1. Water level in piezometer measured at 0.5m depth (Elev.345.8m) on June 11, 2001.</p>																

ON_MOT 00111682.GPJ ON_MOT.GDT 10/7/01

<div style="display: flex; justify-content: space-between;"> <div>PROJECT <u>001-1168-2</u></div> <div>RECORD OF BOREHOLE No BH 01-31</div> <div>1 OF 1</div> <div>METRIC</div> </div>														
W.P. <u>711-92-00</u>			LOCATION <u>N 5156361.8; E 298149.8 (AREA 4)</u>			ORIGINATED BY <u>DE</u>								
DIST <u>54</u> HWY <u>11</u>			BOREHOLE TYPE <u>108mm I.D. Hollow Stem Augers</u>			COMPILED BY <u>AZ</u>								
DATUM <u>Geodetic</u>			DATE <u>June 5, 2001</u>			CHECKED BY <u>JPD</u>								
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL X REMOULDED						
350.8	GROUND SURFACE													
0.0	Sand and Gravel to Gravelly Sand, trace to some silt, occasional cobbles (Fill) Compact Brown Moist		1	SS	18	▽								31 60 (9)
			2	SS	16									
			3	SS	19									
348.4	Schistose Gneiss, Cobbles and Boulders with sand and gravel Boulders up to 0.5m in size (Rockfill) Grey Moist	R1	RC											
2.4														
347.4	Silty Sand to Sand, some gravel, trace clay, occasional schistose gneiss, cobbles and boulders ranging from 0.08m to 0.35m in size Dense to very dense Grey Moist to wet	R2	RC											
3.4														
		4	SS	33										
		R3	RC											
		5	SS	85										
		R4	RC											
343.2													20 47 28 5	
7.6	END OF BOREHOLE													
	Note: 1. Water level in open borehole measured at 4.6m depth (Elev.346.2m) upon completion of drilling. 2. Attempted SPT sampling at 3.0m depth, 50 blows/0m penetration.													

ON_MOT 00111682.GPJ ON_MOT.GDT 97/01

PROJECT 001-1168-2		RECORD OF BOREHOLE No BH 01-32		1 OF 1		METRIC						
W.P. 711-92-00		LOCATION N 5156350.6; E 298172.8 (AREA 4)		ORIGINATED BY DE								
DIST 54 HWY 11		BOREHOLE TYPE 108mm I.D. Hollow Stem Augers		COMPILED BY AZ								
DATUM Geodetic		DATE June 6, 2001		CHECKED BY JPD								
SOIL PROFILE		SAMPLES		GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER			TYPE	"N" VALUES					
348.1	GROUND SURFACE											
0.0	Topsoil											
0.1	Silty Sand, some gravel, trace organics		1	SS	2							
347.5	Very loose											
0.6	Brown Moist Silty Sand to Sand, some gravel and cobbles, some silt, trace clay		2	SS	11							
	Gneiss cobbles up to 0.2m in size											
	Compact Grey Wet		3	SS	21							19 61 17 3
			4	SS	16							
			R1	RC								
343.5	END OF BOREHOLE											
4.6	Note: 1. Attempted SPT sampling at 3.8m depth; refusal due to presence of cobbles. 2. Water level in piezometer measured at 1.3m depth (Elev.346.8m) on June 11, 2001.											

ON_MOT 00111682.GPJ ON_MOT.GDT 97/01

PROJECT 001-1168-2			RECORD OF BOREHOLE No BH 01-33			1 OF 1			METRIC										
W.P. 711-92-00			LOCATION N 5162873.6; E 293198.1 (AREA 9)			ORIGINATED BY DE													
DIST 54 HWY 11			BOREHOLE TYPE 108mm I.D. Hollow Stem Augers			COMPILED BY AZ													
DATUM Geodetic			DATE June 6, 2001			CHECKED BY JPD													
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT w _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)				
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20	40	60						80	100	20	40
325.4	GROUND SURFACE																		
0.0	Sand and Gravel, trace silt (Fill) Compact to very dense Brown becoming reddish brown at about 1.2m depth		1	SS	28		325												38 55 (7)
			2	SS	80/09		324												
323.7																			
1.7	Silty Sand, trace gravel, trace clay, trace to some organics Loose to compact Brown to grey Moist		3	SS	7														5 58 35 2
322.8			4	SS	25		323												9 69 20 2
2.6	Bedrock cored from 2.6m to 5.4m For bedrock coring details refer to Record of Drillhole BH01-33						322												
							321												
320.0							320												
5.4	END OF BOREHOLE																		
	Note: 1. Borehole dry prior to start of coring.																		

ON_MOT_00111682.GPJ ON_MOT.GDT 10/7/01

PROJECT: 001-1168-2

RECORD OF DRILLHOLE: BH 01-33

SHEET 1 OF 1

LOCATION: N 5162873.6; E 293198.1 (AREA 9)

DRILLING DATE: June 6, 2001

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: CME 55 Bombardier

DRILLING CONTRACTOR: Marathon Drilling Co.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV.		RUN No.	PENETRATION RATE (mm/min)	FLUSH	COLOUR % RETURN	FR-FRACTURE				F-FAULT				SM-SMOOTH				FL-FLEXURED				BC-BROKEN CORE				DIAMETRAL POINT LOAD INDEX (MPa)	NOTES WATER LEVELS INSTRUMENTATION																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
				DEPTH (m)	RECOVERY					TOTAL CORE %	SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.3	DIP w.r.t. CORE AXIS	DISCONTINUITY DATA				HYDRAULIC CONDUCTIVITY																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
															TYPE AND SURFACE DESCRIPTION	10 ⁻⁸	10 ⁻⁶	10 ⁻⁴	10 ⁻²	K, cm/sec																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			

DRILLHOLE RK1188-2.GPJ GLDR CAN.GDT 10/7/01 MMZ

DEPTH SCALE

1 : 50



LOGGED: DE

CHECKED: AZ

RECORD OF BOREHOLE No BH 01-34										1 OF 1		METRIC			
PROJECT 001-1168-2			W.P. 711-92-00			LOCATION N 5162901.5; E 293197.3 (AREA 9)			ORIGINATED BY DE						
DIST 54 HWY 11			BOREHOLE TYPE 108mm I.D. Hollow Stem Augers			COMPILED BY AZ									
DATUM Geodetic			DATE June 6, 2001			CHECKED BY JPD									
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	N° VALUES			SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x REMOULDED							
321.5 0.0	GROUND SURFACE Sand and Gravel, trace silt and organics (Fill) Compact		1	SS	11										
320.8 0.8	Boulders and Cobbles with sand and gravel Boulders ranging from 0.2m to 0.9m in size (Rockfill)		2	SS	75/0										
			R1	RC											
			R2	RC											
318.2 3.3	Bedrock cored from 3.3m to 4.7m For bedrock coring details refer to Record of Drillhole BH01-34														
316.8 4.7	END OF BOREHOLE Note: 1. Water level in piezometer measured at 3.0m depth (Elev.318.5m) on June 11, 2001.														

ON_MOT 00111682.GPJ ON_MOT.GDT 10/7/01

PROJECT: 001-1168-2

RECORD OF DRILLHOLE: BH 01-34

SHEET 1 OF 1

LOCATION: N 5162901.5; E 293197.3 (AREA 9)

DRILLING DATE: June 6, 2001

DATUM: Geodetic

INCLINATION: -90°

AZIMUTH: ---

DRILL RIG: CME 55 Bombardier

DRILLING CONTRACTOR: Marathon Drilling Co.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV.	RUN No.	PENETRATION RATE (m/min)	COLOUR FLUSH % RETURN	FR-FRACTURE CL-CLEAVAGE SH-SHEAR VN-VEIN	F-FAULT J-JOINT P-POLISHED S-SLICKENSIDED	SM-SMOOTH R-ROUGH ST-STEPPED PL-PLANAR	FL-FLEXURED UE-UNEVEN W-WAVY C-CURVED	BC-BROKEN CORE MB-MECH. BREAK B-BEDDING	DIAMETRAL POINT LOAD INDEX (MPa)	NOTES WATER LEVELS INSTRUMENTATION				
				DEPTH (m)														
				RECOVERY											R.Q.D. %	FRACT. INDEX PER 0.3	DISCONTINUITY DATA	HYDRAULIC CONDUCTIVITY
				TOTAL CORE %											SOLID CORE %	DIP w.r.t. CORE AXIS	TYPE AND SURFACE DESCRIPTION	10 ⁻⁶ K, cm ³ /sec
				80 80														

DRILLHOLE RK1188-2.GPJ GLDR_CAN.GDT 10/7/01 MMZ

DEPTH SCALE

1:50



LOGGED: DE

CHECKED: AZ

ON_MOT 00111682.GPJ ON_MOT.GDT 9/7/01

+³, X³: Numbers refer to Sensitivity ○³% STRAIN AT FAILURE

RECORD OF BOREHOLE No BH 01-36										1 OF 1		METRIC		
PROJECT 001-1168-2			LOCATION N 5161590.7; E 293967.1 (AREA 7)			ORIGINATED BY DE								
W.P. 711-92-00			BOREHOLE TYPE 108mm I.D. Hollow Stem Augers			COMPILED BY AZ								
DIST 54 HWY 11			DATE June 11, 2001			CHECKED BY JPD								
DATUM Geodetic														
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			SHEAR STRENGTH kPa						
302.3	GROUND SURFACE													
0.0	Sand and Gravel, trace silt (Fill) Loose to compact Brown Moist		1	SS	17		302							
			2	SS	16		301							37 59 (4)
			3	SS	9		300							
			4	SS	23		299							
299.3	Gneiss Boulders and Cobbles with sand and gravel Boulders ranging from 0.4m to 0.6m in size (Rockfill) Grey Moist		5	SS	30/05		298							
				R1	RC		297							
297.5	Sand and Gravel, trace silt and clay, occasional cobbles up to 0.08m in size Compact to very dense Brown Wet		6	SS	28		296							43 48 8 1
				R2	RC		295							
296.3	Bedrock cored from 6.0m to 8.9m For bedrock coring details refer to Record of Drillhole BH01-36		7	SS	50/08		294							
293.4	END OF BOREHOLE													
8.9	Note: 1. Borehole dry prior to start of coring. 2. Auger refusal at 3.2m depth, borehole advanced using 'B' casing to 8m depth.													

ON_MOT_00111682.GPJ ON_MOT.GDT 10/7/01

PROJECT: 001-1168-2

RECORD OF DRILLHOLE: BH 01-36

SHEET 1 OF 1

LOCATION: N 5161590.7; E 293967.1 (AREA 7)

DRILLING DATE: June 11, 2001

DATUM: Geodetic

INCLINATION: -90°

AZIMUTH: ---

DRILL RIG: CME 55 Bombardier

DRILLING CONTRACTOR: Marathon Drilling Co.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	PENETRATION RATE (mm/min)	COLOUR % RETURN FLUSH	FR-FRACTURE CL-CLEAVAGE SH-SHEAR VN-VEIN	F-FAULT J-JOINT P-POLISHED S-SLICKENSIDED	SM-SMOOTH R-ROUGH ST-STEPPED PL-PLANAR	FL-FLEXURED UE-UNEVEN W-WAVY C-CURVED	BC-BROKEN CORE MB-MECH. BREAK B-BEDDING	DIAMETRAL POINT LOAD INDEX (MPa)	NOTES WATER LEVELS INSTRUMENTATION
		Continued from Record of Borehole		296.30										
6		Fresh, foliated, very strong, grey GNEISS (Bedrock)		6.00	1									
7														
8					2									
9		END OF BOREHOLE		293.40										
10				8.90										
11														
12														
13														
14														
15														
16														

DEPTH SCALE

1:50

Golder
Associates

LOGGED: DE

CHECKED: AZ

DRILLHOLE RK1188-2.GPJ GLDR CAN.GDT 9/7/01 MMZ

RECORD OF BOREHOLE No BH 01-37

1 OF 2

METRIC

PROJECT 001-1168-2

W.P. 711-92-00

LOCATION N 5161759.0; E 293860.0 (AREA 8)

ORIGINATED BY DE

DIST 54 HWY 11

BOREHOLE TYPE 108mm I.D. Hollow Stem Augers

COMPILED BY AZ

DATUM Geodetic

DATE June 12, 2001

CHECKED BY JPD

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	*N* VALUES			20	40	60	80	100		
306.1	GROUND SURFACE													
0.0	Asphalt													
0.2	Sand and Gravel, trace silt (Fill) Compact Brown Moist		1	SS	15									
			2	SS	19									
			3	SS	15									
303.3														
2.8	Granite and gneiss Cobbles and Boulders with sand and gravel Cobbles up to 0.2m in size, boulders up to 0.5m in size (Rockfill) Loose to dense Grey Moist		4	SS	9									
			5	SS	40									
			R1	RC										
			R2	RC										
			R3	RC										
			R4	RC										
			R5	RC										
293.8														
12.3	Silty Sand trace clay Numerous cobbles up to 0.08m in size		R6	SC										
292.9														
13.2	Bedrock cored from 13.2m to 13.9m For bedrock coring details refer to Record of Drillhole BH01-37													
292.2														
13.9														

Continued Next Page

+³, X³: Numbers refer to Sensitivity O³% STRAIN AT FAILURE

ON_MOT_00111682.GPJ ON_MOT_GDT 10/7/01

+³, ×³: Numbers refer to Sensitivity ○^{3%} STRAIN AT FAILURE

DATUM: Geodetic

DRILL RIG: CME 55 Bombardier

DRILLING CONTRACTOR: Marathon Drilling Co.

[illegible]

DEPTH SCALE

1 : 50

LOGGED: DE

CHECKED: AZ

ON MOT 00111682.GPJ ON MOT.GDT 9/7/01

+³, ×³: Numbers refer to Sensitivity **○^{3%}** STRAIN AT FAILURE

PROJECT: 001-1168-2

RECORD OF DRILLHOLE: BH 01-38

SHEET 1 OF 1

LOCATION: N 5161156.2; E 294079.2 (AREA 6)

DRILLING DATE: June 12, 2001

DATUM: Geodetic

INCLINATION: -90°

AZIMUTH: ---

DRILL RIG: CME 55 Bombardier

DRILLING CONTRACTOR: Marathon Drilling Co.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	PENETRATION RATE (m/min)	COLLOID % RETURN	FR-FRACTURE				F-FAULT		SM-SMOOTH		FL-FLEXURED		BC-BROKEN CORE		DIAMETRAL POINT LOAD INDEX (MPa)	NOTES WATER LEVELS INSTRUMENTATION				
								CL-CLEAVAGE		SH-SHEAR		VN-VEIN		J-JOINT		P-POLISHED		ST-STEPPED				W-WAVY		B-BEDDING	
								RECOVERY		R.Q.D.		FRACT. INDEX PER 0.3		DISCONTINUITY DATA		HYDRAULIC CONDUCTIVITY									
								TOTAL CORE %	SOLID CORE %																
		Continued from Record of Borehole		284.60																					
		Fresh, foliated, very strong, grey to pink GNEISS (Bedrock)		10.60	1																				
11	N' Casing NCRC				2																				
					3																				
					4																				
12																									
		END OF BOREHOLE		283.20																					
				12.00																					
13																									
14																									
15																									
16																									
17																									
18																									
19																									
20																									

DEPTH SCALE

1 : 50



LOGGED: DE

CHECKED: AZ

DRILLHOLE RK1168-2.GPJ GLDR_CAN.GDT 97/01 MMZ

TABLE 1
Summary of Areas and Field Investigation Program
Highway 11
G.W.P. 711-92-00

Township	Area	Borehole Number	Approximate Station and Offset	Northing (MTM Zone 12)	Easting (MTM Zone 12)	Ground Elevation (m)	Depth (m)
Blyth	1	01-27	15+500, RT	5154309.5	300272.6	359.3	3.0
		01-28	15+525, RT	5154325.4	300253.3	358.4	1.8
		01-26*	15+550, RT	5154332.7	300226.9	361.8	10.7
Notman	2	01-08	10+070, RT	5155396.7	299136.7	356.7	2.8
		01-07*	10+100, RT	5155412.3	299108.8	360.3	4.9
	3	01-30	10+866, RT	5155957.9	298571.9	346.3	1.2
		01-29*	10+900, RT	5155976.2	298540.1	349.4	7.4
	4	01-32	11+425, RT	5156350.6	298172.8	348.1	4.6
		01-31*	11+450, RT	5156361.8	298149.8	350.8	7.6
	5	TP 01-04	15+925, LT	5159436.6	294912.0	303.2	0.2
		TP 01-03	15+950, LT	5159452.9	294897.2	298.7	0.6
		TP 01-02	15+975, LT	5159472.1	294881.2	296.0	0.2
		TP 01-01	16+000, LT	5159491.4	294865.3	294.0	0.8
		01-12	16+030, LT	5159514.9	294844.1	289.6	4.1
		01-09*	16+050, LT	5159543.9	294851.2	299.3	23.9
		01-11	16+075, LT	5159549.1	294818.7	289.4	6.7
		01-10	16+100, LT	5159573.9	294795.5	292.2	3.4
		01-13	16+125, LT	5159606.1	294795.5	294.6	3.1
		01-35*	16+150, LT	5159621.5	294787.5	294.5	11.6
		01-14	16+175, LT	5159627.3	294752.5	291.8	2.2
		01-15	16+200, LT	5159665.0	294749.1	291.6	2.4
		01-16	16+225, LT	5159682.5	294732.1	290.2	2.3
		Zone 1	16+250, LT	5159708.9	294711.2	289.3	-
		Zone 2	16+275, LT	5159727.1	294697.3	288.8	-
		01-17	16+300, LT	5159747.2	294682.6	288.8	2.6
Lyman	6	01-18	11+350, LT	5161106.5	294066.0	289.0	4.6
		01-19	11+375, LT	5161135.2	294054.9	289.7	3.5
		01-38*	11+400, LT	5161156.2	294079.2	295.2	12
		01-20	11+425, LT	5161185.6	294061.3	289.1	2.8
	7	01-21	11+725, RT	5161481.4	294038.6	297.0	3.5
		01-22	11+750, RT	5161503.7	294024.2	297.6	1.5
		Zone 3	11+775, RT	5161537.0	294015.3	297.2	-
		01-23	11+800, RT	5161553.3	294002.0	296.7	2.9
		01-24	11+825, RT	5161571.4	293988.9	297.5	2.8
		01-36*	11+850, RT	5161590.7	293967.1	302.3	8.9
	8	01-25	12+025, RT	5161746.2	293885.0	299.3	3.7
		01-37*	12+050, RT	5161759.0	293860.0	306.1	13.9
	9	01-33*	13+350, RT	5162873.6	293198.1	325.4	5.4
		01-34	13+375, RT	5162901.5	293197.3	321.5	4.7

* Boreholes advanced from Highway 11 roadway grade.

