PHETHOGO CONSULTING (BLOEMFONTEIN)

GEOTECHNICAL REPORT FOR THE PROPOSED TOWNSHIP DEVELOPMENT AT VREDE, FREE STATE

GEOTECHNICAL INVESTIGATION

REFERENCE : SL / 1436 **Document No.: 2012/244/Doc.** **MARCH - 2013**

REG. No. 1987/004282/07

Simlab (EDMS) BEPERK (PTY) LIMITED GEOTEGNIESE DIENSTE GEOTECHNICAL SERVICES

SAASIL/SAACEL No. 208

6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301

+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

Enquiries	:	BLOEMFONTEIN
Our ref.	:	SL / 1436
Your ref.	:	Tembalihle 2000, Phumelela
File ref.	:	2012/244/Doc.
Date	:	March- 2013

PHETHOGO CONSULTING (BLOEMFONTEIN)

GEOTECHNICAL REPORT FOR THE PROPOSED TOWNSHIP DEVELOPMENT AT VREDE, FREE STATE

GEOTECHNICAL INVESTIGATION

C O N T E N T S

APPENDIX

TABLES

FIGURES

1. INTRODUCTION

1.1 Terms of reference

Phethogo Consulting (Bloemfontein) appointed Simlab (Pty) Limited - Geotechnical Services (Bloemfontein) to conduct a geotechnical investigation and compile a geotechnical report for the proposed township development at Vrede in the Free State.

This report contains the results of the geotechnical investigation done by Simlab (Pty) Limited Geotechnical Services (Bloemfontein).

Recommendations are made with regard to founding conditions for proposed buildings and other structures.

1.2 Location

Vrede is situated in the eastern Free State approximately 50km north west of Memel.

Refer to Locality Plan (Appendix A) and Layout Plan (Appendix I) for more detail.

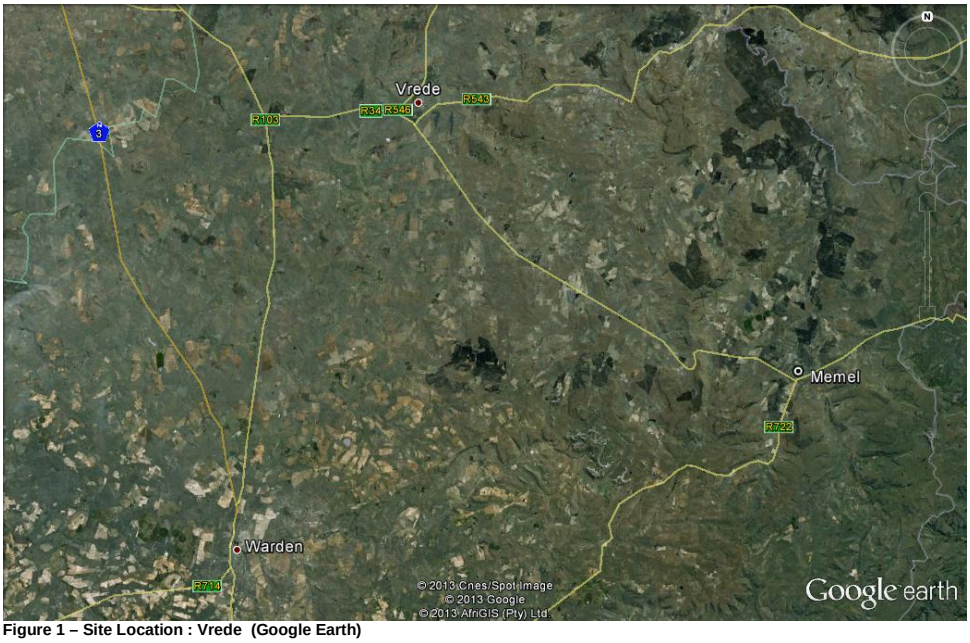


Figure 1 – Site Location : Vrede (Google Earth)

2. INFORMATION USED IN THE STUDY

Jennings JE, Brink ABA, Williams AAB (1973), revised guide to soil profiling for Civil Engineering purposes in Southern Africa

Committee of Land Transport Officials (1998), Standard Specifications for Road and Bridge Works for State Road Authorities. South Africa: South African Institution of Civil Engineering.

Committee of State Road Authorities (1986), Technical Methods for Highways 1: Standard Methods of Testing Road Construction Materials. Pretoria: Department of Transport.

National Home Builders Registration Council (1999), Home Building Manual Part 1 & 2. Revision No: 1. South Africa: National Home Builders Registration.

National Department of Housing (2002), Geotechnical Site Investigations for Housing Developments. South Africa: Greenfield Subsidy Project Developments.

Van Der Merwe D H. (1964), The prediction of heave from the plasticity index and percentage clay fraction of soil. South Africa: South African Institution of Civil Engineering.

Geological Map of the South Africa and the Kingdoms of Lesotho and Swaziland (1997), Council for Geoscience.

State-of-the-art review of Collapsible Soils, Department of Civil Engineering, College of Engineering, Sultan Qaboos, 2000

Vrede Climate : www.saexplorer.co.za

Software : GoogleEarth® 6.2.2. 6613, Google Inc. 2013,
MapSource® 6.16.3, Garmin™, 2010
dotPLOT® 2.4.0, Software Africa©, 2010

3. PROJECT DETAIL

CLIENT:

Phethogo Consulting (Bloemfontein)

CLIENT REPRESENTATIVE:

Mr P De Bie

CLIENT ADDRESS:

PO Box 43284

Heuwelsig

BLOEMFONTEIN

9332

Tel: 051 448 6006/7/8 Fax: 051 448 6728

PROJECT:

REPORT ON THE GEOTECHNICAL INVESTIGATION FOR THE PROPOSED TOWNSHIP DEVELOPMENT AT VREDE IN THE FREE STATE.

TESTING LABORATORY:

Simlab (Pty) Limited – Geotechnical Services (Bloemfontein)

LABORATORY ADDRESS:

Cnr. Grey Street and Lunn Road, Hilton, **BLOEMFONTEIN**, 9301.

Tel: 051 447 0224, Cell: 082 821 9435, Fax: 051 448 8329.

