

# APPENDIX 1

## DETERMINATION OF CORROBIVITY OF SOIL SAMPLES

### LANGELIER SATURATION AND RYZNAR STABILITY INDICES, AGGRESSIVENESS INDEX AND CHLORIDE + SULPHATE TO ALKALINITY CORROBIVITY RATIO

SAMPLE IDENTIFICATION :

ESKOM

REF :

PM 2002/03

1.1 CHEMICAL ANALYSIS		1.2 CORROBIVITY INDICES	
Results are in mg/l unless otherwise stated.			
DETERMINANT : 2:1 WATER:SOIL EXTRACT		TP 10 0.15 - 0.9 m	TP 10
pH Conductivity (mS/m) Total dissolved solids (Calculated) Total Hardness as CaCO <sub>3</sub> Calcium Hardness as CaCO <sub>3</sub> Calcium as Ca Magnesium as Mg Total Alkalinity as CaCO <sub>3</sub> Chloride as Cl Sulphate as SO <sub>4</sub>		7.3 10.5 68 36 24 10 3 34 4 3	Stability pH (pH <sub>s</sub> ) at 20°C Langelier Index at 20°C Ryznar Stability Index at 20°C Aggressiveness Index Cl and SO <sub>4</sub> Corrosivity Index (Corrosivity Ratio)
			9.0 1.7 10.7 9 0.3

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130 Edward Ave, Hennospark 0157  
P O Box 7661, Centurion 0046  
Phone: 27 12 653-1818/653-0021. Fax: 27 12 653-0997  
E-mail: scowalab@iafrica.com

# Scowalab

Civil Engineering Testing Laboratories

## FOUNDATION INDICATOR (TMH 1 : A1, A2, A3, A4, A5 & A6)

CLIENT	ESKOM	DATE REPORTED :	08-Feb-00
	Geotechnical Services	YOUR REF. :	10038417
	P O Box 1091	OUR REF. :	9986
	Johannesburg, 2000	SAMPLE No. :	14661
Attention	Mr. F A Grove	SAMPLE DESCRIPTION :	TP 10 @ 0.15 - 0.9

Material description		SILTY SAND
Sieve analysis Cumulative percentage passing (mm)	75.0	100
	63.0	100
	53.0	100
	37.5	100
	28.5	100
	19.0	100
	13.2	100
	4.75	98
	2.000	87
	0.425	46
Soil Moisture Analysis % < 2.00mm	0.075	15
	0.050	12
	0.005	7
	0.002	3
	2.000 - 0.425	46.8
0.425 - 0.250		16.0
0.250 - 0.150		12.8
0.150 - 0.075		7.5
< 0.075		17.0
Effective size		0.020
Uniformity Coefficient		35.0
Curvature Coefficient		2.3
Over-size Index		0.0
Shrinkage Product		65.0
Grading Coefficient		12.3
Grading module		1.52
Atterberg Limits	Liquid Limit	-
	Plasticity Index	SP
	Linear Shrinkage	1.4
Unified Soil Classification		SM
U.S. Highway Classification		A-1-b(0)
Moisture Content		-

POTENTIAL EXPANSION

PLASTICITY INDEX

PERCENTAGE CLAY

PLASTICITY CHART

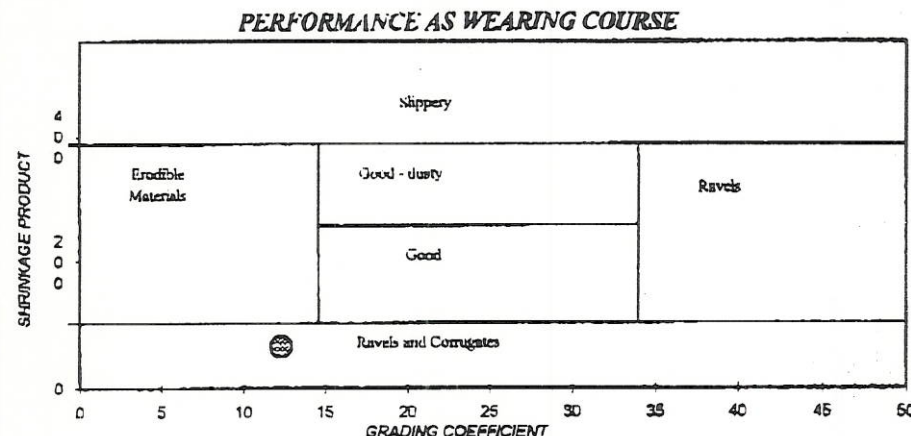
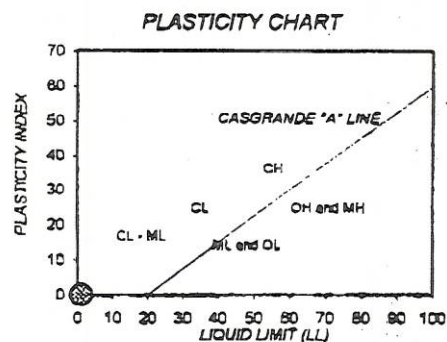
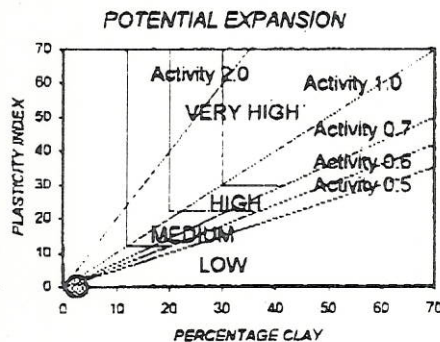
PLASTICITY INDEX