TABLE 2
Summary of Investigated Zones and Test Pits
Highway 11, High Fill Embankment
G.W.P. 711-92-00

Township	Test Pit / Area Number	Approximate Station and Offset	Northing (MTM Zone 12)	Easting (MTM Zone 12)	Ground Elevation (m)	Depth (m)	Comments
Notman	TP 01-04	15+925, LT	5159436.6	294912.0	303.2	0.05 – 0.2	<ul style="list-style-type: none"> An area of about 0.6m x 1.2m was cleared. Stratigraphy consists of topsoil over bedrock. A number of probeholes (more than 10) were put down in the vicinity of the test pit location; rock at shallow depth (less than 0.3m).
	TP 01-03	15+950, LT	5159452.9	294897.2	298.7	0.05 – 0.6	<ul style="list-style-type: none"> A number of probeholes (more than 10) covering an area about 4 m x 4 m were advanced; rock at shallow depth (less than 0.6m). Stratigraphy consists of topsoil over bedrock. Confirmed by shallow test pits.
	TP 01-02	15+975, LT	5159472.1	294881.2	296.0	0.15 – 0.25	<ul style="list-style-type: none"> An area of about 0.3 m x 1.2 m was cleared. Stratigraphy consists of topsoil over bedrock. A number of probeholes (more than 10) were advanced in the vicinity of the test pit location; rock at shallow depth (less than 0.25m).

TABLE 2 (continued)
Summary of Investigated Zones and Test Pits
Highway 11, High Fill Embankment
G.W.P. 711-92-00

Township	Test Pit / Area Number	Approximate Station and Offset	Northing (MTM Zone 12)	Easting (MTM Zone 12)	Ground Elevation (m)	Depth (m)	Comments
Notman	TP 01-01	16+000, LT	5159491.4	294865.3	294.0	0.05 – 0.8	<ul style="list-style-type: none"> Two test pits, each approximately 0.75m x 0.75 m were excavated. Stratigraphy consists of topsoil (fibrous peat) over bedrock. A number of probeholes (more than 10) were advanced in the vicinity of the test pit location; rock at shallow depths (less than 0.3m).
	Zone 1	16+250, LT	5159708.9	294711.2	289.3	-	<ul style="list-style-type: none"> Not possible to set up drill rig due to numerous boulders at ground surface. A number of probeholes advanced within a radius of about 6m; cobbles and boulders at ground surface covered by topsoil; rock encountered at less than 0.25m depth.
	Zone 2	16+275, LT	5159727.1	294697.3	288.8	-	<ul style="list-style-type: none"> Rock outcropping exposed at two locations; cleared 1.5m x 0.6m area. Numerous cobbles and boulders. Not possible to set up drill rig. A number of probeholes advanced; less than 0.25m of topsoil.
Lyman	Zone 3	11+775, RT	5161537.0	294015.3	297.2	-	<ul style="list-style-type: none"> Exposed bedrock at ground surface.

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TABLE 3
Summary of Laboratory Tests
Highway 11
G.W.P. 711-92-00

<i>Area</i>	<i>Borehole No.</i>	<i>Sample No.</i>	<i>Simplified Soil Description</i>	<i>Water Content</i>	<i>Grain Size</i>	<i>Atterberg Limits</i>	<i>Organic Content</i>	<i>Specific Gravity</i>
1	01-27	1	Sandy Silt	x				
		2	Sand and Gravel	x				
		3		x	x			
	01-28	1	Sand and Gravel	x				
		2		x				
		3		x				
	01-26*	1	Gravelly Sand to Sand	x	x			
		2		x	x			
		3		x				
		4		x				
		5		x				
		6		x				
		8	Organic Silty Sand	x				
		9	Sand	x				
		10		x	x			
2	01-8	2	Organic Sandy Silt	x		x	x	x
		3	Gravelly Sand	x				
		4		x	x			
	01-7*	1	Gravelly Sand	x	x			
		5	Gravelly Sand	x				
3	01-30	1	Peat	x				
		2	Silty Sand	x	x			
	01-29*	1	Sand and Gravel	x				
		2		x				
		3		x	x			
4	01-32	1	Silty Sand	x				
		2		x				
		3		x	x			
		4		x				
	01-31*	1	Sand and Gravel to Gravelly Sand	x	x			
		2		x				
		3		x				
		4	Silty Sand	x				
5	01-9*	5		x	x			
		6	Sand	x				
		7		x	x			
	01-11	2	Sand and Gravel	x				
		5	Silty Sand	x				

TABLE 3 (continued)
Summary of Laboratory Tests
Highway 11
G.W.P. 711-92-00

<i>Area</i>	<i>Borehole No.</i>	<i>Sample No.</i>	<i>Simplified Soil Description</i>	<i>Water Content</i>	<i>Grain Size</i>	<i>Atterberg Limits</i>	<i>Organic Content</i>	<i>Specific Gravity</i>
5	01-10	1	Organic Silt	x			x	
		2	Sandy Silt	x	x			
	01-13	1	Sand	x	x			
	01-35*	1	Sand and Gravel to Sand	x				
		2		x	x			
		3		x				
	01-17	6	Sand and Gravel	x				
		1	Silt	x	x			
		2		x				
6	01-18	1	Peat	x				
		3	Gravelly Sand	x	x			
	01-19	2	Sand	x	x			
		3		x				
		4		x				
	01-38*	1	Sand and Gravel to Gravelly Sand	x	x			
		2		x				
		3		x				
7	01-20	1	Gravelly Sand	x				
		2		x				
	01-21	1	Peat	x				
		2	Sand	x				
	01-36*	1	Sand and Gravel	x				
		2		x	x			
		3		x				
		4		x				
8	01-25	1	Peat	x				
		2		x				
	01-37*	1	Sand and Gravel	x				
		2		x				
		3		x	x			
		6	Silty Sand		x			
9	01-33*	1	Sand and Gravel	x	x			
		2		x				
		3	Silty Sand	x	x			
		4		x	x			
	01-34	1	Sand and Gravel	x				

* Borehole advanced from Highway 11 roadway grade.

TABLE 3 (continued)
Summary of Laboratory Tests
Highway 11
G.W.P. 711-92-00

SUMMARY OF NUMBER OF TESTS

Natural Water Content	77
Atterberg Limits	1
Grain Size Distribution	28
Specific Gravity	1
Organic Content	2

Total number of samples obtained in boreholes: 111

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TABLE 4
Summary of Recommendations at High Fill Areas
Highway 11, High Fill Embankments
G.W.P. 711-92-00

Township	Area	Approx. Station	Existing Embankment Fill Type	Recommended Embankment Fill Type for Widening	Organics Encountered Within or Below Existing Embankment	Organics Encountered at Toe of Existing Embankment	Recommended Side Slope <i>for Rock fill emb.</i>	Side Berm Recommended	Anticipated Differential Settlement* (relative to centreline) (mm) (e/p to crest)	Swamp Excavation OPSD
Blyth	1	15+500 to 15+575 <i>75m</i>	Gravelly sand to sand some gravel, trace silt.	Sand and gravel	Yes. Up to 1.4 m thick with pieces of wood up to 0.15 m in size	Yes. Up to 0.5 m below ground surface.	2H : 1V	No.	70 to 140	203.020 (excavate existing slopes to 1H:1V)
Notman	2	10+050 to 10+100 <i>2.5m</i>	Sand and gravel and rockfill.	Rockfill	No.	Yes. <i>0.9</i> Up to 1.5 m below ground surface.	1.25H : 1V	No. <i>84 01-02 01-03 0.9m OS</i>	<20 to <50	203.030 (maintain existing slopes) <i>203.020 excavate.</i>
	3	10+850 to 10+900 <i>50m</i>	Sand and gravel and rockfill.	Rockfill	No.	Yes. Up to at least 0.3 m below ground surface.	1.25H : 1V	No. <i>84-01-30 01-29</i>	<10 to <40	203.030 (maintain existing slopes)
	4	11+420 to 11+460 <i>40m</i>	Sand and gravel and rockfill.	Rockfill	No.	Yes. Up to 0.6 m below ground surface.	1.25H : 1V	No.	<10 to <30	203.030 (maintain existing slopes)
	5 <i>X</i>	15+920 to 16+300 <i>380m</i>	Sand and gravel and rockfill.	Rockfill	No.	Yes. Up to 0.6 m below ground surface.	1.25H:1V	Yes. 6m high x 2 m wide (where embankment height exceeds 6 m).	<20 to <60	203.030 (maintain existing slopes)

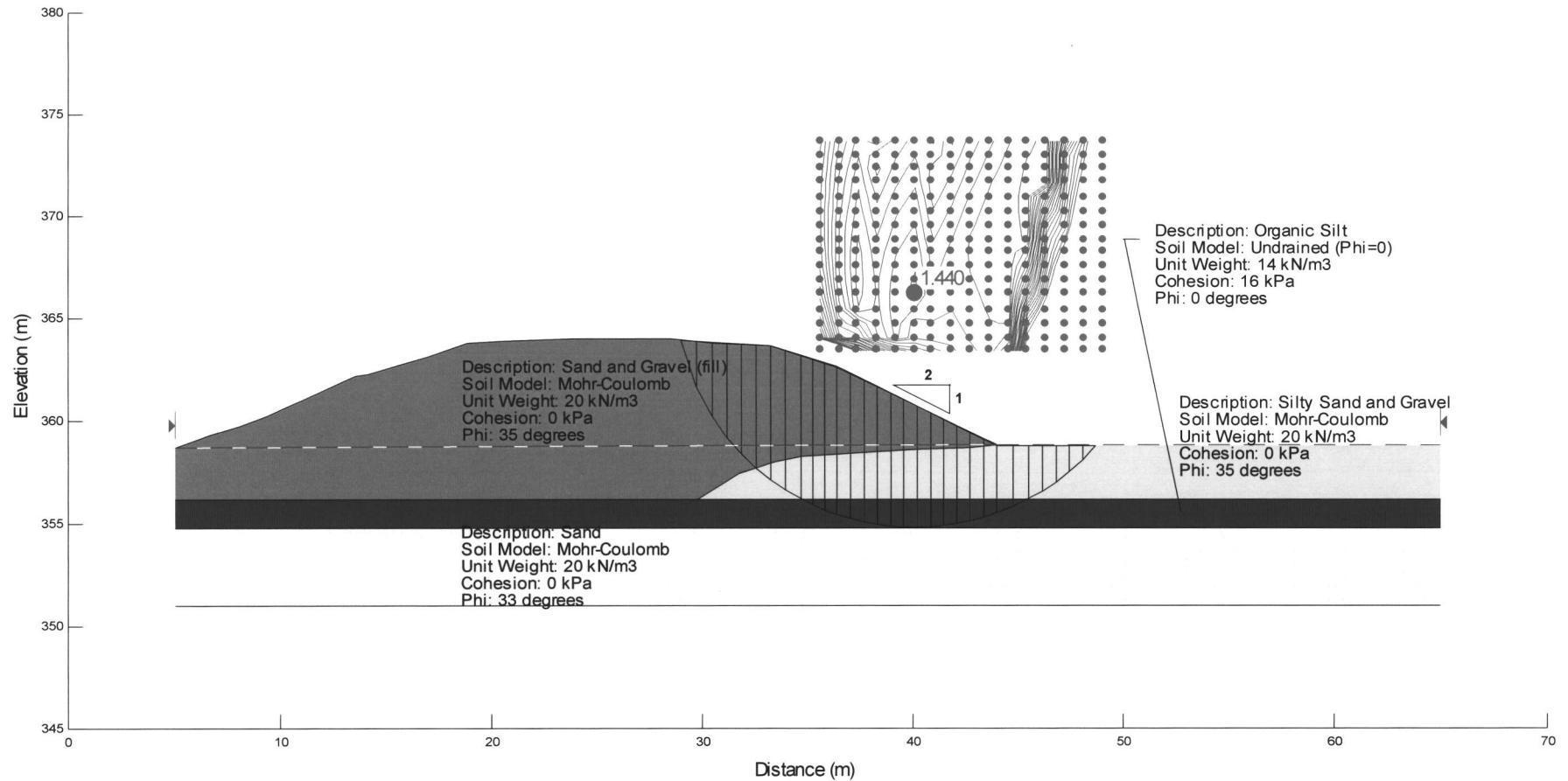
TABLE 4 (continued)
Summary of Recommendations at High Fill Areas
Highway 11, High Fill Embankments
G.W.P. 711-92-00

Township	Area	Approx. Station	Existing Embankment Fill Type	Recommended Embankment Fill Type for Widening	Organics Encountered Within or Below Existing Embankment	Organics Encountered at Toe of Existing Embankment	Recommended Side Slope	Side Berm Recommended	Anticipated Differential Settlements* (relative to centreline) (mm) (e/p to crest)	Swamp Excavation OPSD
Lyman	6	11+350 to 11+450 <i>(100m)</i>	Sand and gravel and rockfill.	Rockfill	No.	Yes. Up to at least <i>0.6</i> m below ground surface. <i>o</i>	1.25H:1V	Yes. 6m high x 2m wide (where embankment height exceeds 6 m).	<20 to <50	203.030 (maintain existing slopes)
	7	11+700 to 11+850 <i>(150m)</i>	Sand and gravel and rockfill.	Rockfill	No.	Yes. Up to <i>0.9</i> m below ground surface.	1.25H:1V	No.	<10 to <30	203.030 (maintain existing slopes)
	8	12+020 to 12+070 <i>(50m)</i>	Sand and gravel and rockfill.	Rockfill	Yes. With pieces of wood up to 0.025 m thick.	Yes. Up to 1.4 m below ground surface.	1.25H:1V	Yes. 6m high x 2m wide (where embankment height exceeds 6 m).	<70 to <90	203.020 (excavate existing slopes to 1H:1V)
	9	13+325 to 13+375 <i>(50m)</i>	Sand and gravel and rockfill.	Rockfill	No.	No. <i>o/p crest</i>	1.25H:1V	No.	<10 to <30	203.030 (maintain existing slopes)

***Note :** Differential settlements include compression of rockfill plus compression of organic layers below existing embankment (where encountered)
It is estimated that 65% of the anticipated differential settlements will occur within the first year following construction
e/p = edge of pavement crest = crest of new widened embankment

**HIGH FILL EMBANKMENT STABILITY
AREA 1 (BLYTH)**

Figure 12



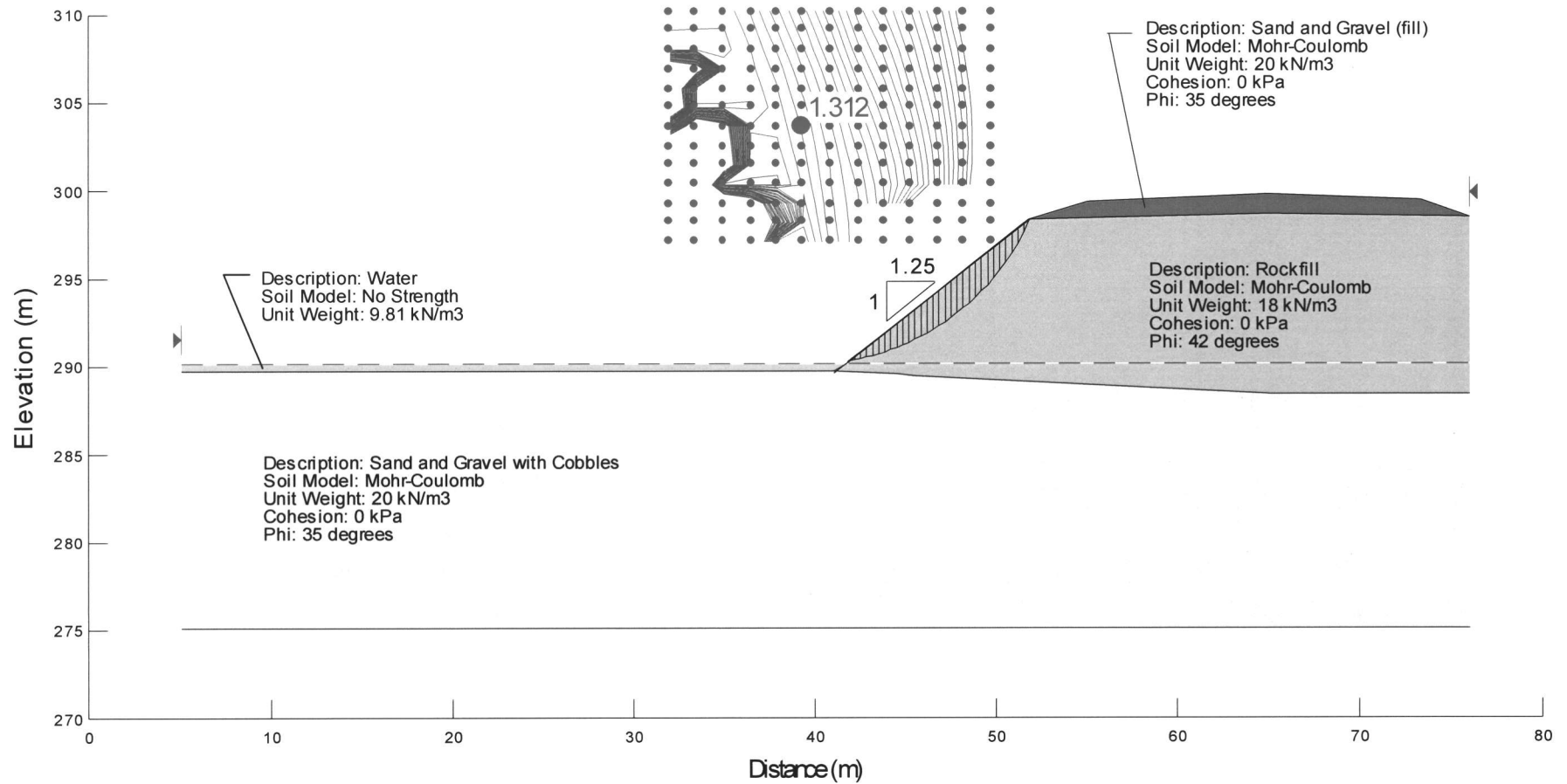
Date: September, 2001
Project: 001-1168-2