E-mail: *simbfn@simlab.co.za* or *fholder@simlab.co.za*

SAMPLE DETAIL:

Sampled by: Mr. Frank Holder

Date Sampled: 20 - 21 November 2012

Date Tested: 12 December 2012 – 24 February 2013

Report Date: 19 March 2013

SAMPLING AND TESTING:

Sampled according to the TMH5 : 1981, and specifications of the client.

Sampling was done by means of a New Holland LB 90.B,75Kw TLB. Tested according to the TMH1 : 1986 specifications.

The test methods used include the following SANAS accredited methods:

- TMH1: 1986, A1 (a) – The wet preparation and sieve analysis of gravel, sand and soil samples.
- TMH1: 1986, A2 – The determination of the liquid limit of soils by means of the flow curve method.
- TMH1: 1986, A3 – The determination of the plastic limit and plasticity index of soils.
- TMH1: 1986, A4 – The determination of the linear shrinkage of soils.
- TMH1: 1986, A5 – The determination of the percentage of material passing a 0.075mm sieve in a soil sample.
- *TMH1: 1986, A6 – The determination of the grain size distribution in soils by means of a hydrometer. (Particle Size Distribution of Samples)
- TMH1 : 1986, method A7 - The determination of the maximum dry density and optimum moisture content of gravel, soil and sand.
- TMH1 : 1986, method A8 -The determination of the California Bearing Ratio of untreated soils and gravels.
- *TMH1: 1986, method A17 – The determination of the moisture content of soils.
- *TMH1 1986: method A20 - The electrometric determination of the pH value of a soil suspension.
- *TMH1 1896: methodA21T - Tentative method for the determination of the conductivity of a saturated soil paste and water.
- *TMH6 ST6 – Dynamic Cone Penetration Test (DCP)
- *Estimated Bearing Ratio – Dr B Van Wyk's Method
- *Colto Classification of Material Properties.
- *Potential Expansiveness of the Material – Van Der Merwe's method.
- *Classification of Site – NHBRC Home Building Manual, Part1, Section2, Table: Residential Site Class Designations.

Tests marked - * "Not SANAS Accredited" in this report are not in the SANAS Schedule of Accreditation for this laboratory"

Opinions and interpretations expressed in the report are outside the scope of SANAS Accreditation of Simlab (Pty) Limited – Geotechnical Services.

SECTION/POSITION SAMPLED:

Simlab (Pty) Limited – Geotechnical Services (Bloemfontein) sampled and tested at positions shown on the Layout Plan (Appendix I).

4. TOPOGRAPHY

The terrain investigated is a relatively flat area with a gentle positive gradient to the north.

The area is covered with short dense grass. Sandstone outcrops occur in the vicinity of TP14, TP26 and TP27.

5. GEOLOGY

Vrede is underlain by the Beaufort group of the Karoo Supergroup and consists of mudstone and sandstone.

Post Karoo dolerite intrusions also occur.

6. CLIMATE

Vrede normally receives about 524mm of rain per year, with most rainfall occurring during summer. It receives the lowest rainfall (0mm) in July and the highest (99mm) in January.

The average midday temperatures for Vrede range from 15.7ºC in June to 25.5ºC in January. The region is coldest during June when the mercury drops to 0.1ºC on average during the night.

7. SITE INVESTIGATION

Fifty three (53) test pits were investigated by means of a New Holland LB90.B, 75kw TLB.

The test pits were profiled in accordance with Brink, Jennings and Williams guidelines for geotechnical profiling. Profiles are given in Appendix B.

Typical samples from selected test pits were taken to conduct the required tests.

The test pit co-ordinates are given in Table 1.

Table 1: Test Pit Co-ordinates

Test Pit No.	Co-ordinates
TP1	29 Y-013743 X3034651
TP2	29 Y-013871 X3034524
TP3	29 Y-014001 X3034402
TP4	29 Y-014124 X3034275
TP5	29 Y-014236 X3034184
TP6	29 Y-014352 X3034069
TP7	29 Y-014470 X3033963
TP8	29 Y-014266 X3033844
TP9	29 Y-014160 X3033974
TP10	29 Y-014021 X3034067
TP11	29 Y-013925 X3034152
TP12	29 Y-013795 X3034240
TP13	29 Y-013679 X3034367
TP14	29 Y-013513 X3034486
TP15	29 Y-013335 X3034403
TP16	29 Y-013502 X3034268
TP17	29 Y-013645 X3034145
TP18	29 Y-013777 X3034034

Test Pit No.	Co-ordinates
TP19	29 Y-013876 X3033954
TP20	29 Y-013993 X3033878
TP21	29 Y-014087 X3033781
TP22	29 Y-013859 X3033775
TP23	29 Y-013763 X3033848
TP24	29 Y-013659 X3033930
TP25	29 Y-013547 X3034039
TP26	29 Y-013408 X3034148
TP27	29 Y-013243 X3034253
TP28	29 Y-013098 X3034145
TP29	29 Y-013296 X3034013
TP30	29 Y-013418 X3033890
TP31	29 Y-013555 X3033810
TP32	29 Y-013656 X3033714
TP33	29 Y-013546 X3033612
TP34	29 Y-013437 X3033709
TP35	29 Y-013325 X3033796
TP36	29 Y-013189 X3033893
TP37	29 Y-013054 X3034009
TP38	29 Y-012897 X3033905
TP39	29 Y-013028 X3033782
TP40	29 Y-013132 X3033661
TP41	29 Y-013245 X3033552
TP42	29 Y-013021 X3033458
TP43	29 Y-012950 X3033544
TP44	29 Y-012877 X3033626

Test Pit No.	Co-ordinates
TP45	29 Y-012787 X3033721
TP46	29 Y-012653 X3033646
TP47	29 Y-012737 X3033560
TP48	29 Y-012821 X3033455
TP49	29 Y-012725 X3033366
TP50	29 Y-012654 X3033447
TP51	29 Y-012566 X3033545
TP52	29 Y-012550 X3033420
TP53	29 Y-012288 X3033253

Co-ordinate system – WGS 84 LO29

Test positions 19, 20 and 21 are located in a stream.

At the time of the investigation, marshy conditions occurred in the vicinity of TP43.

Test pit 44 is located in a dam.

Bedrock levels are summarised in Table 2.