LIQUID LIMIT (LL)

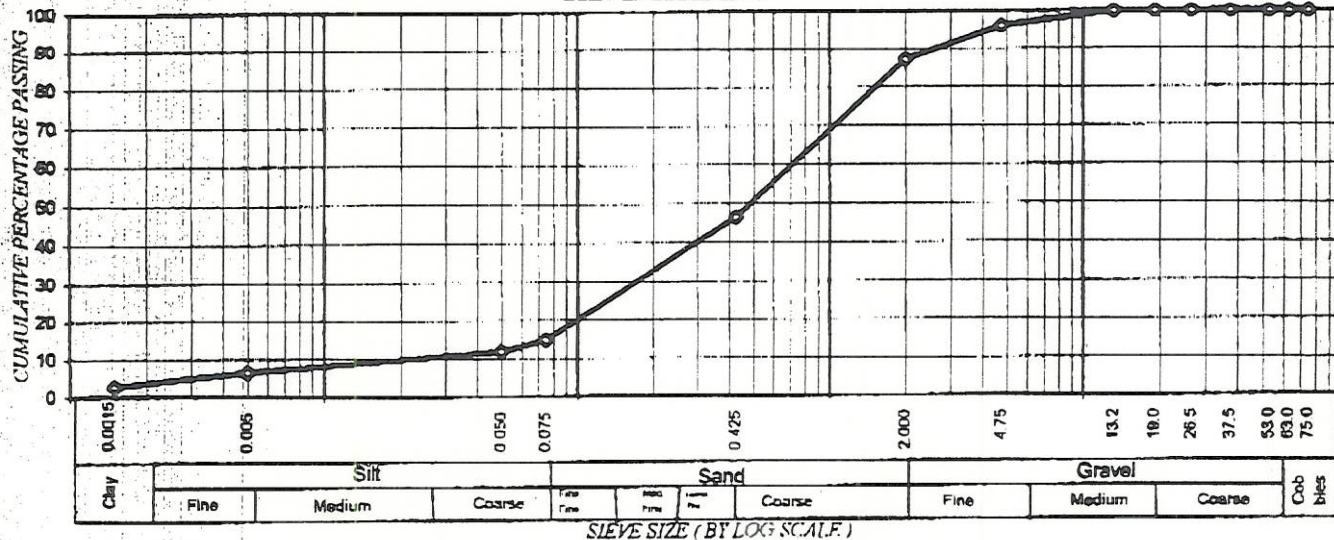
PERFORMANCE AS WEARING COURSE

SHRINKAGE PRODUCT

GRADING COEFFICIENT



## SIEVE GRADING



Investment Facility Company 842 (Pty) Limited trading as Scowalab and Civilab. Registration No: 98/19071/07  
BRANCHES: CENTURION • JOHANNESBURG • PIETERMARITZBURG • RUSTENBURG • VRYHEID

Directors: CT Dittmer, PJ Erasmus, TT Goba, RKC Grainger, ND Graham, RM Lamb, PD Naidoo, MG Nixon  
LL Pike, RJ Scheurenberg, A Tanner, DP Viljoen

FIND / 9986 / 14661 / 5.11

for Scowalab



## APPENDIX 2

## DETERMINATION OF CORROSIVITY OF SOIL SAMPLES

REF : PM 2002/03

AGGRESSIVENESS TOWARDS CONCRETE : AGGRESSIVENESS INDEX  
(PORTLAND CEMENT INSTITUTE - J.J. BASSON PUBLICATION)

## SAMPLE IDENTIFICATION

ESKOM

DETERMINANT	TP 10 7.12 - 5.9	VALUE	CONSTANT	INDEX
pH		7.3	200	440
Calcium Carbonate Saturated pH		8.4	-2000	2200
Calcium Hardness as CaCO <sub>3</sub>		24	2.2	1047
Total Ammonium as NH <sub>4</sub>		0.7	10	7
Magnesium as Mg		3	0.6	2
Sulphates as SO <sub>4</sub>		3	0.3	1
Chlorides as Cl		4	0.2	1
Total Dissolved Solids		68		
Leaching - corrosion sub-index, LCSi				1229
Spelling - corrosion sub-index, SCSi				3.5
Final aggressiveness index at 25 Degr. C. corrected for stagnant conditions, Nc				618