Golder Associates

Drawn: JPD
Checked: DEB

**HIGH FILL EMBANKMENT STABILITY
AREA 5 (NOTMAN)**

Figure 13



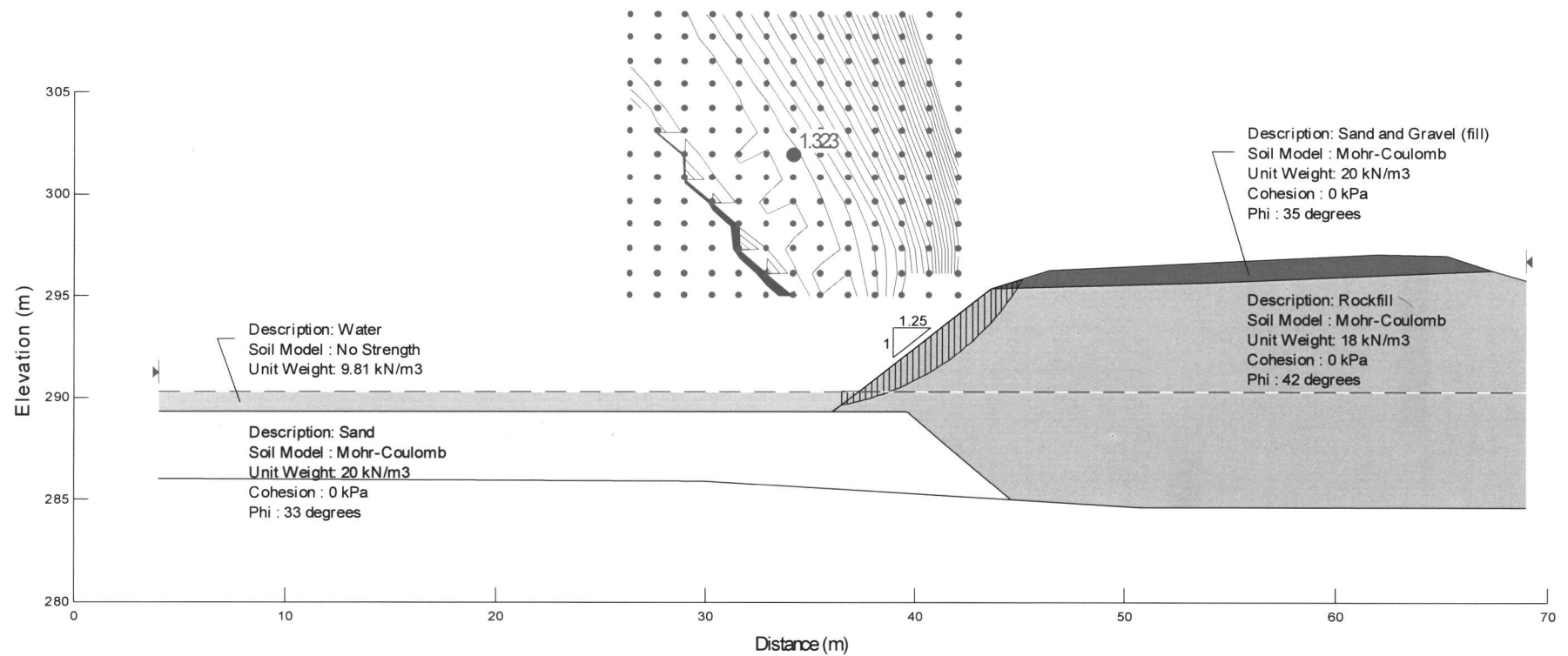
Date: September, 2001
Project: 001-1168-2

Golder Associates

Drawn: JPD
Checked: DEB

**HIGH FILL EMBANKMENT STABILITY
AREA 6 (LYMAN)**

Figure 14



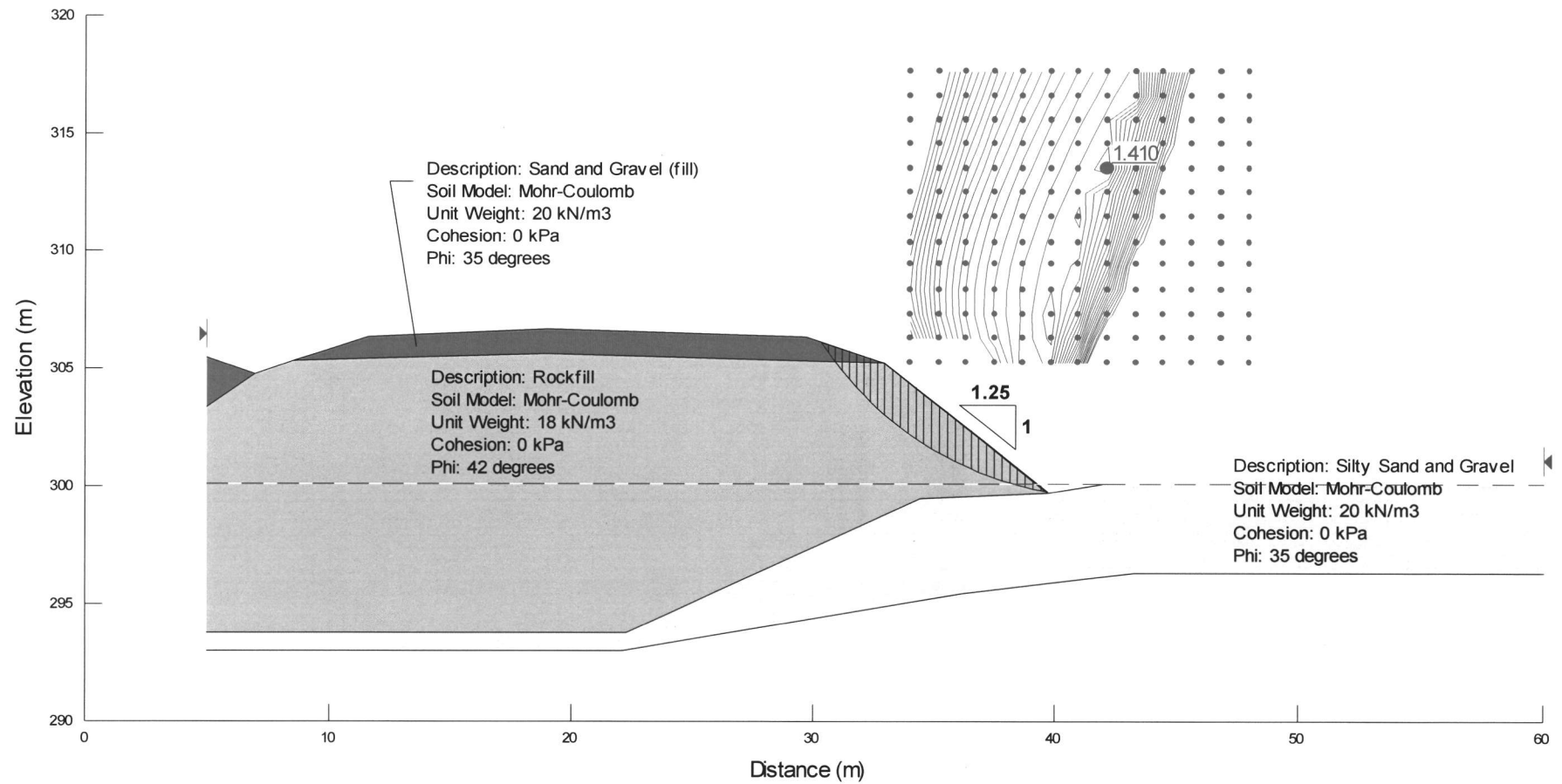
Date: September, 2001
Project: 001-1168-2

Golder Associates

Drawn: JPD
Checked: DEB

HIGH FILL EMBANKMENT STABILITY AREA 8 (LYMAN)

Figure 15



Date: September, 2001
 Project: 001-1168-2

Golder Associates

Drawn: JPD
 Checked: DEB

APPENDIX A
LABORATORY TEST DATA

TABLE A1

SUMMARY OF WATER CONTENT DETERMINATIONS

PROJECT NUMBER	001-1168-2
PROJECT NAME	McCormick Rankin / Hwy 11 & Tomiko R. Bridge / North Bay
DATE TESTED	June, 2001

Borehole No.	Sample No.	Depth (ft)	Depth (m)	Water Content (%)	Atterberg Limits LL, PL, PI
01-07	1	2.5-4.5	0.76-1.37	6.0%	LL=118.2, PL=73.35, PI=44.85
01-07	5	15.0-15.7	4.57-4.79	18.2%	
01-08	2	2.5-4.5	0.76-1.37	76.0%	
01-08	3	5.0-7.0	1.52-2.13	22.4%	
01-08	4	7.5-9.0	2.29-2.74	13.1%	
01-09	4	45.0-46.6	13.72-14.20	1.8%	
01-09	5	55.0-57.0	16.76-17.37	24.9%	
01-09	6	65.0-67.0	19.81-20.42	11.8%	
01-09	7	76.5-78.5	23.32-23.93	13.9%	
01-10	1	0.0-2.0	0.00-0.61	118.8%	
01-10	2	2.5-3.5	0.76-1.07	25.9%	
01-11	2	2.0-4.0	0.61-1.22	23.2%	
01-11	5	20.0-22.0	6.10-6.71	30.3%	
01-12	2	2.0-4.0	0.61-1.22	23.9%	
01-13	1	8.0-10.0	2.44-3.05	22.8%	
01-17	1	3.0-4.5	0.91-1.37	21.5%	
01-17	2	5.0-7.0	1.52-2.13	26.7%	
01-18	1	0.0-1.3	0.00-0.40	70.1%	
01-18	3	8.0-10.0	2.44-3.05	20.3%	
01-19	2	3.0-4.5	0.91-1.37	24.2%	
01-19	3	4.5-6.5	1.37-1.98	24.5%	
01-19	4	10.0-11.3	3.05-3.44	17.6%	
01-20	1	0.0-2.0	0.00-0.61	33.1%	
01-20	2	5.0-6.0	1.52-1.83	19.0%	
01-21	1	0.0-2.5	0.00-0.76	146.9%	
01-24	2	2.0-2.3	0.61-0.70	24.0%	
01-25	1	0.0-2.5	0.00-0.76	393.9%	
01-25	2	2.5-4.5	0.76-1.37	373.5%	

TABLE A1 (continued)

SUMMARY OF WATER CONTENT DETERMINATIONS

PROJECT NUMBER		001-1168-2			
PROJECT NAME		McCormick Rankin / Hwy 11 & Tomiko R. Bridge / North Bay			
DATE TESTED		June, 2001			
Borehole No.	Sample No.	Depth (ft)	Depth (m)	Water Content (%)	Atterberg Limits LL, PL, PI
01-26	1	0.5-2.5	0.15-0.76	4.8%	
01-26	2	2.5-4.5	0.76-1.37	5.3%	
01-26	3	7.5-9.5	2.29-2.90	9.0%	
01-26	4	7.5-9.5	2.29-2.90	10.2%	
01-26	5	10.0-12.0	3.05-3.66	5.4%	
01-26	6	12.5-14.5	3.81-4.42	12.0%	
01-26	8	20.0-22.0	6.10-6.71	134.6%	
01-26	9	25.0-27.0	7.62-8.23	32.7%	
01-26	10	30.0-32.0	9.14-9.75	13.8%	
01-27	1	0.0-2.0	0.00-0.61	39.0%	
01-27	2	2.5-4.5	0.76-1.37	17.4%	
01-27	3	5.0-7.0	1.52-2.13	10.6%	
01-28	1	0.0-2.0	0.00-0.61	42.1%	
01-28	2	2.5-4.5	0.76-1.37	28.2%	
01-28	3	5.0-5.9	1.52-1.80	10.0%	
01-29	1	0.0-2.0	0.00-0.61	4.7%	
01-29	2	2.5-4.5	0.76-1.37	5.3%	
01-29	3	5.0-7.0	1.52-2.13	8.6%	
01-30	1	0.0-2.0	0.00-0.61	124.1%	
01-30	2	2.5-3.9	0.76-1.19	12.9%	
01-31	1	0.0-2.0	0.00-0.61	4.8%	
01-31	2	2.5-4.5	0.76-1.37	7.9%	
01-31	3	5.0-7.0	1.52-2.13	6.1%	
01-31	4	15.0-17.0	4.57-5.18	10.2%	
01-31	5	20.0-22.0	6.10-6.71	7.1%	
01-32	1	0.0-2.0	0.00-0.61	42.8%	
01-32	2	2.5-4.5	0.76-1.37	21.0%	
01-32	3	5.0-7.0	1.52-2.13	10.8%	
01-32	4	7.5-9.5	2.29-2.90	10.1%	

TABLE A1 (continued)

SUMMARY OF WATER CONTENT DETERMINATIONS

PROJECT NUMBER		001-1168-2			
PROJECT NAME		McCormick Rankin / Hwy 11 & Tomiko R. Bridge / North Bay			
DATE TESTED		June, 2001			
Borehole	Sample	Depth	Depth	Water	Atterberg Limits
No.	No.	(ft)	(m)	Content	LL, PL, PI
01-33	1	0.0-2.0	0.00-0.61	4.4%	
01-33	2	2.5-2.9	0.76-0.88	3.0%	
01-33	3	5.0-7.0	1.52-2.13	25.6%	
01-33	4	7.5-8.5	2.29-2.59	17.2%	
01-34	1	0.0-2.0	0.00-0.61	3.6%	
01-35	1	0.0-2.0	0.00-0.61	3.2%	
01-35	2	2.5-4.5	0.76-1.37	4.3%	
01-35	3	5.0-7.0	1.52-2.13	5.7%	
01-35	6	19.6-20.3	5.97-6.19	14.8%	
01-36	1	0.0-2.0	0.00-0.61	4.1%	
01-36	2	2.5-4.5	0.76-1.37	5.0%	
01-36	3	5.0-7.0	1.52-2.13	3.9%	
01-36	4	7.5-9.5	2.29-2.90	3.6%	
01-36	6	15.8-17.8	4.82-5.43	9.8%	
01-37	1	0.5-2.5	0.15-0.76	3.9%	
01-37	2	2.5-4.5	0.76-1.37	3.2%	
01-37	3	5.0-7.0	1.52-2.13	3.9%	
01-38	1	0.0-2.0	0.00-0.61	4.1%	
01-38	2	2.5-4.5	0.76-1.37	3.0%	
01-38	3	5.0-7.0	1.52-2.13	7.2%	

TABLE A2
SUMMARY OF ORGANIC CONTENT DETERMINATIONS

PROJECT NUMBER		001-1168-2		
PROJECT NAME		McCormick Rankin / Hwy 11 & Tomiko R. Bridge / North Bay		
DATE TESTED		June, 2001		
Borehole No.	Sample No.	Depth ft	Depth m	Organic Content %
01-08	2	2.5-4.5	0.76-1.37	27.60
01-10	1	0.0-2.0	0.00-0.61	18.02

Notes:

1. Samples dried at 110 degree centigrade prior to testing.
2. Test performed according to ASTM D2974-87 Standard, test method C.
3. Organic matter determined by burning the oven dried samples in a muffle furnace at 440 degree centigrade.

TABLE A3
SPECIFIC GRAVITY TEST RESULTS

ASTM D 854-98 TEST METHOD A

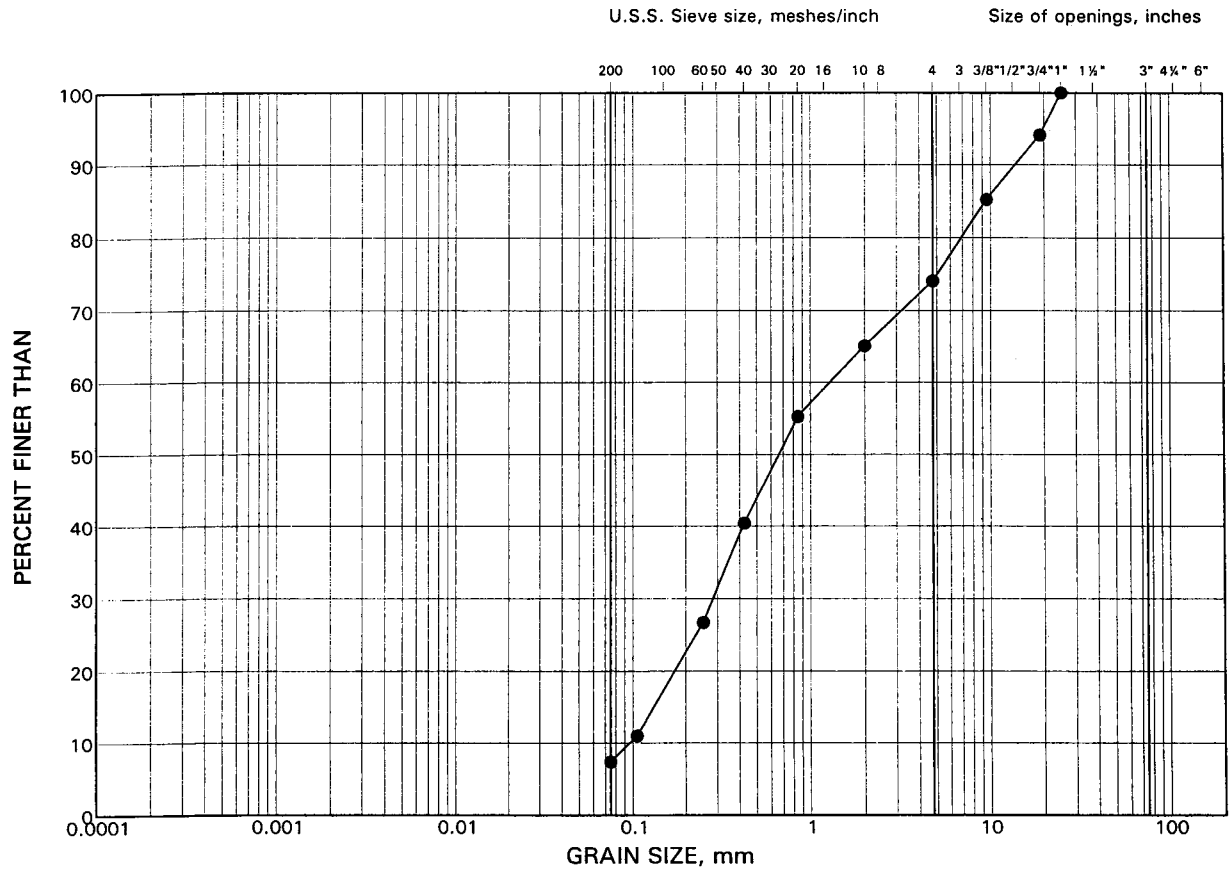
PROJECT NUMBER	001-1168-2	
PROJECT NAME	McCormick Rankin / Hwy 11 & Tomiko R. Bridge / North Bay	
DATE TESTED	June, 2001	
		Measured
Borehole	Sample	Specific
Number	Number	Gravity
01-08	2	2.16

Note: Test carried out on soil particles <4.75mm using kerosene .