Table 2: Bedrock Levels

Test Pit No.	Bedrock Level (mm)	Description of Bedrock
TP1	-1500	Mudstone
TP2	-1500	Hard weathered dolerite
TP3	-700	Mudstone
TP4	-700	Mudstone
TP9	-400	Sandstone
TP10	-1000	Mudstone
TP11	-650	Sandstone
TP13	-900	Sandstone

Test Pit No.	Bedrock Level (mm)	Description of Bedrock
TP14	Outcrop	Sandstone
TP15	-1200	Sandstone
TP16	-700	Weathered dolerite rock
TP17	-650	Sandstone
TP18	-1150	Mudstone
TP22	-1100	Sandstone
TP23	-700	Mudstone
TP25	-1100	Sandstone
TP26	Outcrop	Sandstone
TP27	Outcrop	Sandstone
TP29	-850	Mudstone
TP30	-1400	Sandstone
TP31	-1000	Mudstone
TP32	-1900	Sandstone
TP33	-1300	Sandstone
TP34	-700	Mudstone
TP35	-1000	Mudstone
TP36	-1000	Mudstone
TP38	-1700	Sandstone
TP39	-2000	Sandstone
TP40	-1000	Mudstone
TP41	-1200	Sandstone
TP45	-1300	Sandstone
TP46	-1500	Sandstone
TP47	-2200	Mudstone
TP48	-2500	Mudstone

Test Pit No.	Bedrock Level (mm)	Description of Bedrock
TP49	-2600	Mudstone
TP50	-1300	Sandstone
TP51	-1300	Sandstone
TP52	-1500	Sandstone
TP53	-1600	Mudstone

8. GEOTECHNICAL EVALUATION

8.1 Potentially Collapsible Soils

For the purpose of identifying whether potentially collapsible soils occur over the terrain in question, criteria proposed by Priklonski (1952) and Handy (1973) are used.

The evaluation is summarised for selected test pit profiles that cover the area investigated.

Table 3: * Test Pit Evaluation – Collapsibility

Test Pit No.	Depth (m)	Description	Criteria	
			Priklonski (1952)	**Handy (1973)**
			K_D = (natural mc- P L) / PI	**Soil clay % <0.002mm**
			K_D <0 : Highly collapsible soil	**<16% : High probability**
			K_D >0.5 : Non-collapsible soil	**16-24% : Probability of collapse**
			K_D >1.0 : Swelling soils	**24-32% : Less than 50% probability of collapse**
				>32% : Usually safe from collapse
TP1	0.0 - 0.7	Sandy clay	K_D = 0.45 : Close to non-collapsible	Clay 34% <0.002mm Usually safe from collapse
	0.7 - 1.5	Sandy clay	K_D = −0.071 : Highly collapsible soil	Clay 26% <0.002mm Probability of collapse < 50%
TP7	0.0 - 0.6	Sandy clay	K_D = 0.2 : Collapsible soil	Clay 19% < 0.002mm : Probability of collapse
	0.6 -1.2	Clayey weathered dolerite	K_D = 0.34 : Collapsible soil	Clay 25% < 0.002mm : Probability of collapse < 50%
TP16	0.0 - 0.7	Clayey weathered dolerite	K_D = - 0.43 : Highly collapsible soil	Clay 3% ,0.002mm : High probability of collapse
TP18	0.4 - 0.9	Sandy clay	K_D = - 0.17 : Highly collapsible soil	Clay 17% <0.002mm : Probability of collapse
TP22	0.0 - 0.6	Sandy clay	K_D = 0.13 : Collapsible soil	Clay 18% <0.002mm : probability of collapse
	0.6 - 1.1	Sandy clay	K_D = 0.10 : Collapsible soil	Clay 27% <0.002mm : Probability of collapse < 50%

Test Pit No.	Depth (m)	Description	Criteria	
			Priklonski (1952)	**Handy (1973)**
			K_D = (natural mc- P L) / PI	**Soil clay % <0.002mm**
			K_D <0 : Highly collapsible soil	**<16% : High probability**
			K_D >0.5 : Non-collapsible soil	**16-24% : Probability of collapse**
			K_D >1.0 : Swelling soils	**24-32% : Less than 50% probability of collapse**
				>32% : Usually safe from collapse
TP24	0.4 - 2.1	Clayey ferricrete	K_D = −0.12 : Highly collapsible soil	Clay 35% <0.002mm : Usually safe from collapse
	2.1 - 3.0	Clayey ferricrete	K_D = 0.12 : Collapsible soil	Clay 30% <0.002mm : Probability of collapse < 50%
TP32	0.3 - 1.0	Sandy clay	K_D = -0.07 : Highly collapsible soil	Clay 41% <0.002mm : Usually safe from collapse
	1.0 - 1.9	Sandy clay	K_D = - 0.34 : Highly collapsible soil	Clay 38% <0.002mm : Usually safe from collapse
TP36	0.3 - 0.7	Clay	K_D = -0.19 : Highly collapsible soil	Clay 40% <0.002mm : Usually safe from collapse
TP36	0.7 - 1.0	Clay	K_D = -0.17 : Highly collapsible to non-collapsible soil	Clay 42% <0.002mm : Usually safe from collapse
TP42	1.0 - 3.0	Clay	K_D = 0.66 : Non collapsible soil	Clay 36% <0.002mm : Probability of collapse < 50%
TP53	0.3 - 0.9	Clay	K_D = 0.074 : Collapsible soil	Clay 31% <0.002mm : Probability of collapse < 50%
	0.9 - 1.6	Clay	K_D = - 0.25 : Highly collapsible soil	Clay 37% <0.002mm : Usually safe from collapse

mc : Moisture Content PL : Plastic Limit PI : Plastic Index

Although Priklonski and Handy's criteria in some instances give conflicting results a number of soil types can be considered potentially collapsible based on Priklonski and Handy's models.

If collapse potential is of concern to the design engineer it is suggested that one-dimensional oedometer or consolidation test be done for a specific construction site.

Consolidation tests have been done on selected soil types, the results of which are given in Appendix F.

8.2 Potentially Expansive Soils

The potential expansiveness of the soil profiles investigated, vary from low to high based on *van der Merwe's method for predicting potential heave.

The potential heave is summarised in Table 4.