CK 96/61252/23

# Watertreatment

33 Toekoms Street PO Box 2974 Uppington 8800  
Tel (054) 27864 Fax (054) 27864 Cell 082 491 8136  
3326864 3326864

09/11/99

Van: Hannes de Kock

Van: Louwé

Watertoetse vir Total Dissolved Solids

Hier volg die uitslae van die toetse - TDS - 10400 ppm

Seewater ~ 35000

Groete

Lise

Louise Wiese

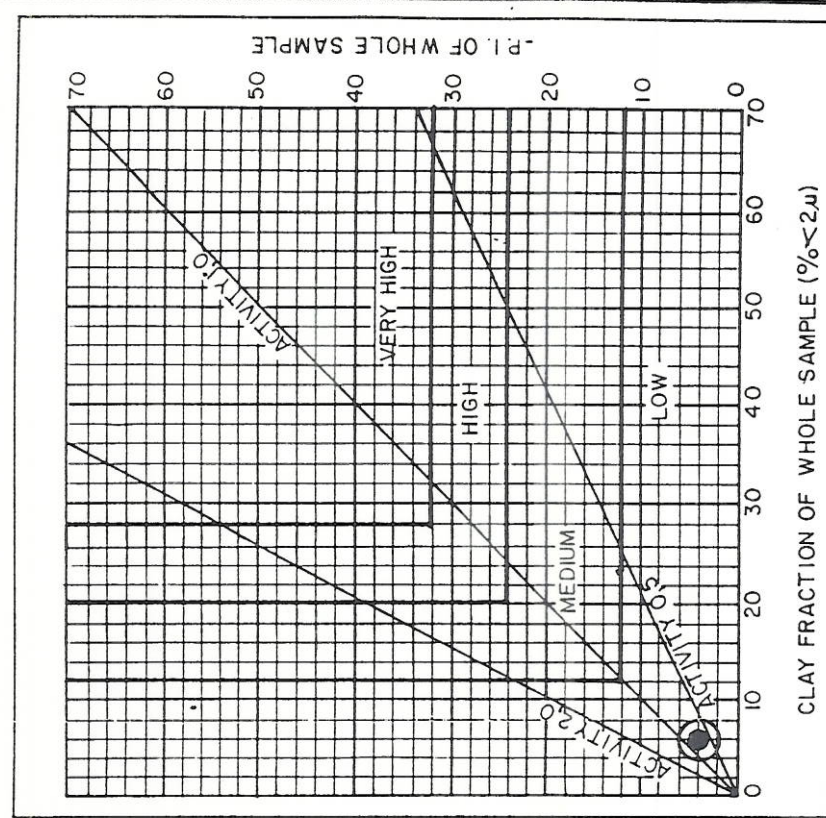
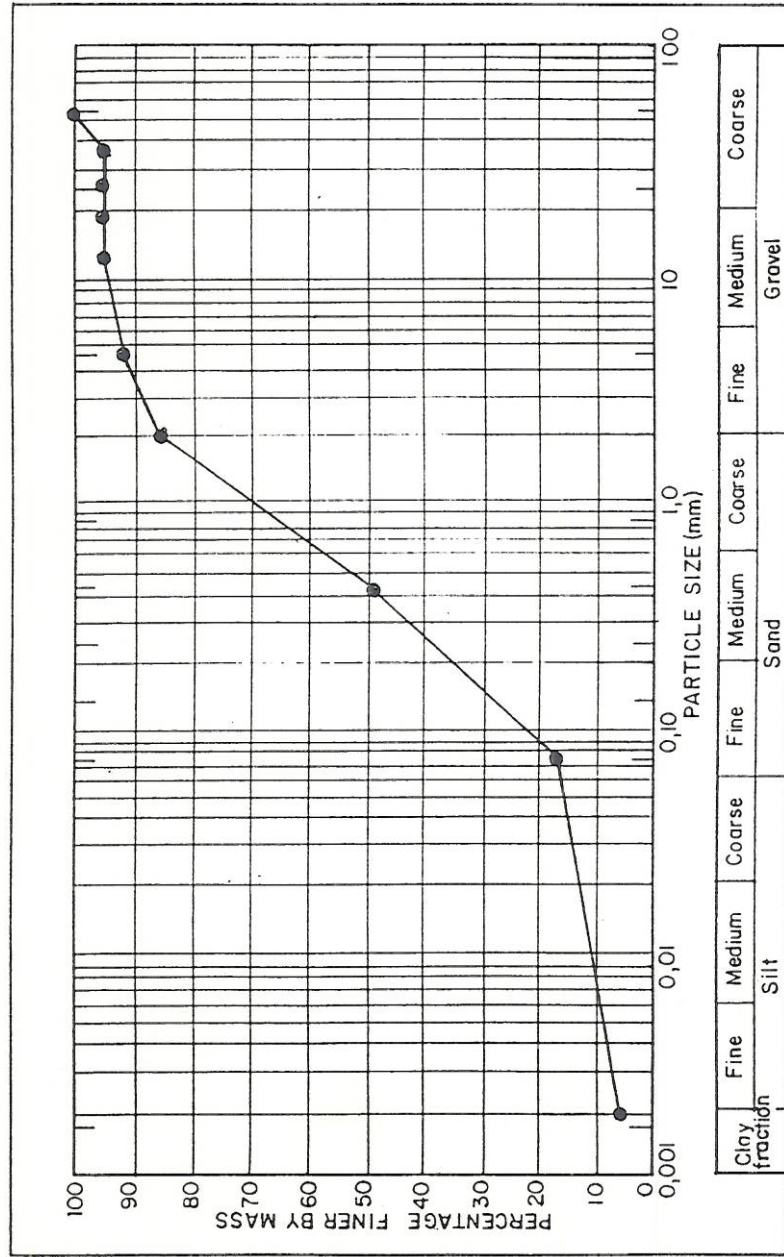
JCG Watertreatment

deurloos > 10 ppm  
seewater

# KIMATLAB

## POTENTIAL EXPANSIVENESS TEST

CLIENT BVI RAADGEWENDE INGENIEURS	PROJECT PAUL PUTS SUBSTASIE	YOUR REF MNR DE KOCK	OUR REF SL 1560	DATE 1999.10.27
SAMPLE No. K21-651	TEST HOLE No. TP 10	DEPTH 0,15-0,9m	DESCRIPTION LIGBRUIN, FYN, VERWEERDE, GRANIETIESE GRUIS MET VERSPREIDE HOEKIGE, KWARTSIETKLIPPIES	