GRAIN SIZE DISTRIBUTION (Area 1)

Gravelly Sand, trace Silt (Fill)

FIGURE A1



SILT AND CLAY SIZES		FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE
FINE GRAINED		SAND SIZE			GRAVEL SIZE		SIZE

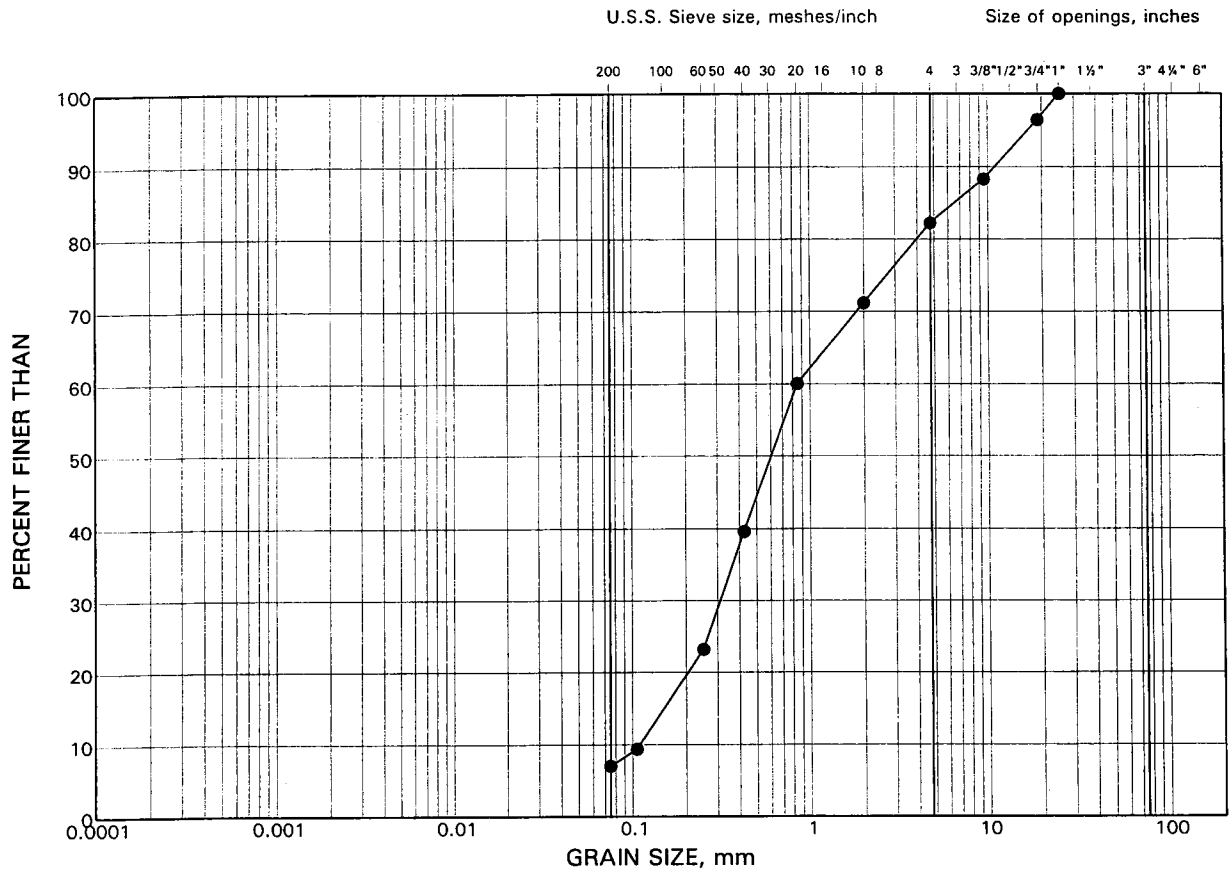
LEGEND

SYMBOL	BOREHOLE	SAMPLE	ELEVATION (m)
•	01-26	1	361.0

GRAIN SIZE DISTRIBUTION (Area 1)

Sand, some Gravel, trace Silt (Fill)

FIGURE A2



SILT AND CLAY SIZES		FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE
FINE GRAINED		SAND SIZE			GRAVEL SIZE		SIZE

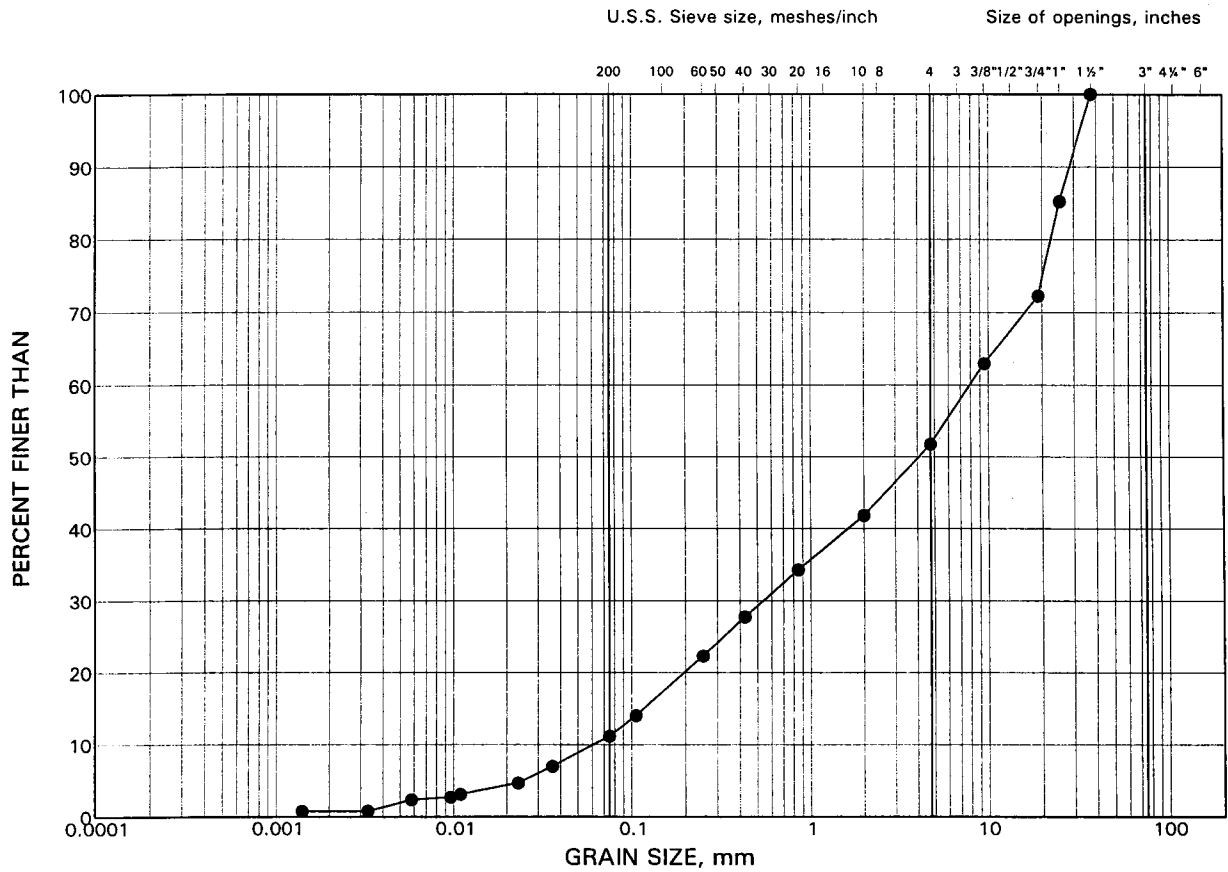
LEGEND

SYMBOL	BOREHOLE	SAMPLE	ELEVATION (m)
•	01-26	2	360.4

GRAIN SIZE DISTRIBUTION (Area 1)

Sand and Gravel, some Silt, trace Clay

FIGURE A3



SILT AND CLAY SIZES		FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE
FINE GRAINED		SAND SIZE			GRAVEL SIZE		SIZE

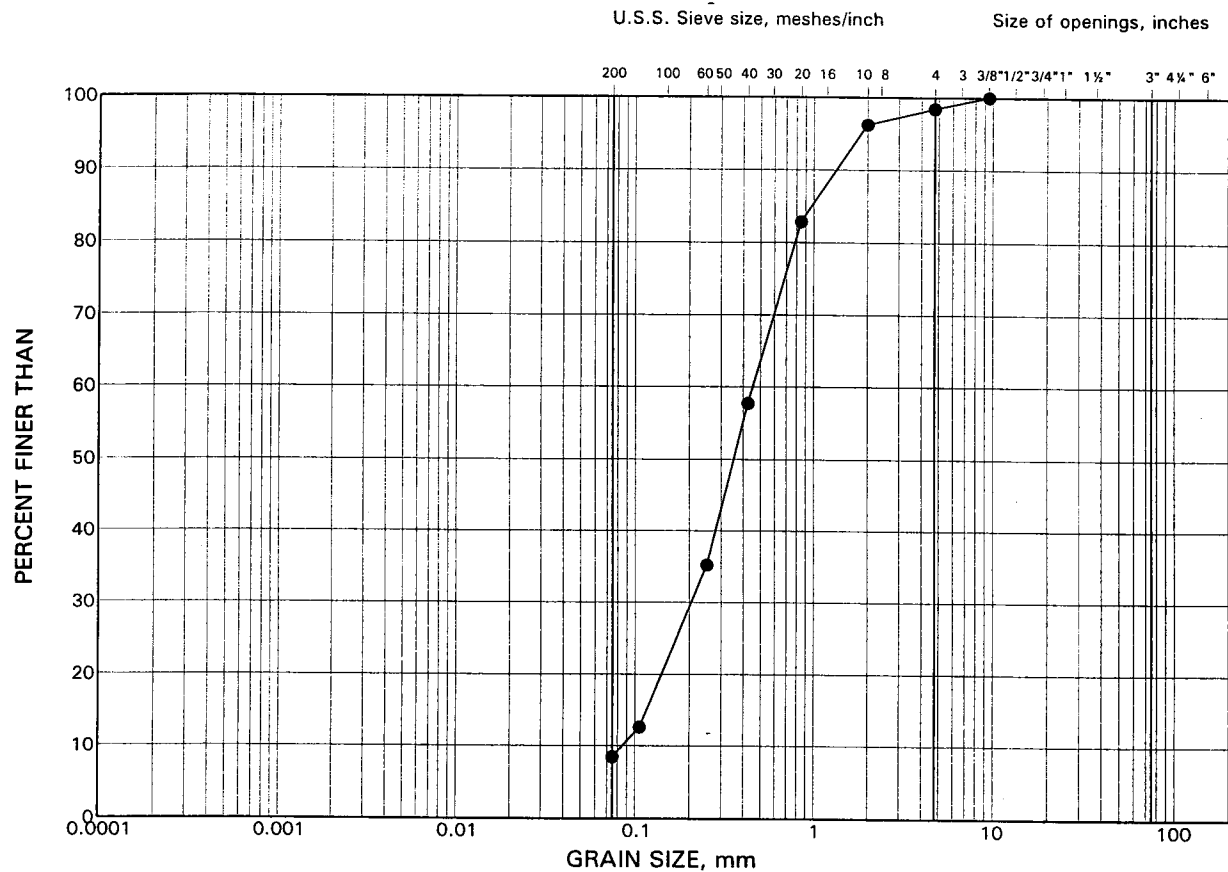
LEGEND

SYMBOL	BOREHOLE	SAMPLE	ELEVATION (m)
•	01-27	3	357.5

GRAIN SIZE DISTRIBUTION (Area 1)

Sand, trace Gravel, trace Silt

FIGURE A4



SILT AND CLAY SIZES		FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE
FINE GRAINED		SAND SIZE			GRAVEL SIZE		SIZE

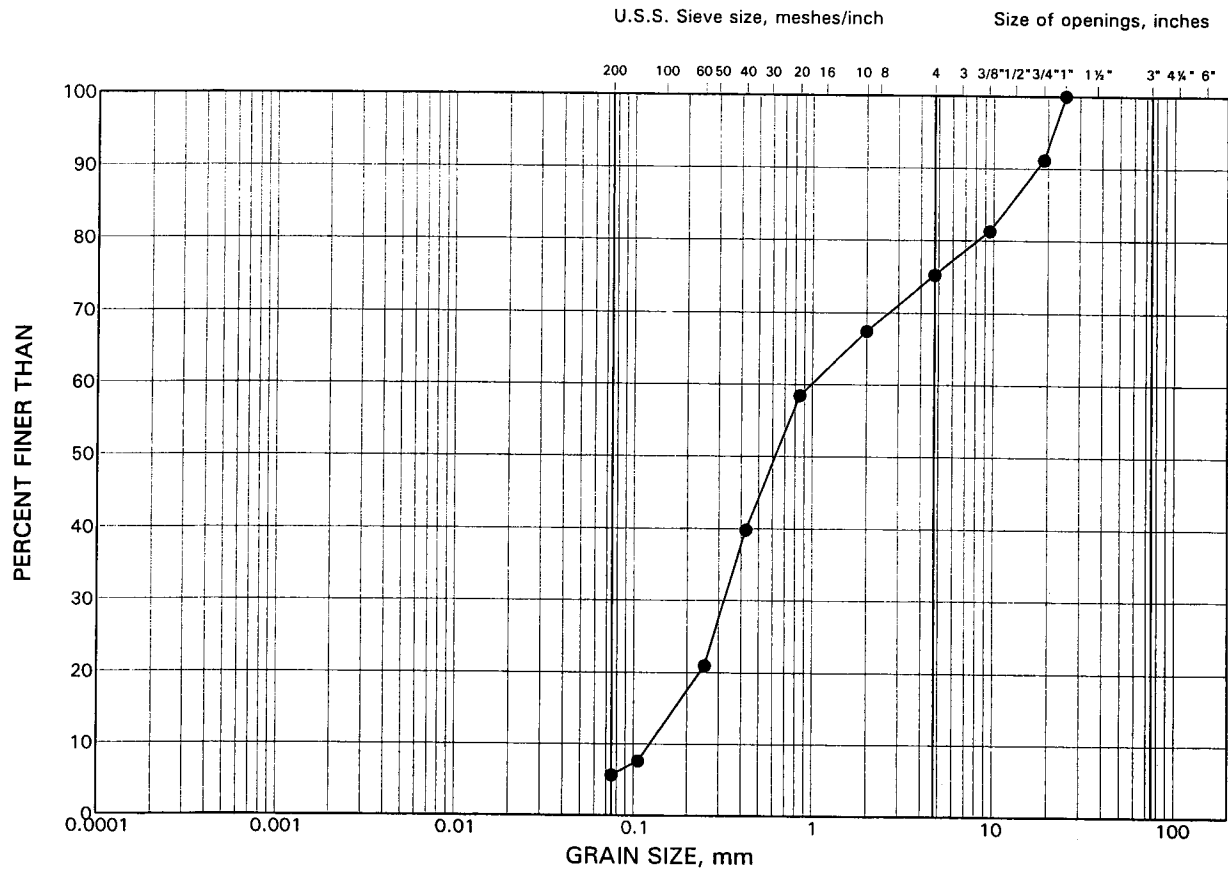
LEGEND

SYMBOL	BOREHOLE	SAMPLE	ELEVATION (m)
•	01-26	10	352.0

GRAIN SIZE DISTRIBUTION (Area 2)

Gravelly Sand, trace Silt (Fill)

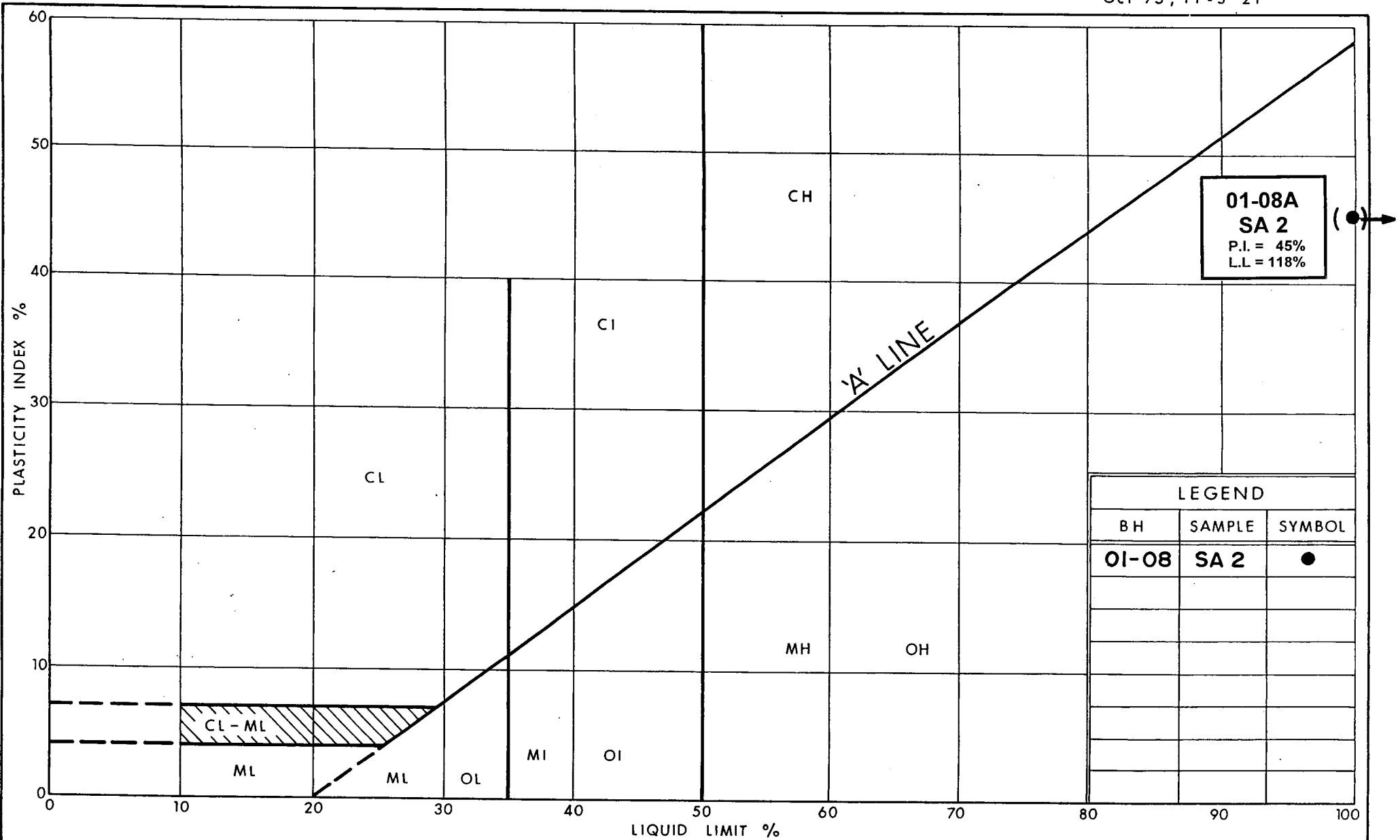
FIGURE A5



SILT AND CLAY SIZES		FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE
FINE GRAINED		SAND SIZE			GRAVEL SIZE		SIZE

LEGEND

SYMBOL	BOREHOLE	SAMPLE	ELEVATION (m)
•	01-07	1	358.9



Ministry of
Transportation

PLASTICITY CHART ORGANIC SILT (AREA 2)