Table 4: *Potential Heave and NHBRC Classification

Test Pit No.	Depth of Layer (mm)	Potential Heave (mm)	Classification (NHBRC)
TP8, TP9, TP16, TP17, TP23, TP25, TP29, TP31, TP34, TP35, TP36, TP37, TP40,	Total soil profile	Low	H
TP1	0 - 700 700 - 1500	Medium / 11.0 Medium / 9.4 **TOTAL: 20.4**	H2
TP2	0 - 900 900 - 1500	Medium / 13.0 High / 14.5 **TOTAL: 27.5**	H2
TP3	0 - 400	Medium / 7.0	H
TP4	0 - 500	Medium / 9.0	H1
TP5	0 - 600	Medium / 10.0	H1
TP6	0 - 500	Medium / 9.0	H1
TP7	0 - 600 160 - 1200	High / 20.0 High / 15.8 **TOTAL: 35.8**	H3
TP10	0 - 1000	Medium / 14.5	H1

Test Pit No.	Depth of Layer (mm)	Potential Heave (mm)	Classification (NHBRC)
TP12	0 - 400 400 - 800	Medium / 7.2 Medium / 6.0 **TOTAL: 13.2**	H1
TP13	0 - 500 500 - 900	Medium / 9.0 Medium / 7.0 **TOTAL: 16.0**	H2
TP15	0 - 800	Medium / 12.0	H1
TP18	0 - 400 900 - 1150	Medium / 7.0 Medium / 4.7 **TOTAL: 11.7**	H1
TP22	600 - 1100	Medium / 6.9	H
TP24	400 - 2100	Medium / 21.0	H2
TP28	600 – 1200 1200 – 2850	High / 16.0 Medium / 15.0 **TOTAL: 31.0**	H3
TP30	300 - 600	High / 10.0	H1
TP32	1000 - 1900	Medium / 9.5	H1
TP33	600 -1300	Medium / 8.7	H1
TP38	300 – 800 800 – 1700	Medium / 7.5 Medium / 10.0 **TOTAL: 17.5**	H2
TP39	1000 - 2000	Medium / 10.4	H1
TP41	0 - 600 600 - 1200	Medium / 9.5 Medium / 7.8 **TOTAL: 17.3**	H2
TP42	400 - 1000 1000 - 3000	Medium / 8.3 Medium / 19.0 **TOTAL: 27.3**	H2

Test Pit No.	Depth of Layer (mm)	Potential Heave (mm)	Classification (NHBRC)
TP46	0 - 600 600 - 1500	Medium / 9.5 Medium / 11.1 **TOTAL: 20.6**	H2
TP47	400 - 1000 1000 - 2200	Medium / 8.3 Medium / 12.2 **TOTAL: 20.5**	H2
TP48	300 - 600 600 - 2500	Medium / 5.0 Medium / 21.0 **TOTAL: 26.0**	H2
TP50	300 - 700 700 - 1300	High / 12.7 Medium / 7.6 **TOTAL: 20.3**	H2
TP51	500 - 1300	Medium / 9.8	H1
TP52	400 - 1500	Medium / 13.5	H1
TP53	300 - 900 900 - 1600	Medium / 8.7 Medium / 8.0 **TOTAL: 16.7**	H1

8.3 Potentially Compressible Soils

Given ideal conditions such as saturated moisture content and applied load the soil encountered over this area will be compressible to a degree. (By the process of consolidation)

Consolidation tests were conducted on selected soil types. Refer to Appendix F

8.4 Ground Water Seepage or Level

There was no ground water seepage or level encountered at the time of the investigation.

8.5 Slope Stability (Steep Slopes & Unstable Natural Slopes)

No steep fill or unstable natural slopes occur over the proposed development area.

8.6 Erodibility of the Soil Profile

There is no evidence that erosion had taken place or is occurring at the time of the investigation.

8.7 Excavatibility

Excavations during the investigation showed that the soil covering the bedrock can be excavated with ease by means of pick and shovel or TLB excavator.

The soil can in general be excavated at a rate of 0.4m³/min by means of a TLB.

The bedrock however may require power equipment for excavations.

8.8 Aggressiveness of Soil

The conductivity and pH of selected soil types were measured to estimate the aggressiveness of the soil.

Based on the results the soil in general is corrosive to very corrosive. Precautionary measures may be necessary with regards to the selection of service materials.

The result of this exercise is summarised in the following table.

Table 5: *Aggressiveness of Soil

Test Pit No.	Layer (mm)	Description	pH	Conductivity (Sm^{-1})	Aggressiveness
TP1	0 - 700	Sandy clay	6.20	0.0218	Mildly corrosive
	700 - 1500	Sandy clay	7.81	0.4474	Very corrosive
TP2	900 – 1500	Sandy clay	5.86	0.3404	Very corrosive
TP5	600 - 1000	Weathered dolerite	6.16	0.3307	Very corrosive
TP10	0 - 1000	Sandy clay	5.95	0.3793	Very corrosive
TP12	0 - 400	Sandy clay	7.72	0.2237	Very corrosive
	400 - 800	Sandy clay	8.11	0.4950	Very corrosive
TP16	0 - 700	Weathered dolerite	7.58	0.4668	Very corrosive
TP18	400 - 900	Sandy clay	7.06	0.1305	Corrosive
	900 - 1150	Sandy clay	8.38	0.3015	Very corrosive
TP22	0 - 600	Sandy clay	6.97	0.1751	Corrosive
	600 - 1100	Sandy clay	8.73	0.2723	Very corrosive
TP24	400 - 2100	Clay & ferricrete	8.44	0.2626	Very corrosive
	2100 - 3000	Clay & ferricrete	7.10	0.2626	Very corrosive
TP30	300 - 600	Sandy clay	8.64	0.2529	Very corrosive
	600 - 1400	Clay & ferricrete	8.03	0.2626	Very corrosive
TP33	0 - 600	Clay	8.11	0.2042	Very corrosive
	600 - 1300	Ferricrete	6.15	0.2042	Very corrosive
TP35	400 - 1000	Ferricrete	7.19	0.1653	Corrosive
TP40	400 - 1000	Sandy clay	5.83	0.1945	Corrosive
TP46	600 - 1500	Clay	7.52	0.3598	Very corrosive
TP50	700 - 1300	Clay	7.01	0.1362	Corrosive
TP52	400 - 1500	Clay	7.92	0.3015	Very corrosive
TP53	900 - 1600	Clay	6.23	0.3598	Very corrosive

8.9 Bearing Capacity

The estimated bearing capacity (kPa) based on DCP tests are given in Appendix E.