UNDISTURBED / DISTURBED SAMPLE DATA	
Insitu Moisture Content (%)	
Relative Density	
Bulk Density (dry)(kg/m³)	
Bulk Density (wet)(kg/m³)	

CLAY FRACTION (%)	
Soil Fines	12
Whole Sample	6

ATTENBERG LIMITS	
Liquid Limit	27
Plastic Limit	18
Plasticity Index	9
Linear Shrinkage	4

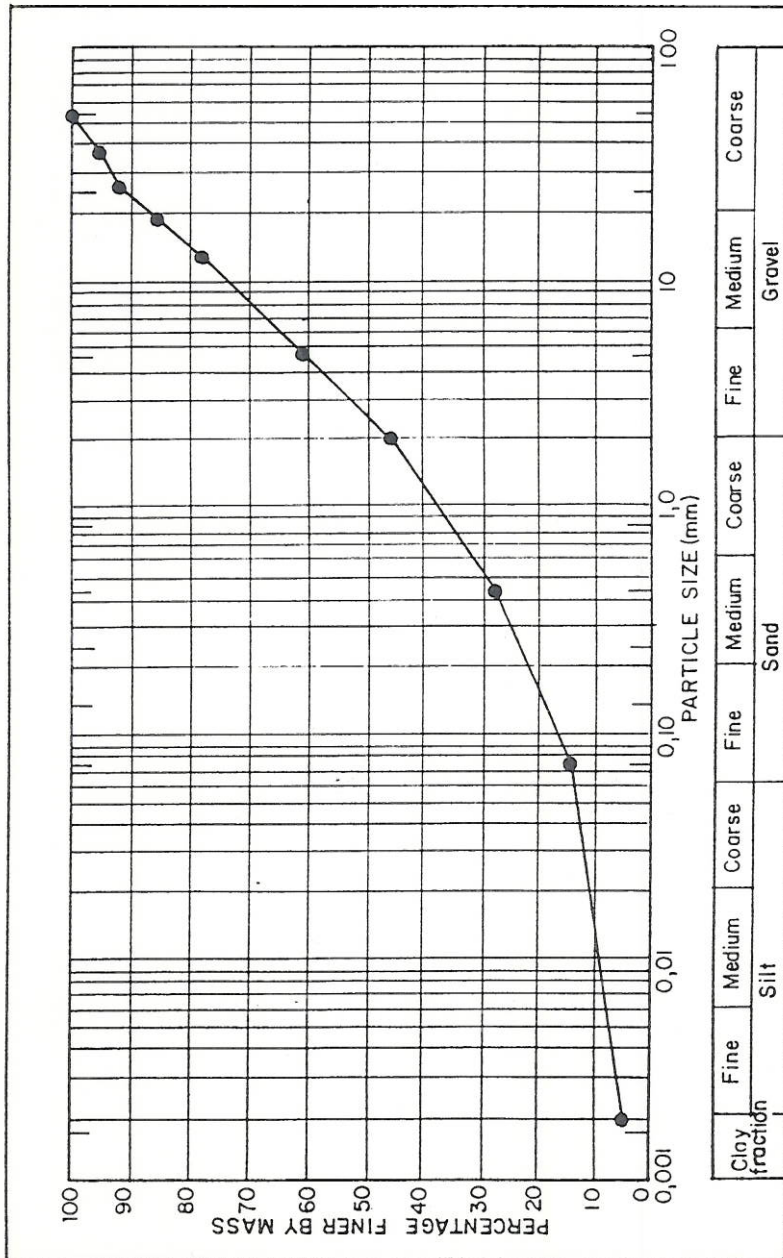
WHOLE SAMPLE	
Soil Fines	13
Whole Sample	4