FIG No

A 6

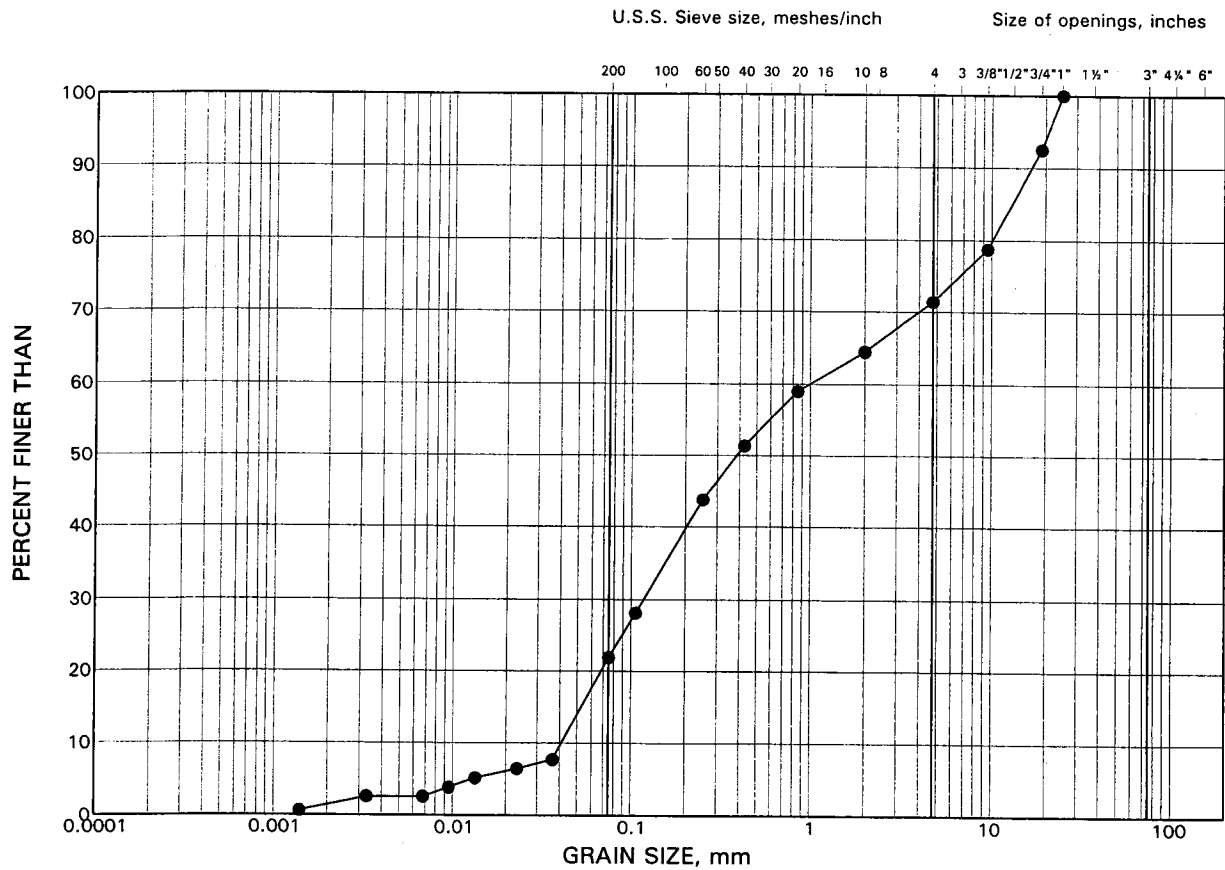
W P

711-92-00

GRAIN SIZE DISTRIBUTION (Area 2)

Gravelly Sand, some Silt, trace Clay

FIGURE A7



SILT AND CLAY SIZES		FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE
FINE GRAINED		SAND SIZE			GRAVEL SIZE		SIZE

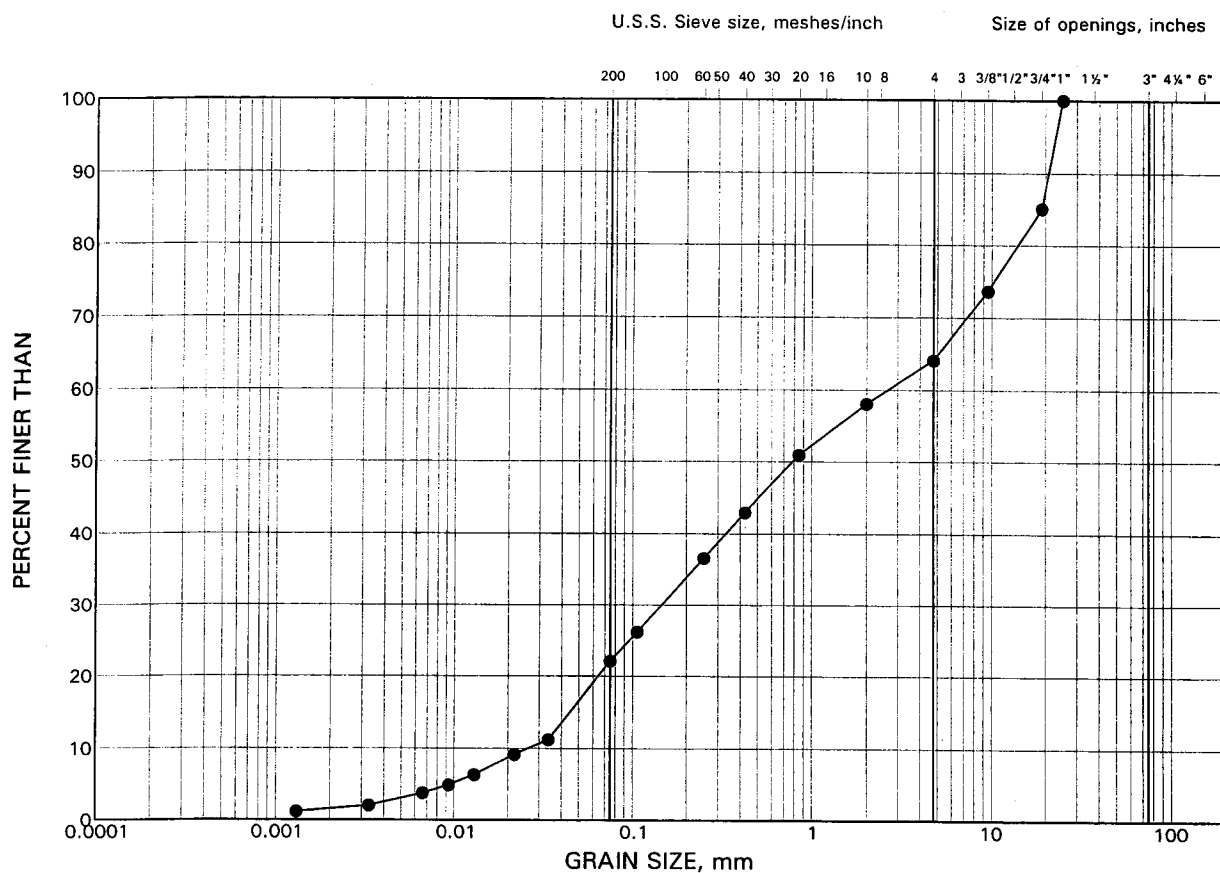
LEGEND

SYMBOL	BOREHOLE	SAMPLE	ELEVATION (m)
•	01-08	4	354.0

GRAIN SIZE DISTRIBUTION (Area 3)

Sand and Gravel, some Silt, trace Clay (Fill)

FIGURE A8



SILT AND CLAY SIZES		FINE	MEDIUM	COARSE	FINE	COARSE
FINE GRAINED		SAND SIZE			GRAVEL SIZE	
					SIZE	

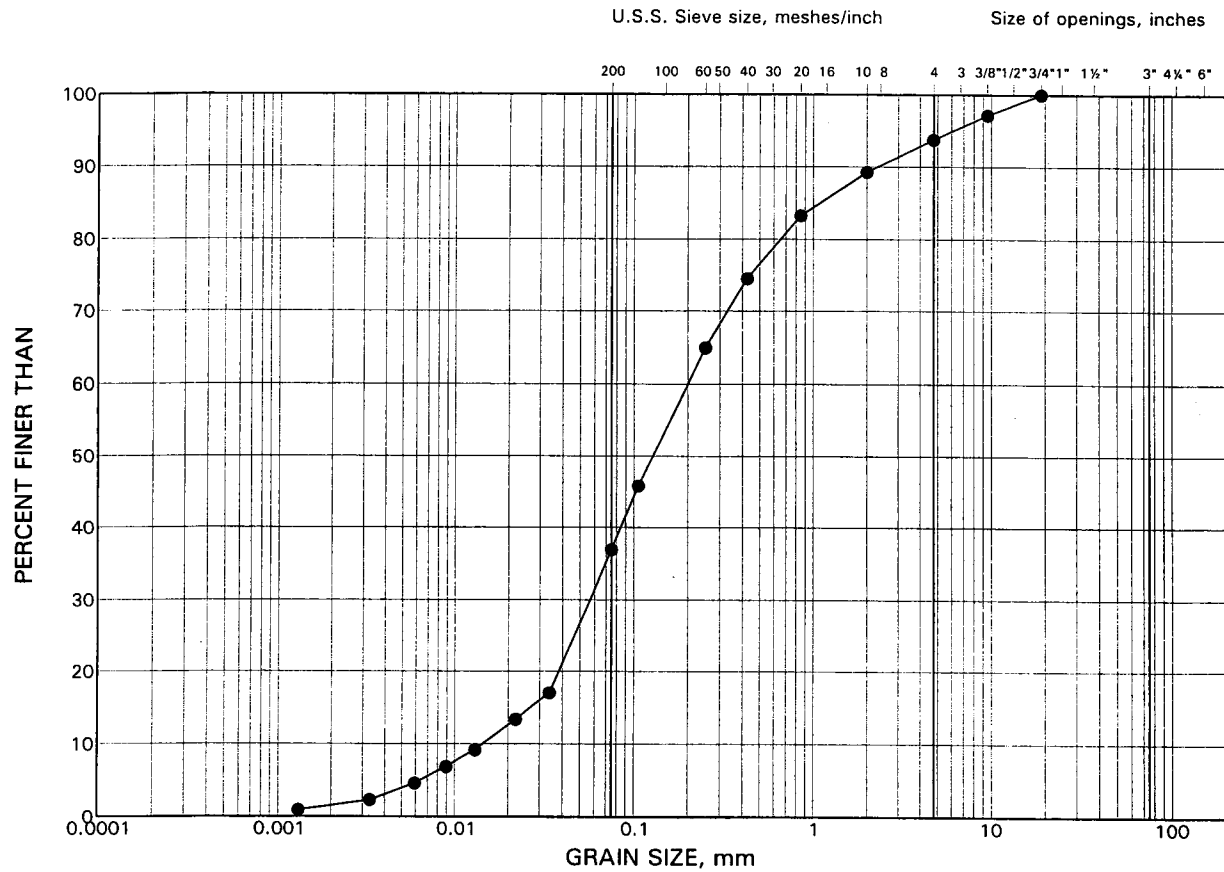
LEGEND

SYMBOL	BOREHOLE	SAMPLE	ELEVATION (m)
•	01-29	3	347.3

GRAIN SIZE DISTRIBUTION (Area 3)

Silty Sand, trace Gravel, trace Clay

FIGURE A9



SILT AND CLAY SIZES	FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE
FINE GRAINED	SAND SIZE			GRAVEL SIZE		SIZE

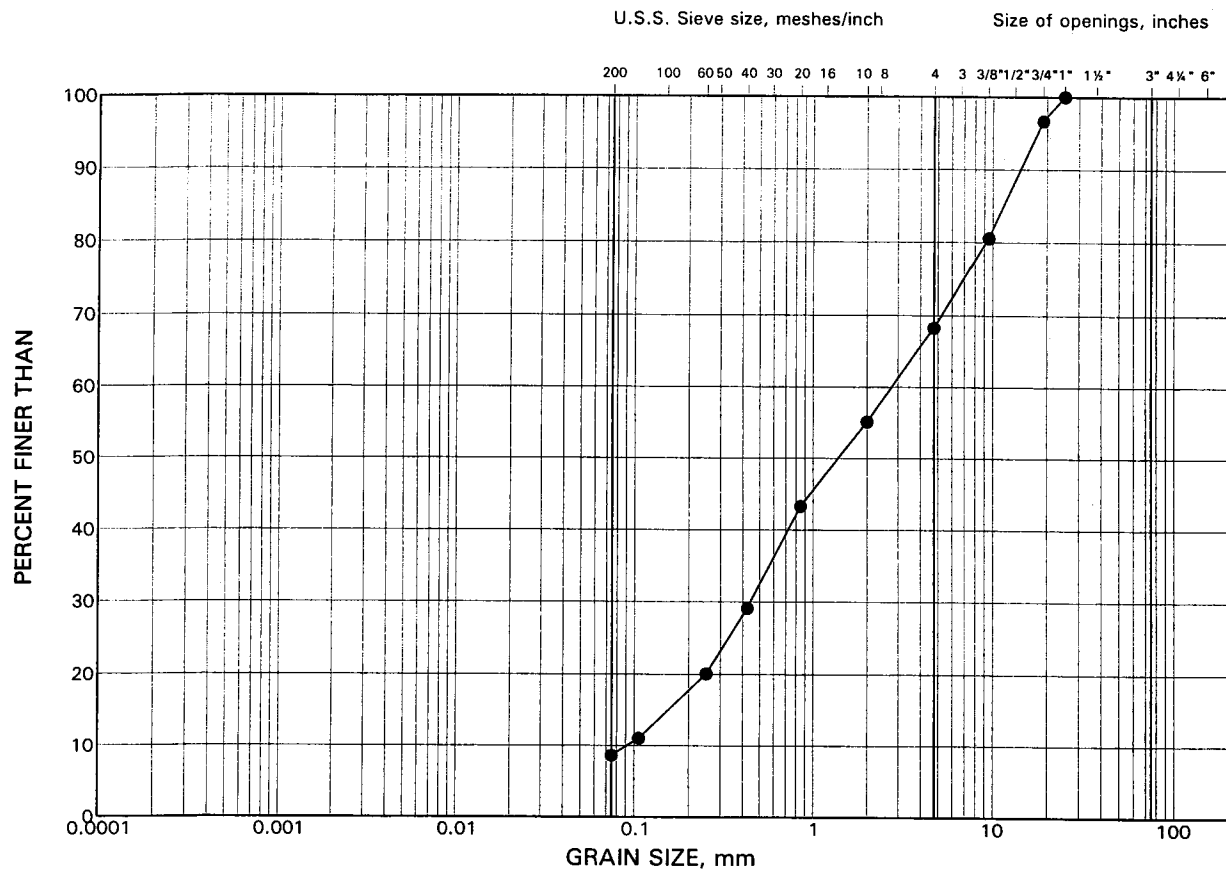
LEGEND

SYMBOL	BOREHOLE	SAMPLE	ELEVATION (m)
•	01-30	2	345.1

GRAIN SIZE DISTRIBUTION (Area 4)

Gravelly Sand, trace Silt (Fill)

FIGURE A10



SILT AND CLAY SIZES		FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE
FINE GRAINED		SAND SIZE			GRAVEL SIZE		SIZE

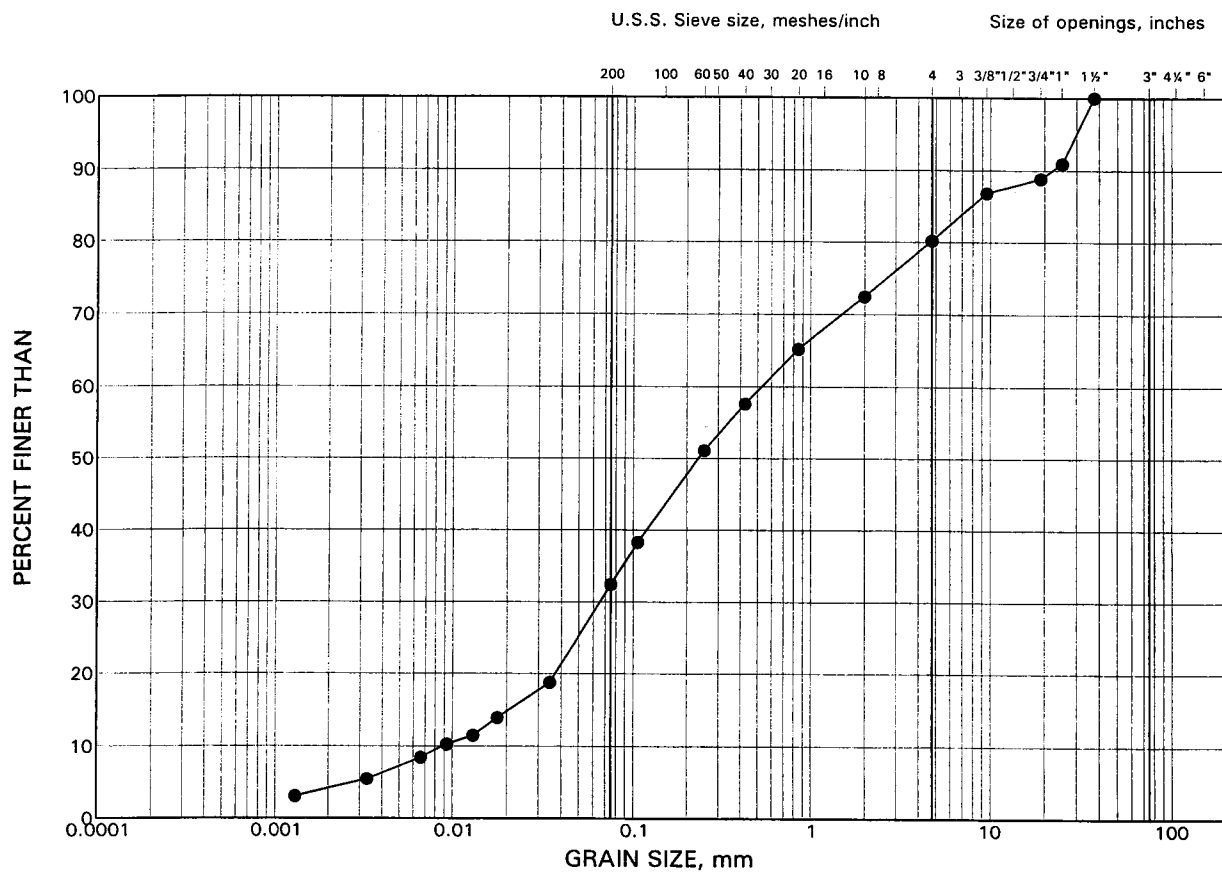
LEGEND

SYMBOL	BOREHOLE	SAMPLE	ELEVATION (m)
•	01-31	1	350.2

GRAIN SIZE DISTRIBUTION (Area 4)