Note that the DCP results are only valid for the time when the DCP measurements were taken and will vary as the moisture content of the soil varies.

9.0 Infrastructure – Roads and Streets

The soil covering the bedrock is not suitable to be used as selected layers in streets or roads.

9. SITE ZONING

The proposed area is classified in accordance with the classification system described in the *NHBRC'S Home Building Manual Part 1 & 2.

9.1 Classification of Soil Conditions

Based on the laboratory results and *van der Merwe's method of predicting the potential heave of soil profiles, the area can be classified as follows:

Zone 1 : (H) TP3, TP8 TP9,TP16, TP17, TP23, TP25, TP29, TP31, TP34, TP35, TP36 & TP40
Soil conditions with a potential heave of <7.5mm.

Zone 2 : (H1) TP4, TP5, TP6, TP10, TP12, TP15, TP18, TP30, TP32, TP33, TP39, TP51, TP52 & TP53
Soil conditions with a potential heave of 7.5 - 15mm.

Zone 3 : (H2) TP1, TP2, TP13, TP24, TP38, TP41, TP42, TP46, TP47, TP48 & TP50
Soil conditions with a potential heave of 15 -30mm.

Zone 4 : (H3) TP7 & TP28
Soil conditions with a medium potential heave of >30mm.

10. RECOMMENDATIONS

The recommended foundation design, building procedures and precautionary measures for single storey structures on expansive soils is summarised in Table 6.

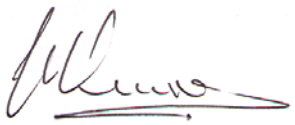
Table 6: * NHBRC Site Class

Site Class	Estimated Total Heave (mm)	Construction Type	Foundation Design and Building Procedures
H	<7.5mm	Normal	• Normal construction (strip footings or slab-on-the-ground) foundation. • Site drainage and service/plumbing precautions recommended.
H1	7.5-15mm	Modified normal	• Lightly reinforced strip footings. • Articulation joints at all internal/external doors and openings. • Light reinforcement in masonry. • Site drainage and plumbing/service precautions.
		Soil raft	• Remove all or necessary parts of expansive horizon to 1.0m beyond the perimeter of the building and replace with inert backfill compacted to 93% MOD AASHTO density at -1% to +2% of optimum moisture content. • Normal construction with lightly reinforced strip footings and light reinforcement in masonry if residual movements are <7.5mm, or construction type appropriate to residual movements. • Site drainage and plumbing/service precautions.
H2	15-30mm	Stiffened or cellular raft	• Stiffened or cellular raft of articulated lightly reinforced masonry. • Site drainage and plumbing/service precautions.

Site Class	Estimated Total Heave (mm)	Construction Type	Foundation Design and Building Procedures
		Piled construction	• Piled foundations with suspended floor slabs with or without ground beams. • Site drainage and plumbing/service precautions.
		Split construction	• Combination of reinforced masonry and full movement joints. • Suspended floors or fabric reinforced ground slabs acting independently from the building. • Site drainage and plumbing/service precautions.
		Soil raft	• Remove all or necessary parts of expansive horizon to 1.0m beyond the perimeter of the building and replace with inert backfill compacted to 93% MOD AASHTO density at -1% to +2% of optimum moisture content. • Normal construction with lightly reinforced strip footings and light reinforcement in masonry if residual movements are <7.5mm, or construction type appropriate to residual movements. • Site drainage and plumbing/service precautions.
H3	>30mm	Stiffened or cellular raft	• Stiffened or cellular raft of articulated lightly reinforced masonry. • Site drainage and plumbing/service precautions
		Piled construction	• Piled foundations with suspended floor slabs with or without ground beams' • Site drainage and plumbing/service precautions.

Site Class	Estimated Total Heave (mm)	Construction Type	Foundation Design and Building Procedures
H3	>30mm	Soil raft	• Remove all or necessary parts of expansive horizon to 1.0m beyond the perimeter of the building and replace with inert backfill compacted to 93% MOD AASHTO density at -1% to +2% of optimum moisture content. • Normal construction with lightly reinforced strip footings and light reinforcement in masonry if residual movements are <7.5mm, or construction type appropriate to residual movements. • Site drainage and plumbing/service precautions.

The above is only a recommendation and the design should be done by a professional engineer.



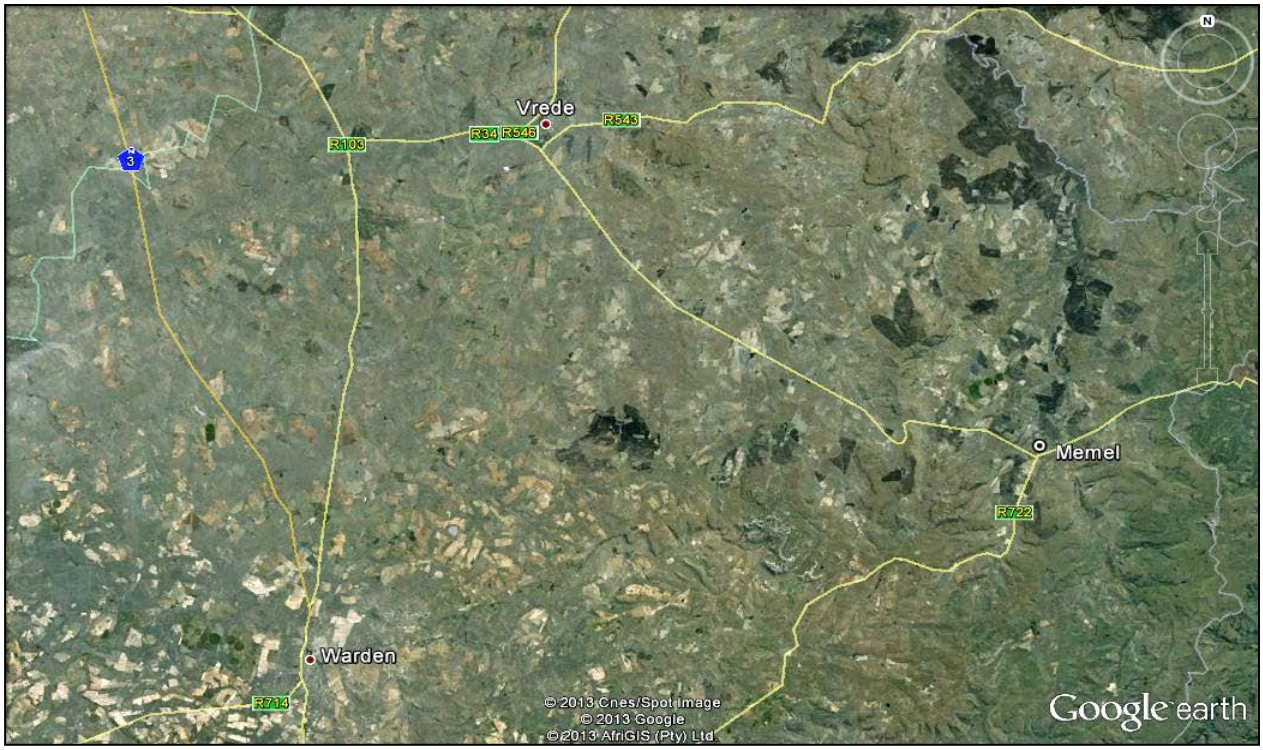
F HOLDER (Senior Technician)
for : SIMLAB (PTY) LIMITED