REMARKS	VERSTEURDE MONSTER



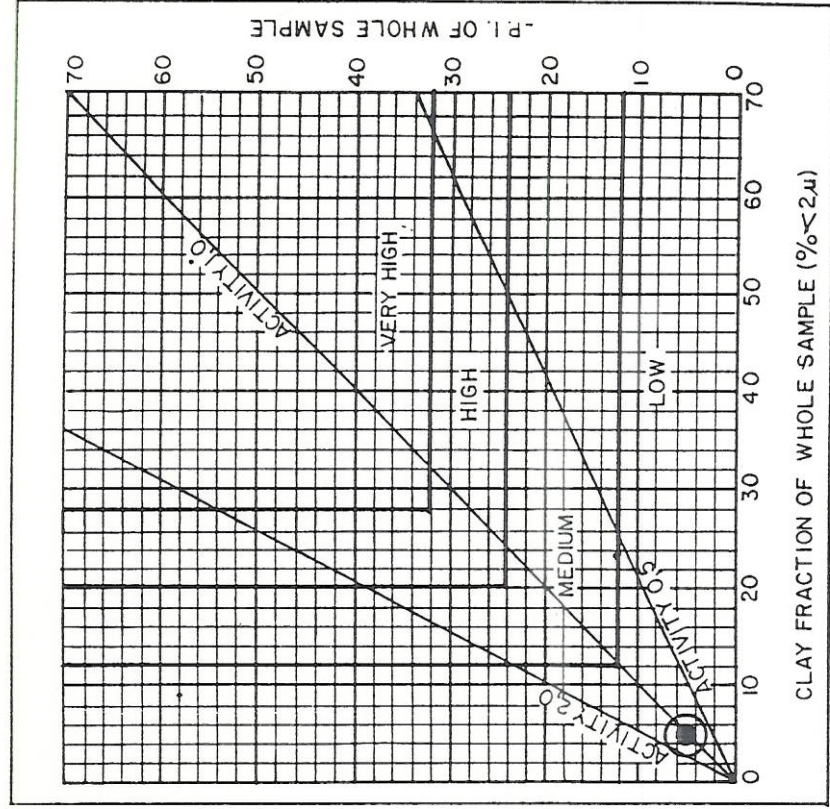
## POTENTIAL EXPANSIVENESS TEST

CLIENT BVI RAADGEWENDE INGENIEURS	PROJECT PAUL PUTS KRAGSTASIE	YOUR REF MNR DE KOCK	OUR REF SL 1560	DATE 1999.10.27
SAMPLE No. K21-652	TEST HOLE No. TP 10	DEPTH 0,9-1,5m	DESCRIPTION LIGBRUIN, EFFE NODULÈRE, KALKREETGRUIJS	



ATTERBERG LIMITS		CLAY FRACTION (%)	