Silty Sand, some Gravel, trace Clay

FIGURE A11



SILT AND CLAY SIZES		FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE
FINE GRAINED		SAND SIZE			GRAVEL SIZE		SIZE

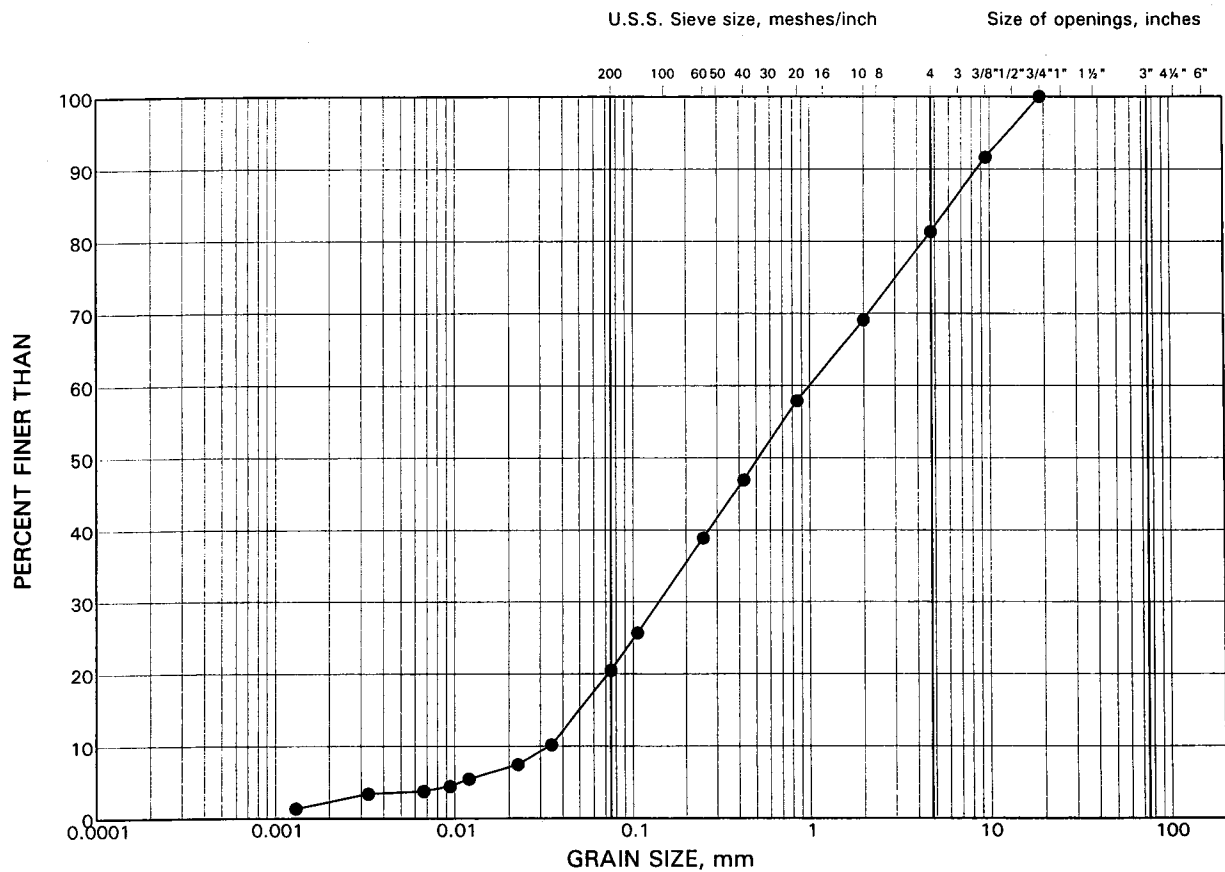
LEGEND

SYMBOL	BOREHOLE	SAMPLE	ELEVATION (m)
•	01-31	5	344.1

GRAIN SIZE DISTRIBUTION (Area 4)

Sand, some Gravel, some Silt, trace Clay

FIGURE A12



SILT AND CLAY SIZES		FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE
FINE GRAINED		SAND SIZE			GRAVEL SIZE		SIZE

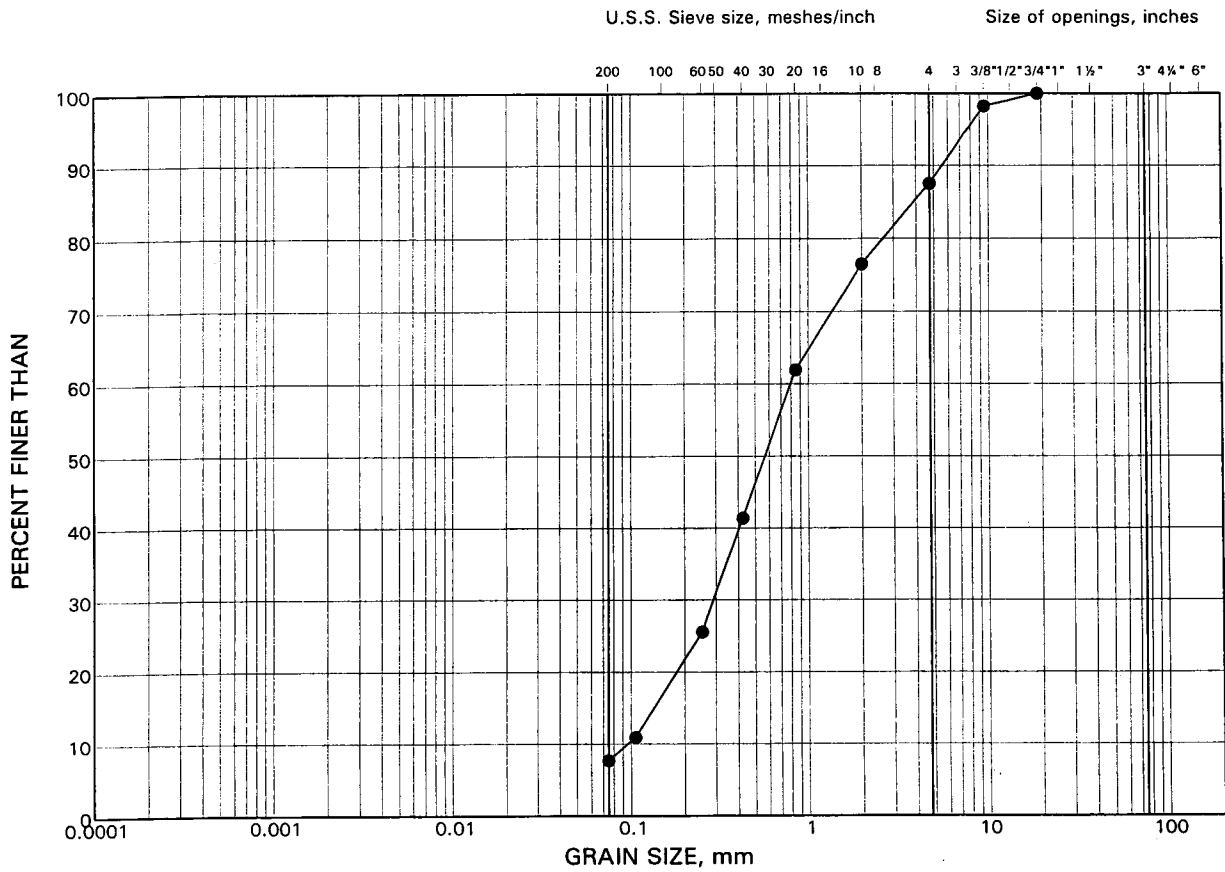
LEGEND

SYMBOL	BOREHOLE	SAMPLE	ELEVATION (m)
•	01-32	3	346.0

GRAIN SIZE DISTRIBUTION (Area 5)

Sand, some Gravel, trace Silt (Fill)

FIGURE A13



SILT AND CLAY SIZES		FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE
FINE GRAINED		SAND SIZE			GRAVEL SIZE		SIZE

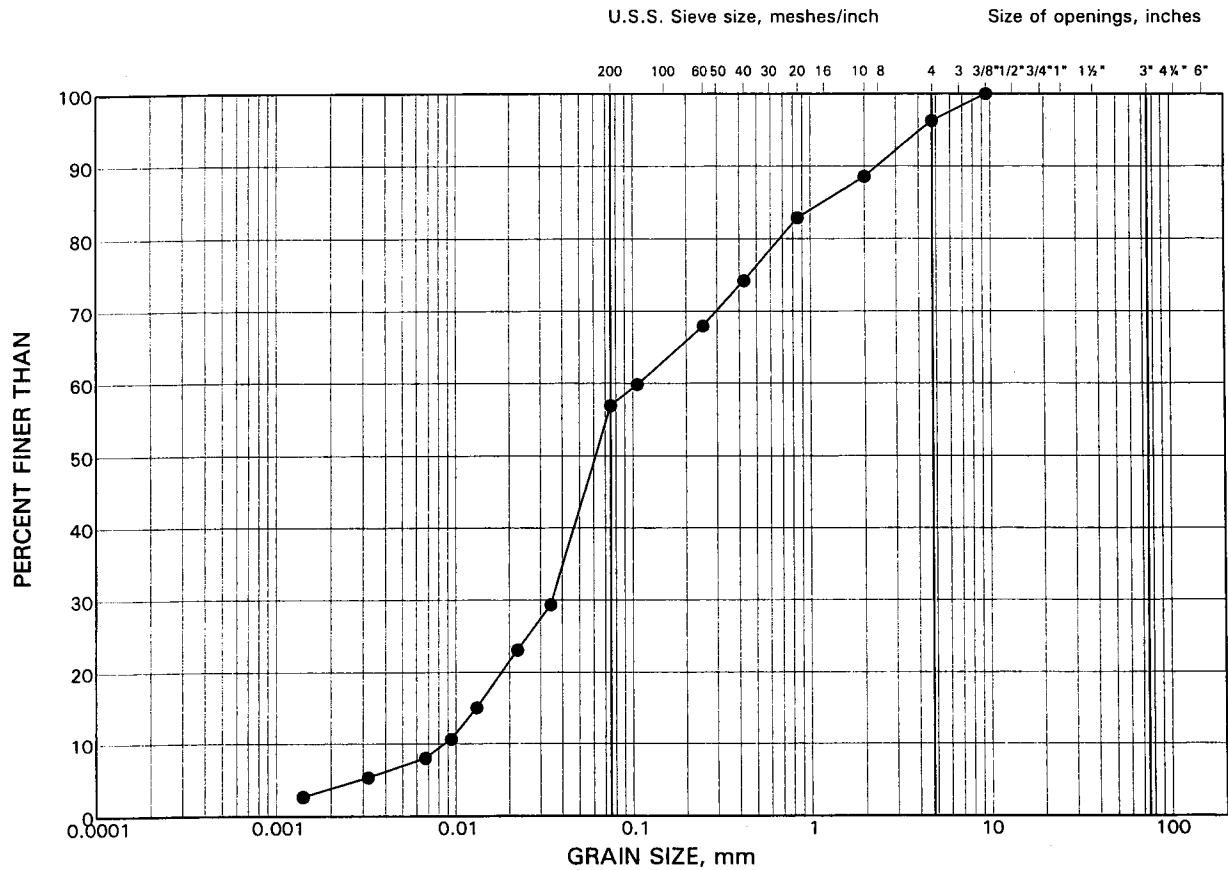
LEGEND

SYMBOL	BOREHOLE	SAMPLE	ELEVATION (m)
•	01-35	2	293.1

GRAIN SIZE DISTRIBUTION (Area 5)

Silt and Sand, trace Gravel, trace Clay

FIGURE A14



SILT AND CLAY SIZES		FINE		MEDIUM	COARSE	FINE	COARSE	COBBLE
FINE GRAINED		SAND SIZE			GRAVEL SIZE		SIZE	

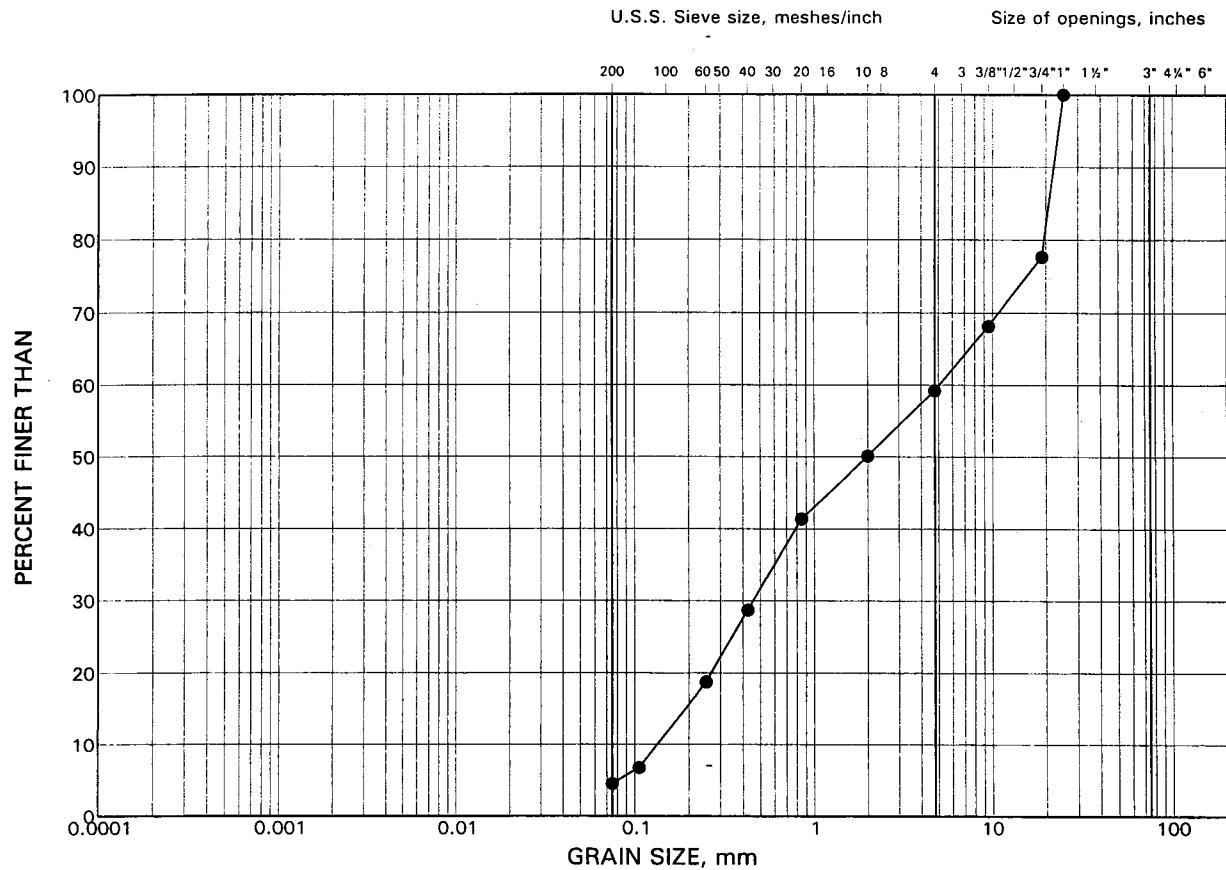
LEGEND

SYMBOL	BOREHOLE	SAMPLE	ELEVATION (m)
•	01-10	2	291.0

GRAIN SIZE DISTRIBUTION (Area 5)

Sand and Gravel, trace Silt

FIGURE A15



SILT AND CLAY SIZES		FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE
FINE GRAINED		SAND SIZE			GRAVEL SIZE		SIZE

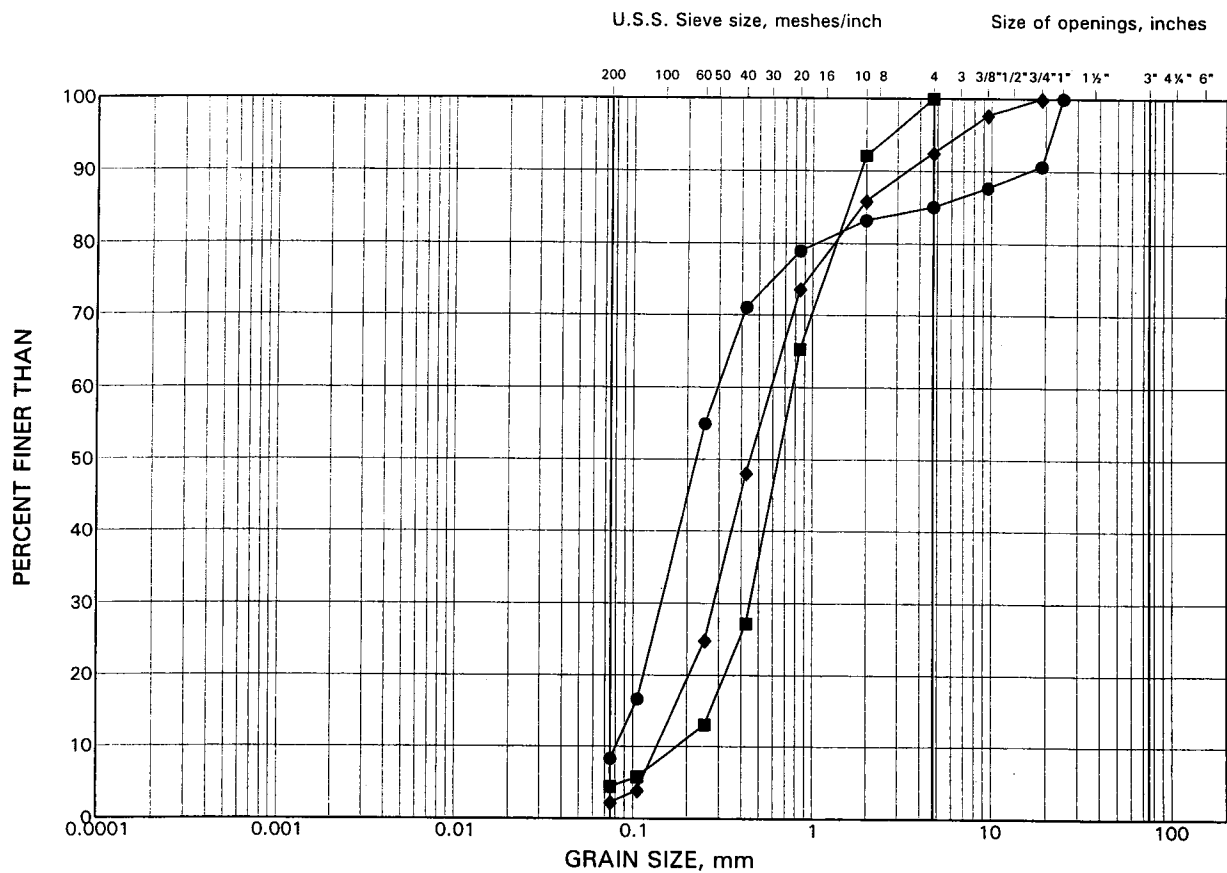
LEGEND

SYMBOL	BOREHOLE	SAMPLE	ELEVATION (m)
•	01-09	7	275.4

GRAIN SIZE DISTRIBUTION (Area 5)