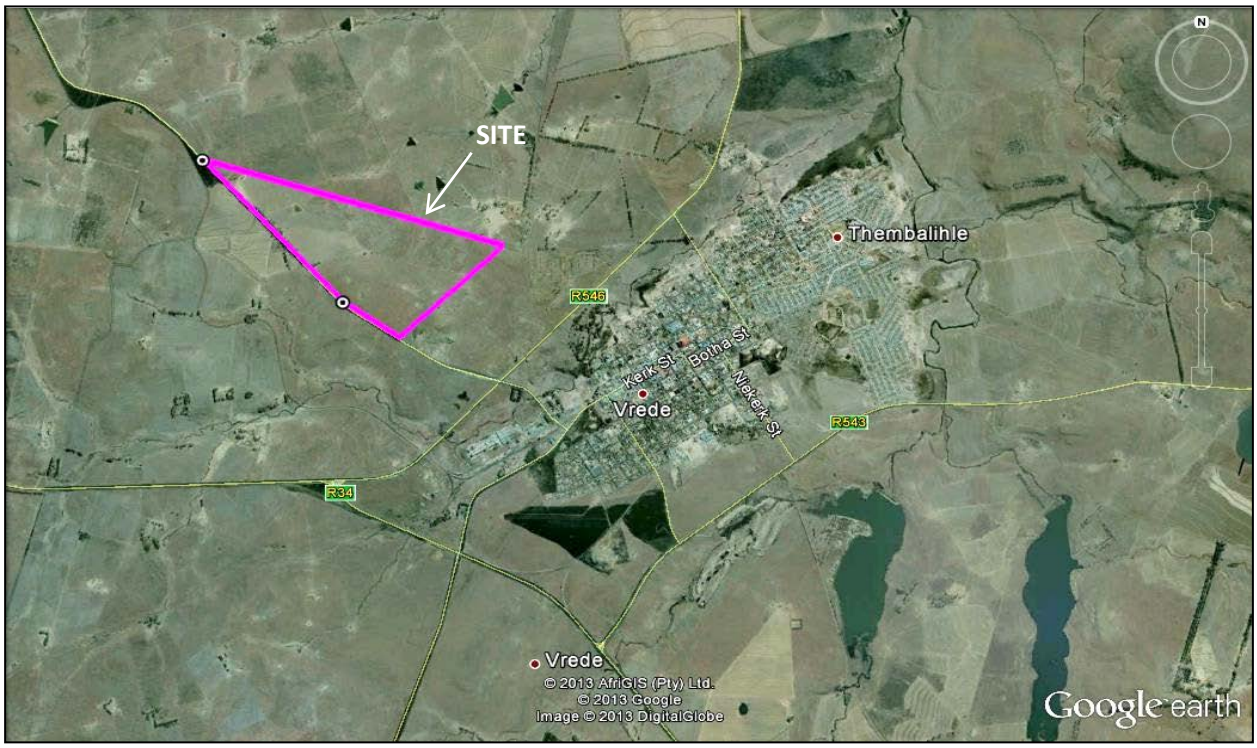
J VAN VUUREN (Laboratory Manager)
(Technical Signatory)

APPENDIX A
LOCALITY PLAN

Simlab (EDMS) BEPERK (PTY) LIMITED GEOTEGNIESE DIENSTE GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07 SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448-8329, simbfn@simlab.co.za

LOCALITY PLAN





APPENDIX B
IN SITU MATERIAL PROFILES

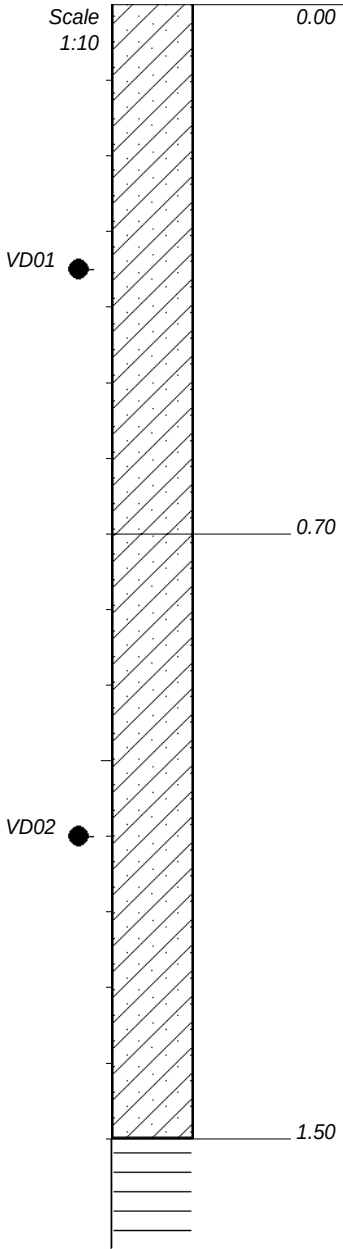
Simlab (PTY) LTD
GEOTECHNICAL SERVICES

PHETHOGO CONSULTING
TOWNSHIP DEVELOPMENT - VREDE

HOLE No: TP01
Sheet 1 of 1

JOB NUMBER: 2012/244/DOC.