Liquid Limit	45	Soil Fines	18
Plastic Limit	28	Whole Sample	5
Plasticity Index	17		
Linear Shrinkage	7,5		

UNDISTURBED / DISTURBED SAMPLE DATA			
Insitu Moisture Content (%)			
Relative Density			
Bulk Density (dry) (kg/m³)			
Bulk Density (wet) (kg/m³)			



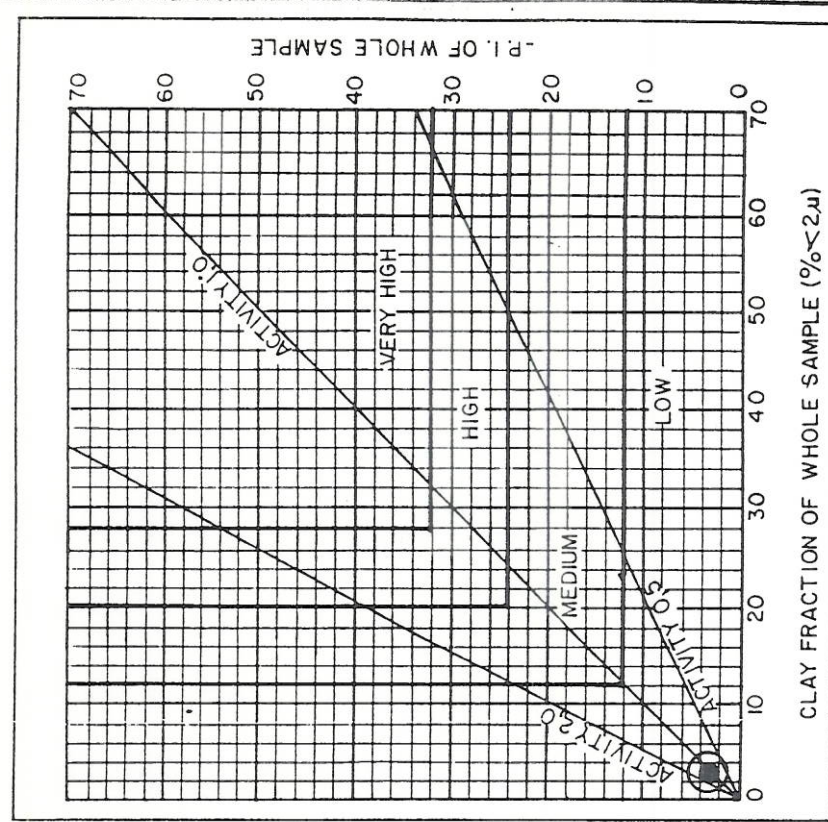
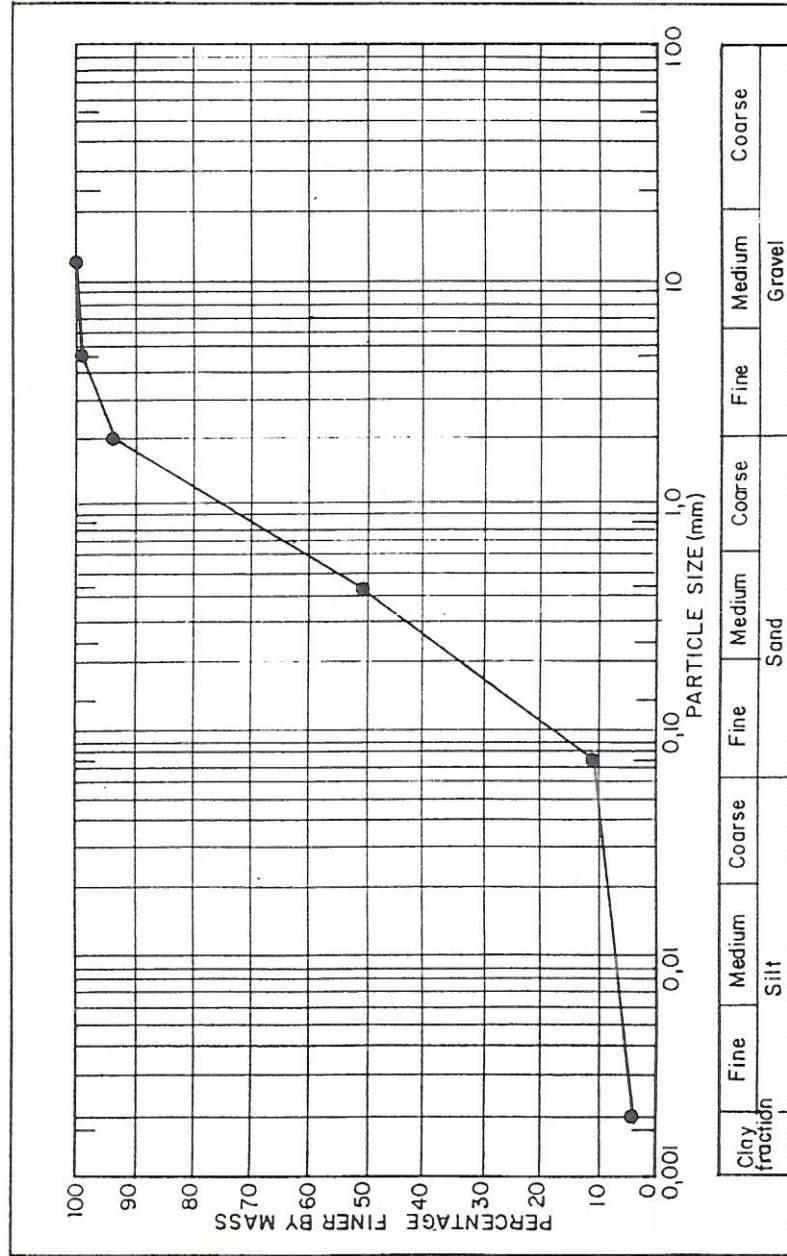
REMARKS	VERSTEURDE MONSTER