Sand, trace Gravel, trace Silt

FIGURE A16



SILT AND CLAY SIZES		FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE
FINE GRAINED		SAND SIZE			GRAVEL SIZE		SIZE

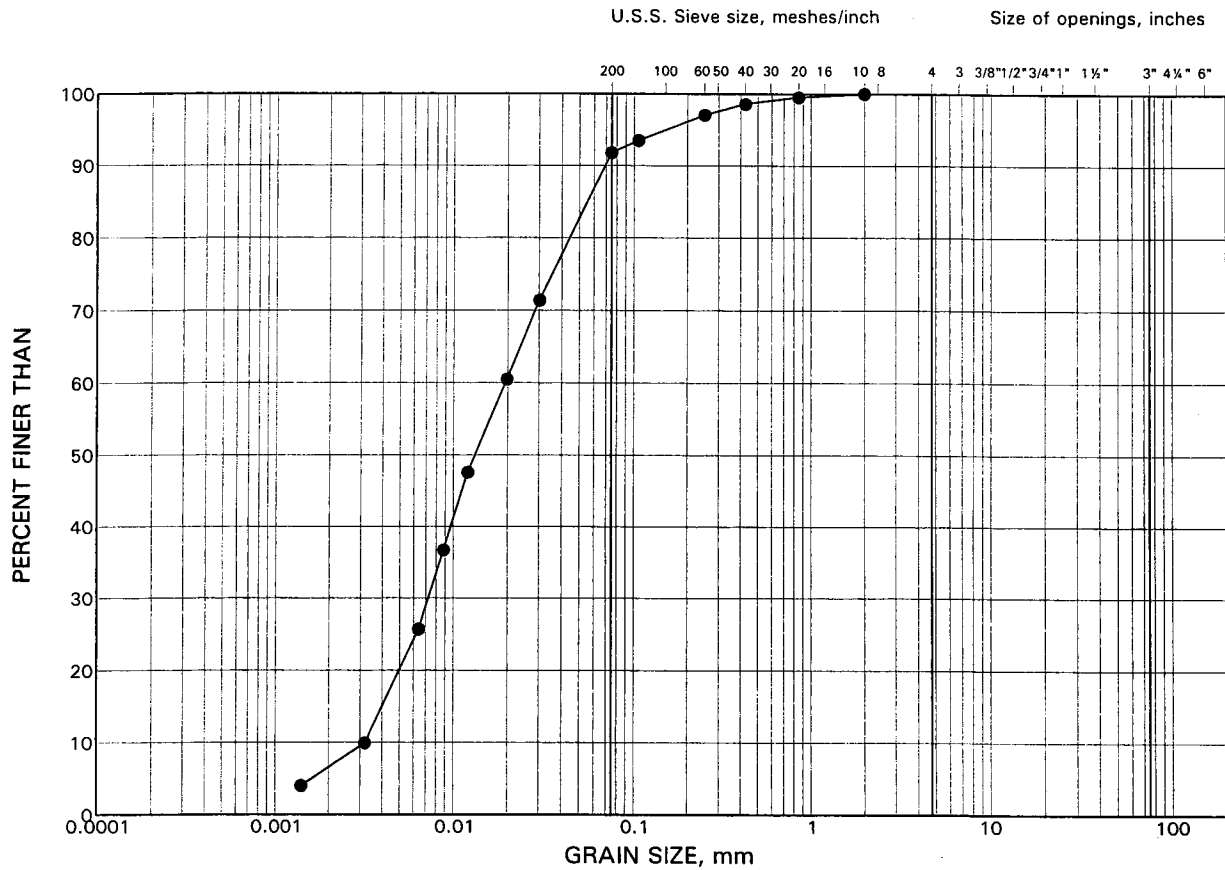
LEGEND

SYMBOL	BOREHOLE	SAMPLE	ELEVATION (m)
●	01-09	5	281.9
■	01-12	2	288.7
◆	01-13	1	291.6

GRAIN SIZE DISTRIBUTION (Area 5)

Silt, trace Sand, trace Clay

FIGURE A17



SILT AND CLAY SIZES		FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE
FINE GRAINED		SAND SIZE			GRAVEL SIZE		SIZE

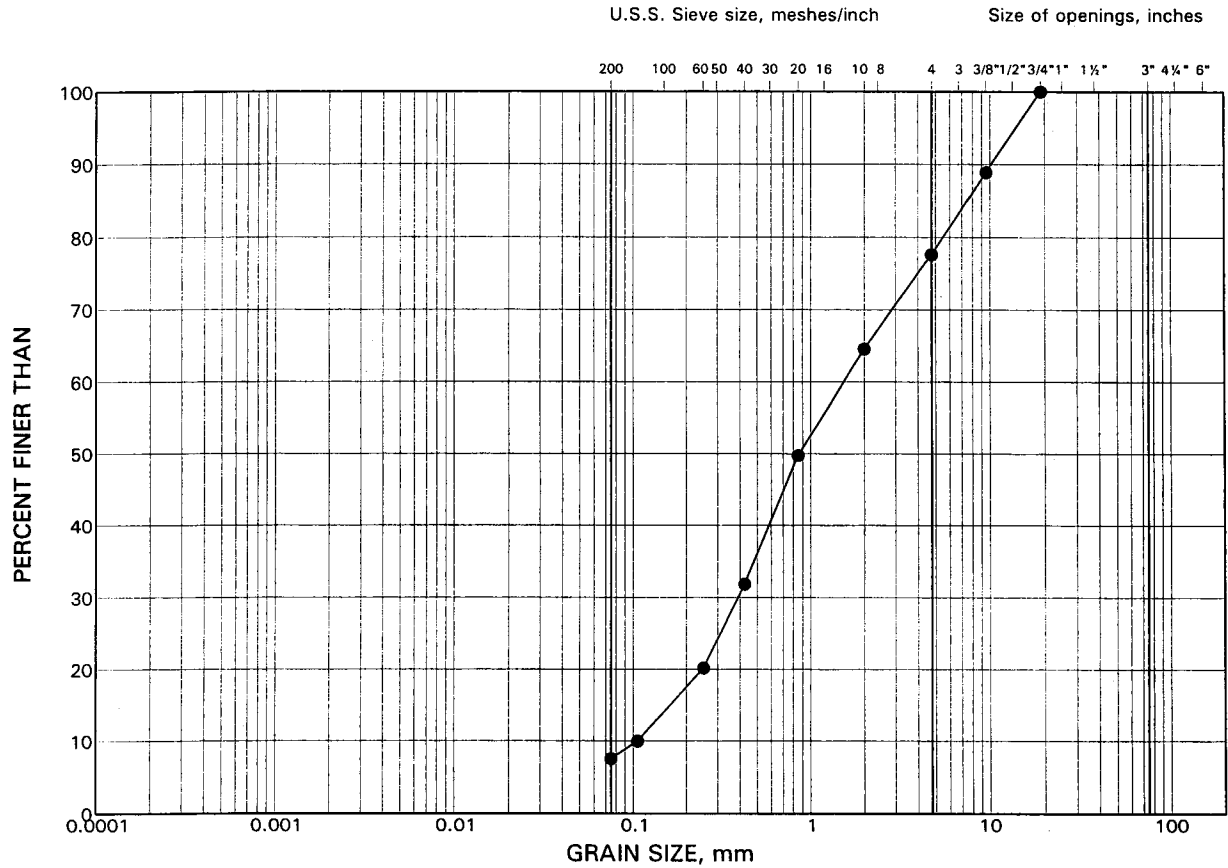
LEGEND

SYMBOL	BOREHOLE	SAMPLE	ELEVATION (m)
•	01-17	1	285.9

GRAIN SIZE DISTRIBUTION (Area 6)

Gravelly Sand, trace Silt (Fill)

FIGURE A18



SILT AND CLAY SIZES		FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE
FINE GRAINED		SAND SIZE			GRAVEL SIZE		SIZE

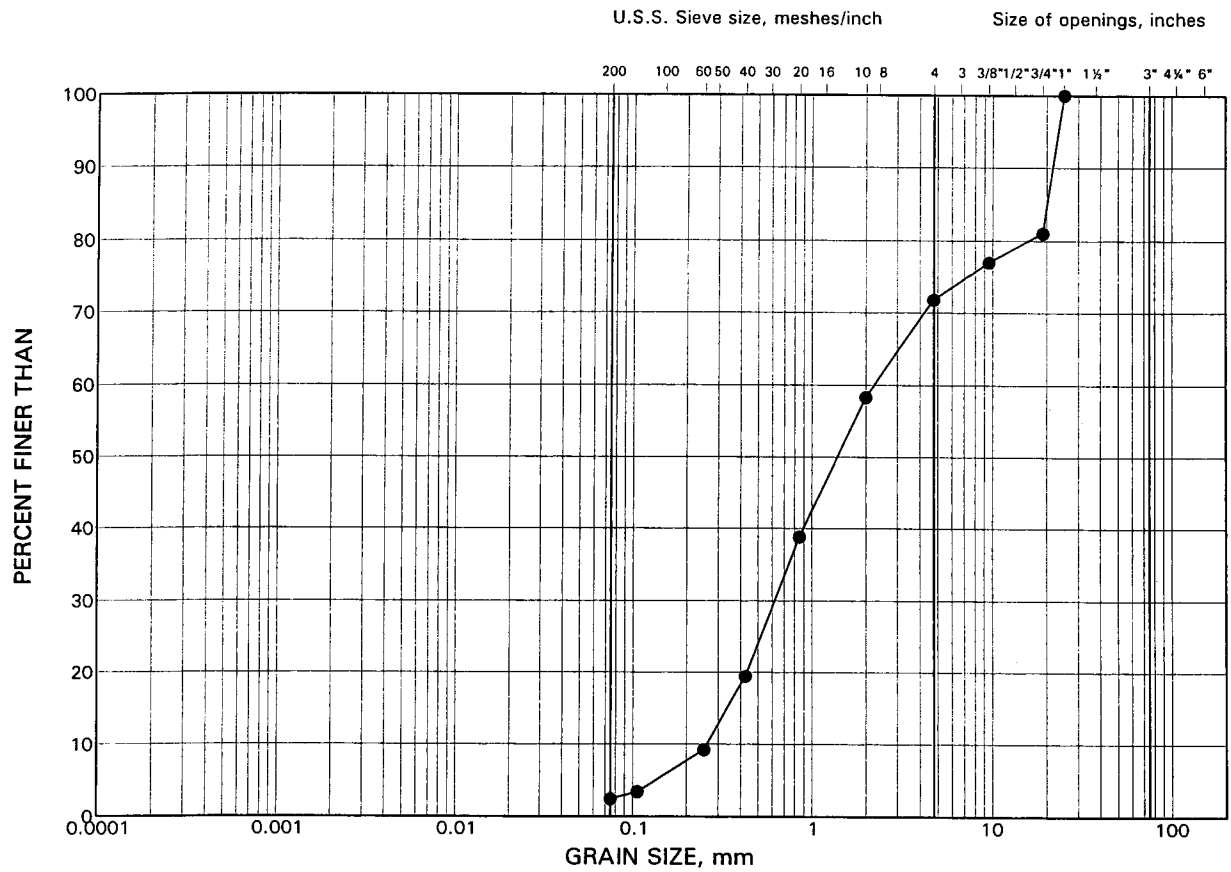
LEGEND

SYMBOL	BOREHOLE	SAMPLE	ELEVATION (m)
•	01-38	1	294.6

GRAIN SIZE DISTRIBUTION (Area 6)

Gravelly Sand, trace Silt

FIGURE A19



SILT AND CLAY SIZES	FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE
FINE GRAINED	SAND SIZE			GRAVEL SIZE		SIZE

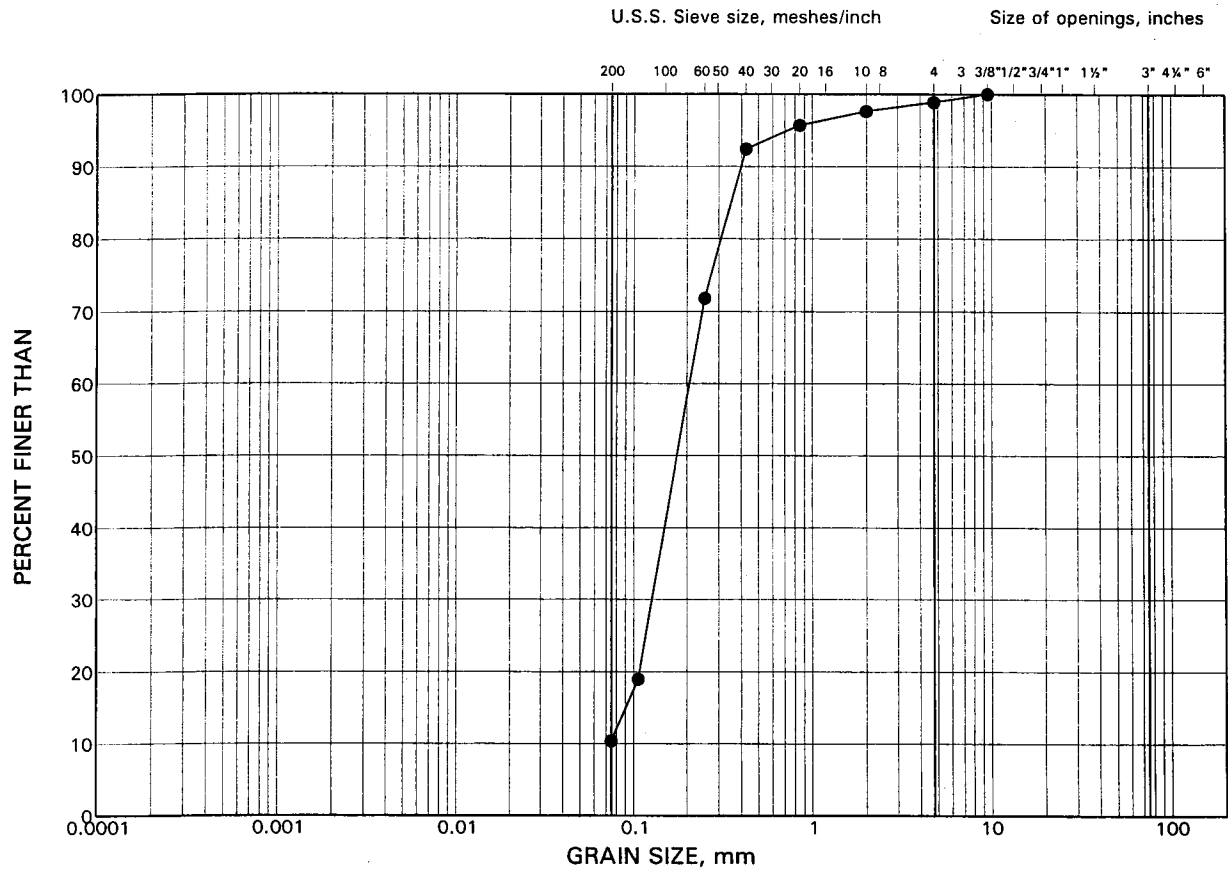
LEGEND

SYMBOL	BOREHOLE	SAMPLE	ELEVATION (m)
•	01-18	3	286.0

GRAIN SIZE DISTRIBUTION (Area 6)

Sand, trace Gravel, trace Silt

FIGURE A20



SILT AND CLAY SIZES			FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE
FINE GRAINED			SAND SIZE			GRAVEL SIZE		SIZE

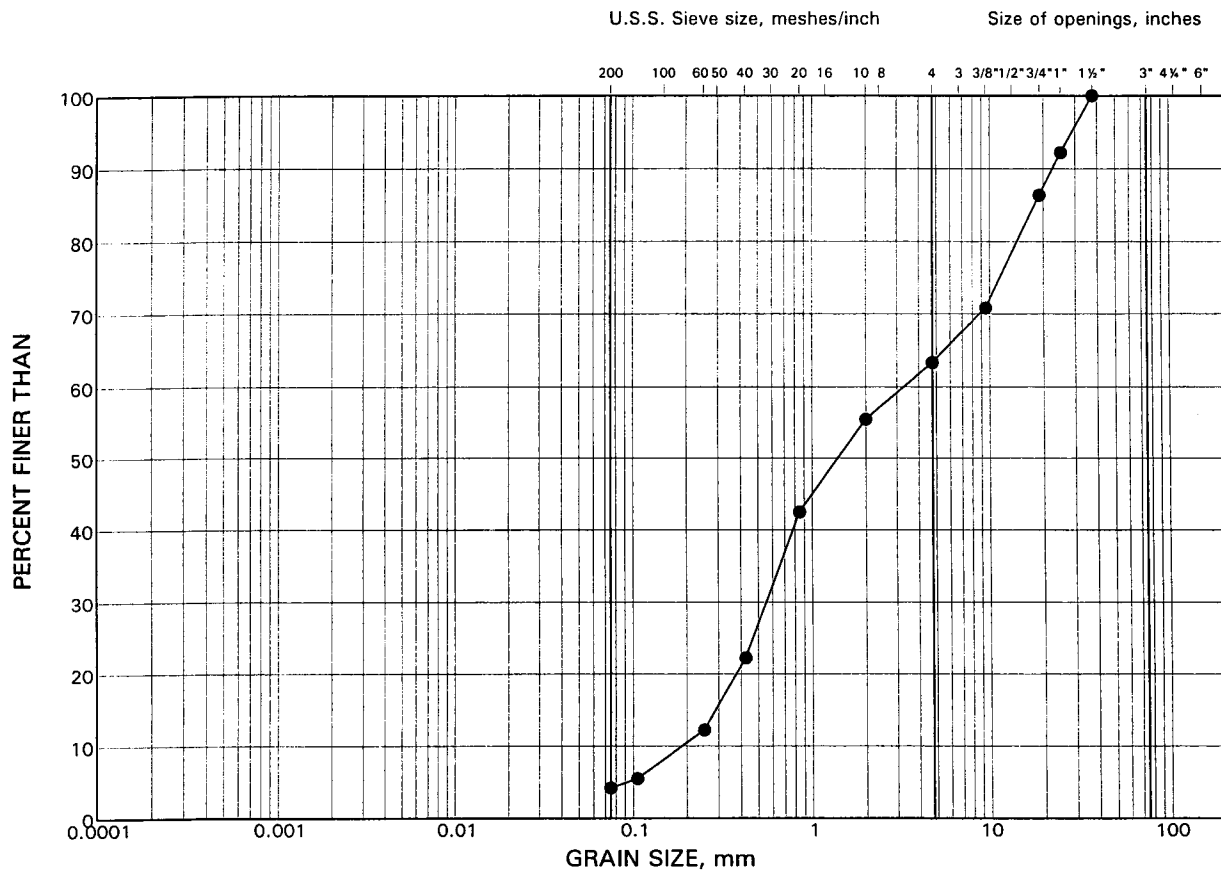
LEGEND

SYMBOL	BOREHOLE	SAMPLE	ELEVATION (m)
•	01-19	2	288.3

GRAIN SIZE DISTRIBUTION (Area 7)

Sand and Gravel, trace Silt (Fill)