Scale 1:10



0.00 Slightly moist dark brown stiff sandy clay.

0.70 Slightly moist yellow brown stiff sandy clay.

1.50 + 1.500 Soft rock / Olive mudstone.

NOTES

1) Disturbed sample VD01 taken at 0.350m.

2) Disturbed sample VD02 taken at 1.100m.

3) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : F HOLDER
MACHINE : TLB
DRILLED BY : F HOLDER
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM :
DATE : 20/11/2012
DATE : 11/03/2013

ELEVATION : -
X-COORD : X3034651
Y-COORD : 29 Y-013743

HOLE No: TP01

TYPE SET BY : S VD MERWE
SETUP FILE : STANDARD.SET

DATE : 19/03/13 11:33
TEXT : ..\Desktop\INSITU~1.TXT

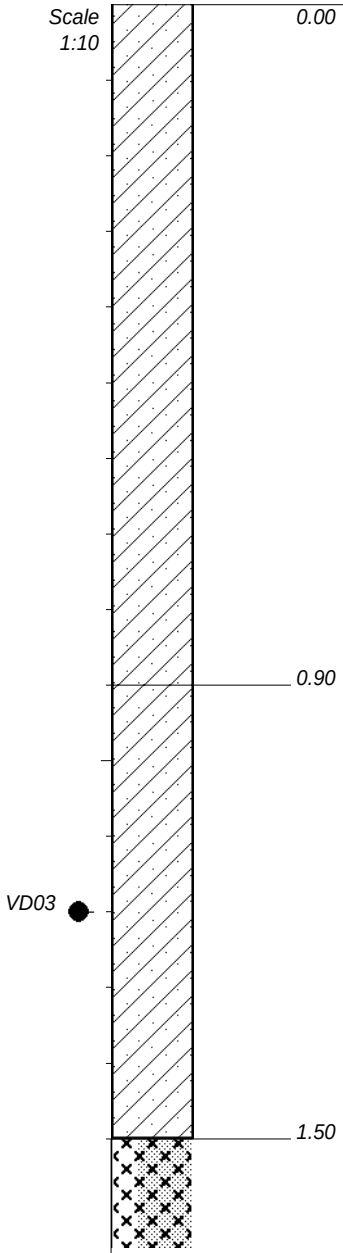
Simlab (PTY) LTD
GEOTECHNICAL SERVICES

PHETHOGO CONSULTING
TOWNSHIP DEVELOPMENT - VREDE

HOLE No: TP02
Sheet 1 of 1

JOB NUMBER: 2012/244/DOC.

Scale 1:10



0.00 Slightly moist dark brown stiff sandy clay.

0.90 Slightly moist light brown stiff sandy clay.

1.50 + 1.500 Hard weathered dolerite.

NOTES

1) Disturbed sample VD03 taken at 1.200m.

2) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : F HOLDER
MACHINE : TLB
DRILLED BY : F HOLDER
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM :
DATE : 20/11/2012
DATE : 11/03/2013

ELEVATION : -
X-COORD : X3034524
Y-COORD : 29 Y-013871

HOLE No: TP02

TYPE SET BY : S VD MERWE
SETUP FILE : STANDARD.SET

DATE : 19/03/13 11:33
TEXT : ..\Desktop\INSITU~1.TXT

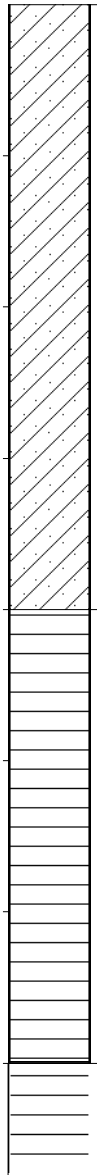
Simlab (PTY) LTD
GEOTECHNICAL SERVICES

PHETHOGO CONSULTING
TOWNSHIP DEVELOPMENT - VREDE

HOLE No: TP03
Sheet 1 of 1

JOB NUMBER: 2012/244/DOC.

Scale 1:5



0.00 Slightly moist light brown stiff sandy clay.

0.40 Slightly moist olive dense mudstone.

0.70 + 0.700 Soft rock / Olive mudstone.

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : F HOLDER
MACHINE : TLB
DRILLED BY : F HOLDER
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM :
DATE : 20/11/2012
DATE : 11/03/2013

ELEVATION : -
X-COORD : X3034402
Y-COORD : 29 Y-014001

HOLE No: TP03

TYPE SET BY : S VD MERWE
SETUP FILE : STANDARD.SET

DATE : 19/03/13 11:33
TEXT : ..\Desktop\INSITU~1.TXT

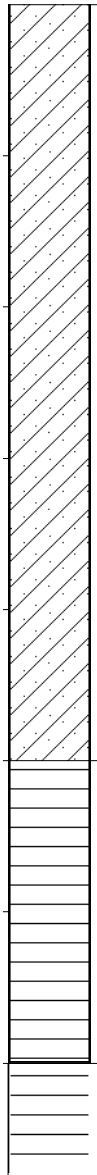
Simlab (PTY) LTD
GEOTECHNICAL SERVICES

PHETHOGO CONSULTING
TOWNSHIP DEVELOPMENT - VREDE

HOLE No: TP04
Sheet 1 of 1

JOB NUMBER: 2012/244/DOC.

Scale 1:5



0.00 Slightly moist dark brown stiff sandy clay.

0.50 Slightly moist olive dense mudstone.

0.70 + 0.700 Soft rock / Olive mudstone.