# KIMATLAB

## POTENTIAL EXPANSIVENESS TEST

CLIENT BVI RAADGEWENDE INGENIEURS	PROJECT PAUL PUTS SUBSTASIE	YOUR REF MNR DE KOCK	OUR REF SL 1560	DATE 1999.10.27
SAMPLE No. K21-650	TEST HOLE No. TP 4	DEPTH 0,15-1,5m	DESCRIPTION LIGBRUIN, FYN, VERWEERDE, GRANIETIESE GRUIS MET VERSPREIDE HOEKIGE, KWARTSIETKLIPPIES	



ATTERBERG LIMITS		CLAY FRACTION (%)	
Liquid Limit	23	Soil Fines	8
Plastic Limit	18	Whole Sample	4
Plasticity Index	5		
Linear Shrinkage	2,5		

UNDISTURBED / DISTURBED SAMPLE DATA	
Insitu Moisture Content (%)	
Relative Density	
Bulk Density (dry) (kg/m <sup>3</sup> )	
Bulk Density (wet) (kg/m <sup>3</sup> )	

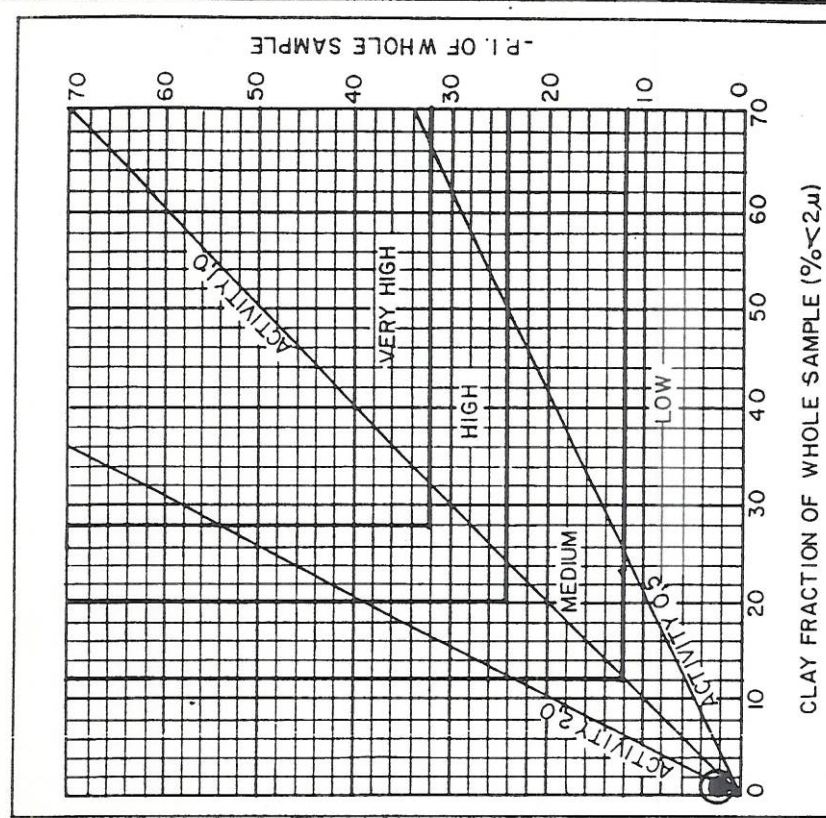
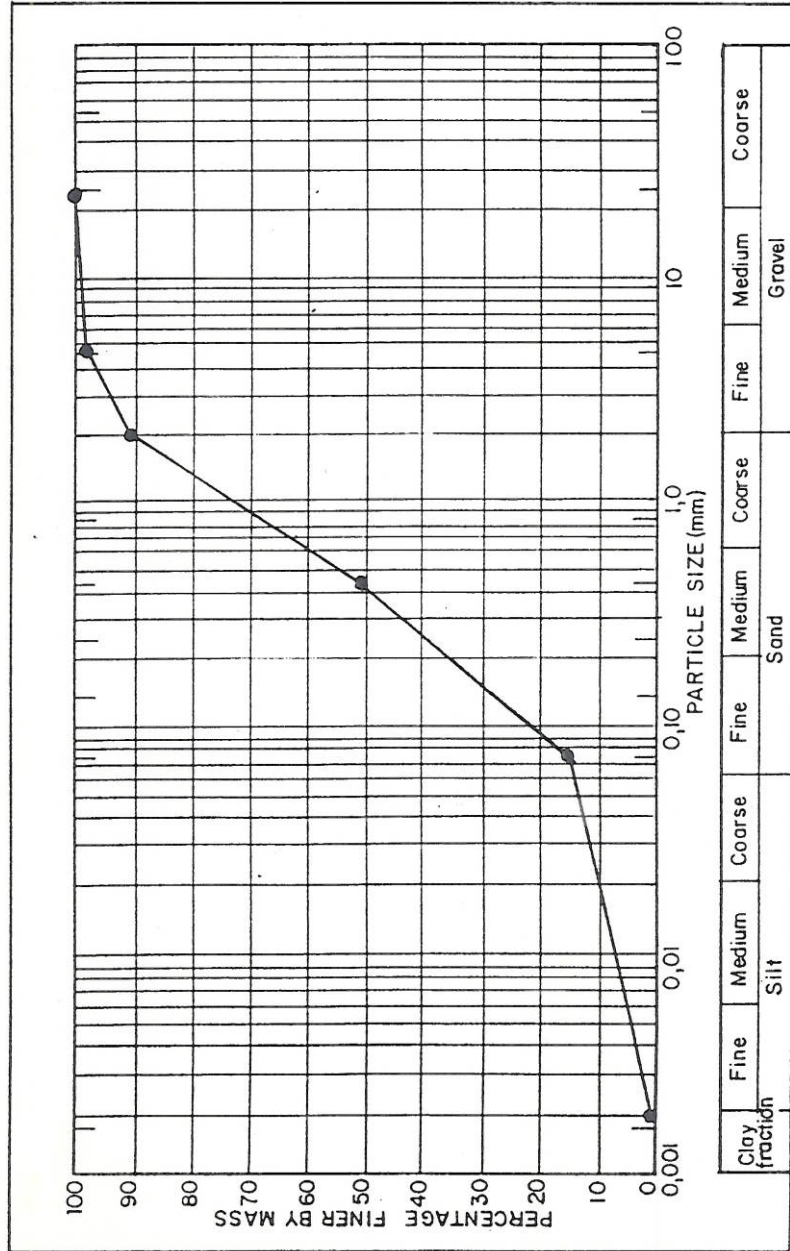
REMARKS	VERSTEURDE MONSTER



# KIMATLAB

## POTENTIAL EXPANSIVENESS TEST

CLIENT	BVI RAADGEWENDE INGENIEURS	PROJECT	PAUL PUTS SUBSTASIE	YOUR REF	MNR DE KOCK	OUR REF	SL 1560	DATE	1999.11.12
SAMPLE No.	K21-730	TEST HOLE No.	TP 12	DEPTH	0,1 - 0,9m	DESCRIPTION	LIGBRUIN TOT LIG-ROOIBRUIN, FYN, VERWEERDE GRANIET EN KWARTSJETGRUIS		