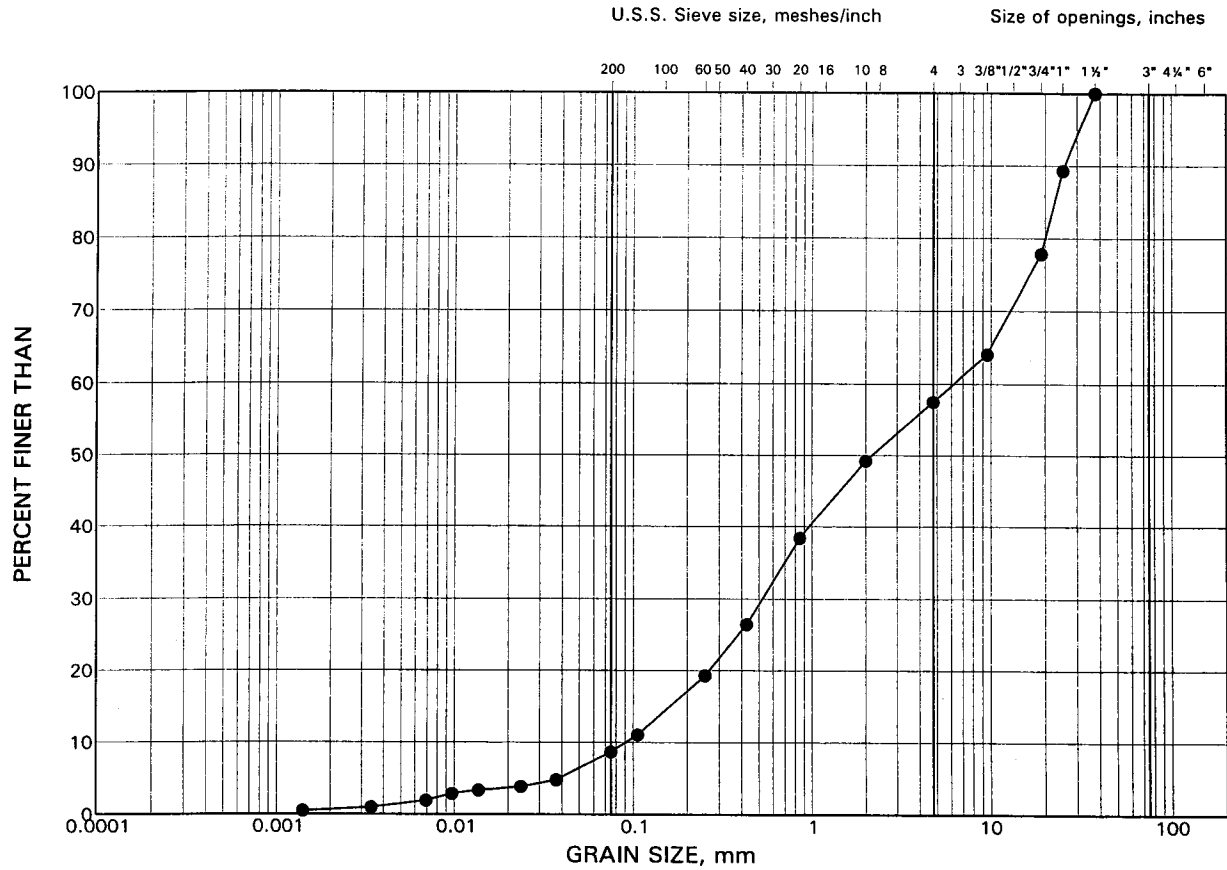
FIGURE A21



GRAIN SIZE DISTRIBUTION (Area 7)

Sand and Gravel, trace Silt, trace Clay

FIGURE A22



SILT AND CLAY SIZES		FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE
FINE GRAINED		SAND SIZE			GRAVEL SIZE		SIZE

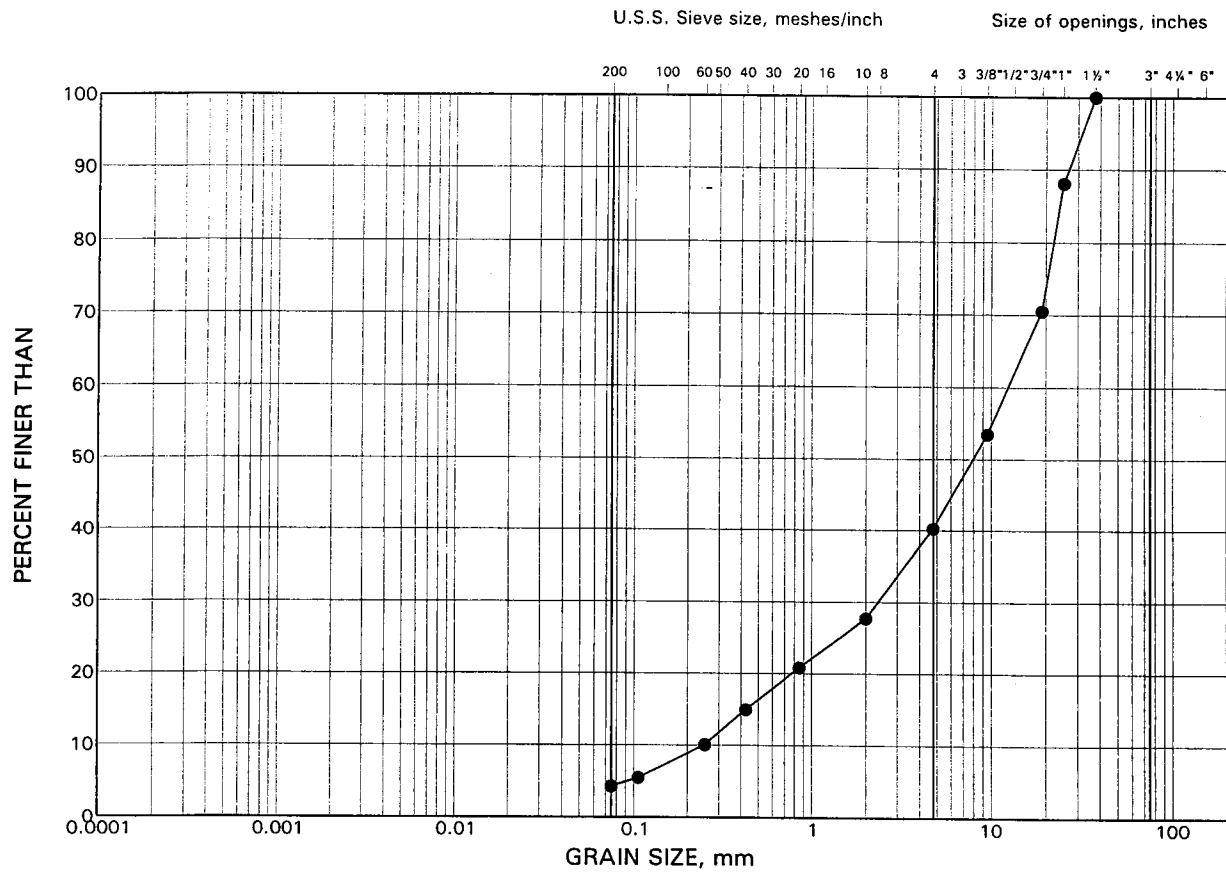
LEGEND

SYMBOL	BOREHOLE	SAMPLE	ELEVATION (m)
•	01-36	6	296.9

GRAIN SIZE DISTRIBUTION (Area 8)

Sand and Gravel, trace Silt (Fill)

FIGURE A23



SILT AND CLAY SIZES		FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE
FINE GRAINED		SAND SIZE			GRAVEL SIZE		SIZE

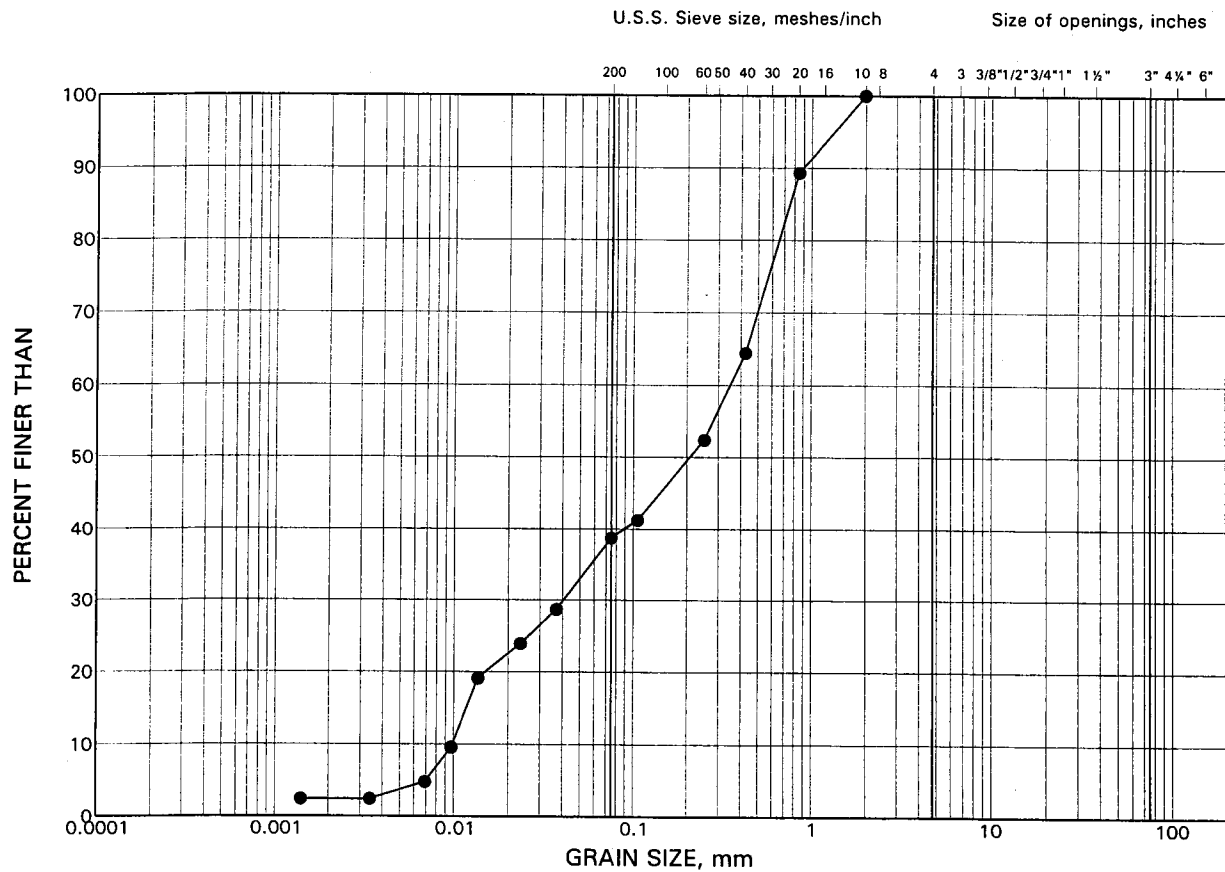
LEGEND

SYMBOL	BOREHOLE	SAMPLE	ELEVATION (m)
•	01-37	3	304.0

GRAIN SIZE DISTRIBUTION (Area 8)

Silty Sand, trace Clay

FIGURE A24



SILT AND CLAY SIZES		FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE
FINE GRAINED		SAND SIZE			GRAVEL SIZE		SIZE

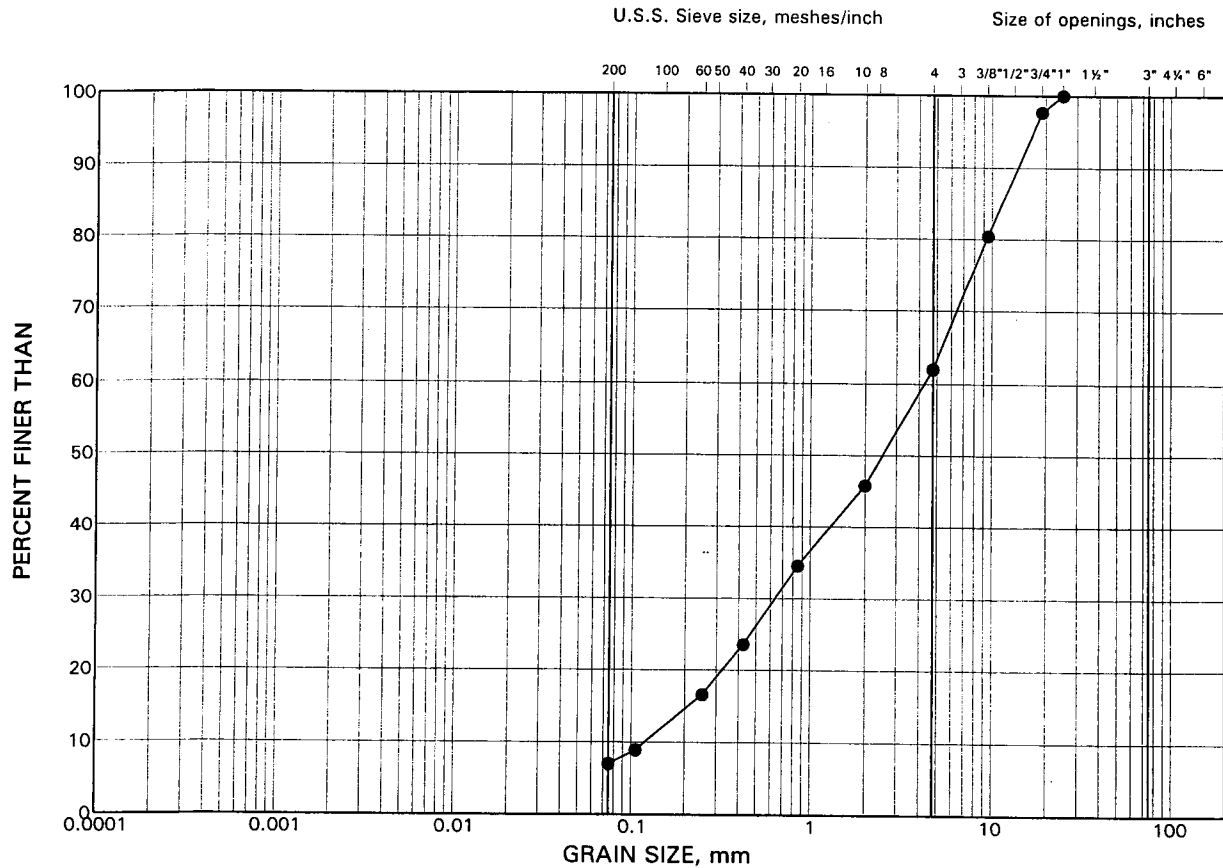
LEGEND

SYMBOL	BOREHOLE	SAMPLE	ELEVATION (m)
•	01-37	6	293.9

GRAIN SIZE DISTRIBUTION (Area 9)

Sand and Gravel, trace Silt (Fill)

FIGURE A25



SILT AND CLAY SIZES		FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE
FINE GRAINED		SAND SIZE			GRAVEL SIZE		SIZE

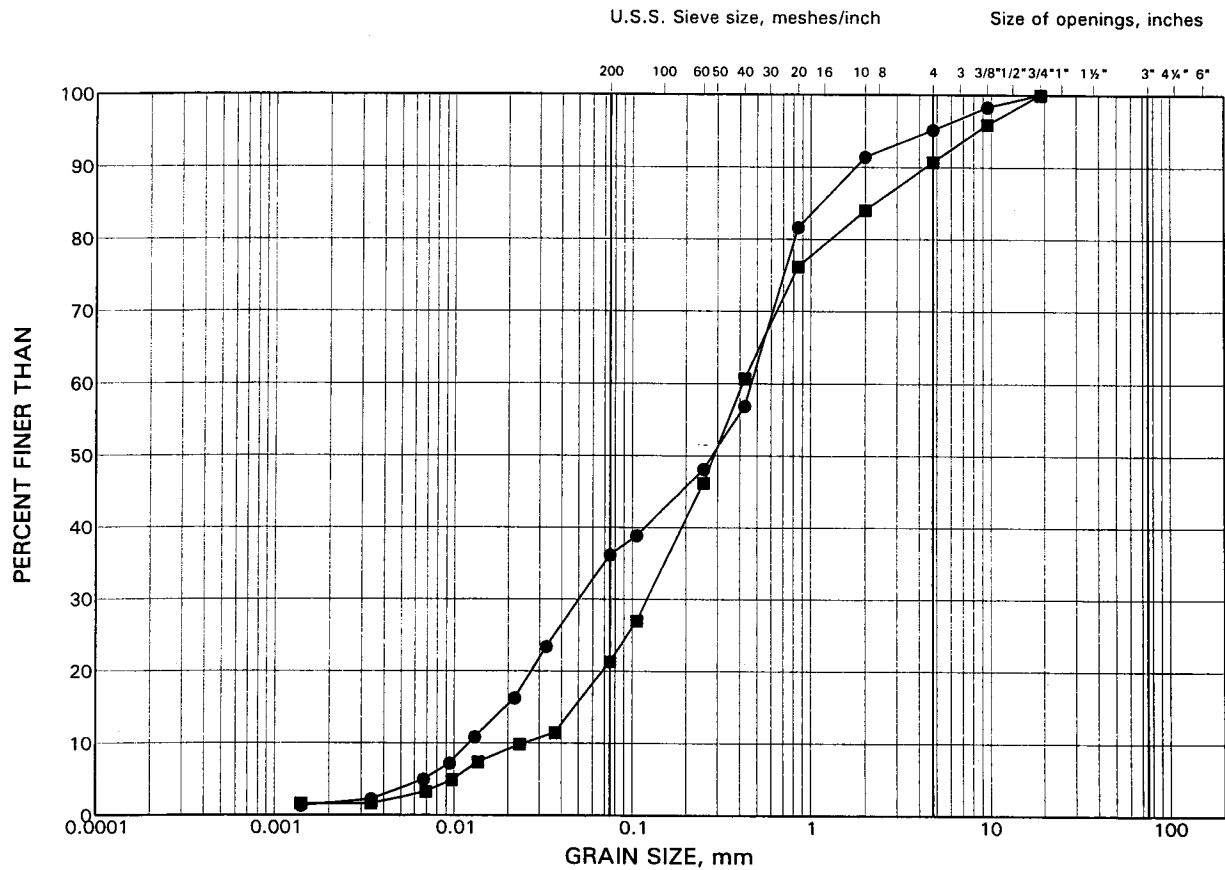
LEGEND

SYMBOL	BOREHOLE	SAMPLE	ELEVATION (m)
•	01-33	1	324.8

GRAIN SIZE DISTRIBUTION (Area 9)

Silty Sand, trace Gravel, trace Clay

FIGURE A26



SILT AND CLAY SIZES		FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE
FINE GRAINED		SAND SIZE			GRAVEL SIZE		SIZE

LEGEND

SYMBOL	BOREHOLE	SAMPLE	ELEVATION (m)
•	01-33	3	323.3
■	01-33	4	322.8