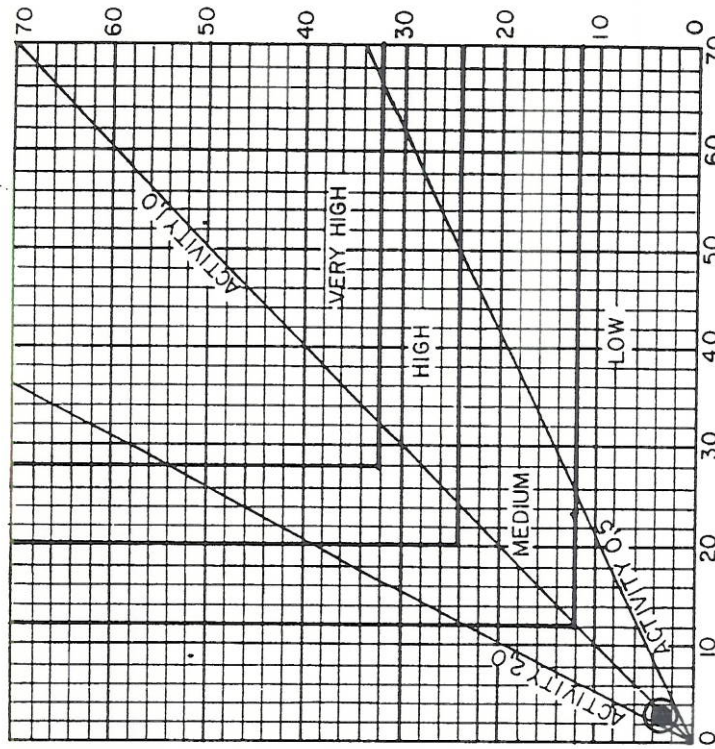
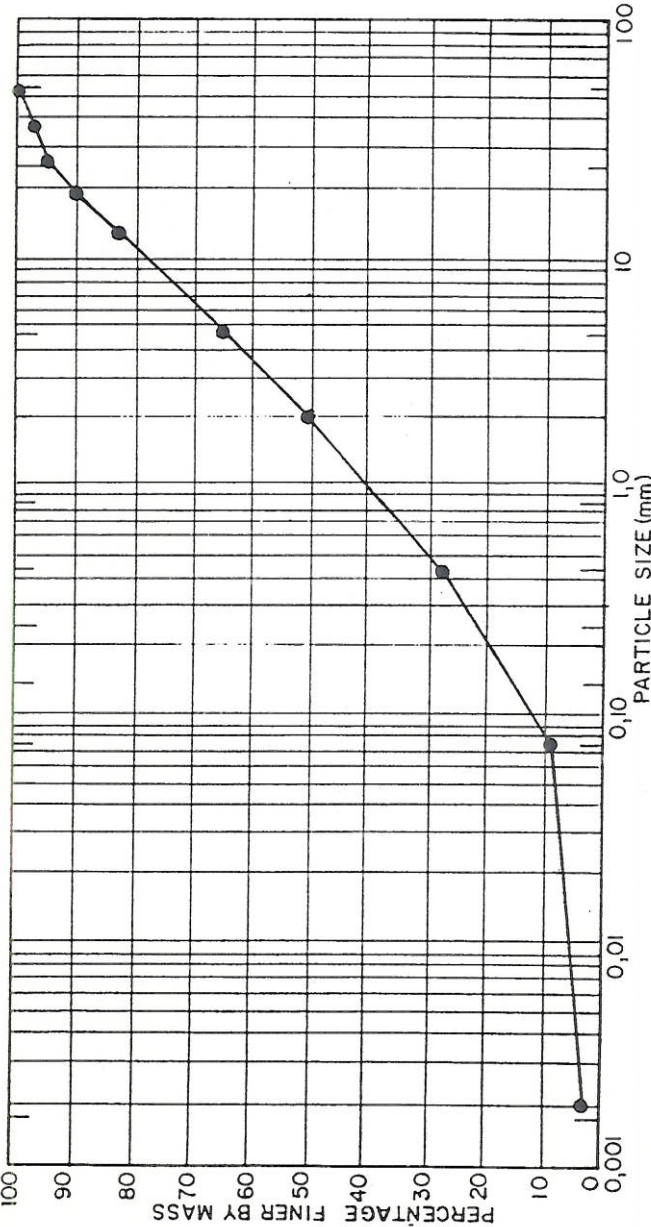
ATTERBERG LIMITS		CLAY FRACTION (%)	
Liquid Limit	17	Soil Fines	2
Plastic Limit	14	Whole Sample	1
Plasticity Index	3		
Linear Shrinkage	1,4		

UNDISTURBED / DISTURBED SAMPLE DATA	
In situ Moisture Content (%)	
Relative Density	
Bulk Density (dry) (kg/m³)	
Bulk Density (wet) (kg/m³)	

REMARKS	VERSTEURDE MONSTER



Clay fraction	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse
	Silt						Sand						Gravel		



ATTERBERG LIMITS		SOIL FINES	WHOLE SAMPLE	CLAY FRACTION (%)	UNDISTURBED / DISTURBED SAMPLE DATA	
Liquid Limit	31	9			Insitu Moisture Content (%)	
Plastic Limit	22				Relative Density	
Plasticity Index	9	3			Bulk Density (dry)(kg/m <sup>3</sup> )	
Linear Shrinkage	4				Bulk Density (wet)(kg/m <sup>3</sup> )	

CLAY FRACTION OF WHOLE SAMPLE ( $\% < 2\mu$ )
REMARKS VERSTEURDE MONSTER

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TP	LS	BD	PRA
- Test Pit	- Linear Shrinkage	- Insitu Dry Density kg/m <sup>3</sup>	- Modification of U.S. Bureau of
BH	GM	MC	Public Roads Administration
- Borehole	- Grading Modul	- Moisture Content	Classification Systems
LL	µm	OMC	
- Liquid Limit	- Clay Fraction	- Optimum Moisture Content	
PI	PE -	CBR	
- Plastic Index	- Potential Expansiveness		
PI/WS	MDD -		
- PI of Whole Sample	Maximum Dry Density kg/m <sup>3</sup>		

TP	LS	BD	PRA
- Test Pit	- Linear Shrinkage	- Insitu Dry Density kg/m <sup>3</sup>	- Modification of U.S. Bureau of
BH	GM	MC	Public Roads Administration
- Borehole	- Grading Modul	- Moisture Content	Classification Systems
LL	µm	OMC	
- Liquid Limit	- Clay Fraction	- Optimum Moisture Content	
PI	PE -	CBR	
- Plastic Index	- Potential Expansiveness	- California Bearing Ratio	
PI/WS	MDD		
- PI of Whole Sample	- Maximum Dry Density kg/m <sup>3</sup>		