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : F HOLDER
MACHINE : TLB
DRILLED BY : F HOLDER
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM :
DATE : 20/11/2012
DATE : 11/03/2013

ELEVATION : -
X-COORD : X3034275
Y-COORD : 29 Y-014124

HOLE No: TP04

TYPE SET BY : S VD MERWE
SETUP FILE : STANDARD.SET

DATE : 19/03/13 11:33
TEXT : ..\Desktop\INSITU~1.TXT

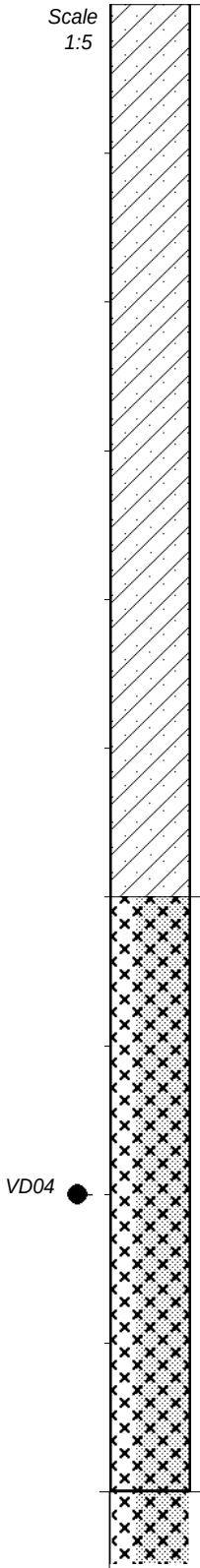
Simlab (PTY) LTD
GEOTECHNICAL SERVICES

PHETHOGO CONSULTING
TOWNSHIP DEVELOPMENT - VREDE

HOLE No: TP05
Sheet 1 of 1

JOB NUMBER: 2012/244/DOC.

Scale 1:5



0.00 Slightly moist dark brown stiff sandy clay.

0.60 Slightly moist orange dense weathered dolerite.

1.00 + 1.000 Slightly moist orange dense weathered dolerite.

NOTES

1) Disturbed sample VD04 taken at 0.800m.

2) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : F HOLDER
MACHINE : TLB
DRILLED BY : F HOLDER
PROFILED BY : SIMLAB (PTY) LIMITED

TYPE SET BY : S VD MERWE
SETUP FILE : STANDARD.SET

INCLINATION : VERTICAL
DIAM :
DATE : 20/11/2012
DATE : 11/03/2013

DATE : 19/03/13 11:33
TEXT : ..\Desktop\INSITU~1.TXT

ELEVATION : -
X-COORD : X3034184
Y-COORD : 29 Y-014236

HOLE No: TP05

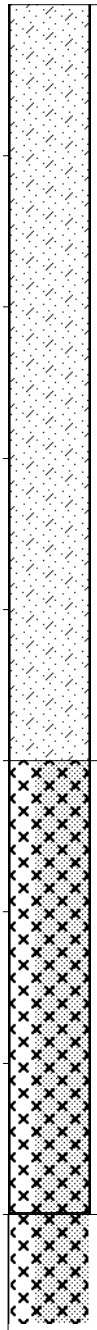
Simlab (PTY) LTD
GEOTECHNICAL SERVICES

PHETHOGO CONSULTING
TOWNSHIP DEVELOPMENT - VREDE

HOLE No: TP06
Sheet 1 of 1

JOB NUMBER: 2012/244/DOC.

Scale 1:5



0.00 Slightly moist medium dense clayey sand.

0.50 Slightly moist orange dense weathered dolerite.

0.80 + 0.800 Slightly moist orange dense weathered dolerite.

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : F HOLDER
MACHINE : TLB
DRILLED BY : F HOLDER
PROFILED BY : SIMLAB (PTY) LIMITED

TYPE SET BY : S VD MERWE
SETUP FILE : STANDARD.SET

INCLINATION : VERTICAL
DIAM :
DATE : 20/11/2012
DATE : 11/03/2013

DATE : 19/03/13 11:33
TEXT : ..\Desktop\INSITU~1.TXT

ELEVATION : -
X-COORD : X3034069
Y-COORD : 29 Y-014352

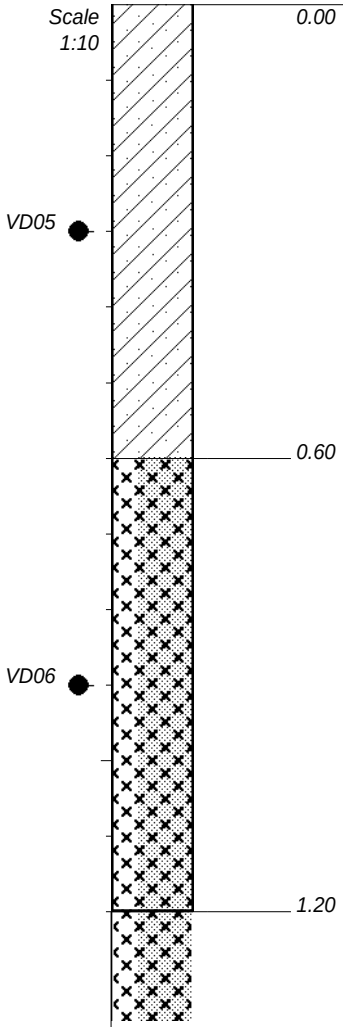
HOLE No: TP06

Simlab (PTY) LTD
GEOTECHNICAL SERVICES

PHETHOGO CONSULTING
TOWNSHIP DEVELOPMENT - VREDE

HOLE No: TP07
Sheet 1 of 1

JOB NUMBER: 2012/244/DOC.



Slightly moist dark brown stiff sandy clay.

Slightly moist orange dense weathered dolerite.

+ 1.200 Orange dense weathered dolerite. Refusal

NOTES

1) Disturbed sample VD05 taken at 0.300m.

2) Disturbed sample VD06 taken at 0.900m.

3) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : F HOLDER
MACHINE : TLB
DRILLED BY : F HOLDER
PROFILED BY : SIMLAB (PTY) LIMITED

TYPE SET BY : S VD MERWE
SETUP FILE : STANDARD.SET

INCLINATION : VERTICAL
DIAM :
DATE : 20/11/2012
DATE : 11/03/2013

DATE : 19/03/13 11:33
TEXT : ..\Desktop\INSITU~1.TXT

ELEVATION : -
X-COORD : X3033963
Y-COORD : 29 Y-014470

HOLE No: TP07

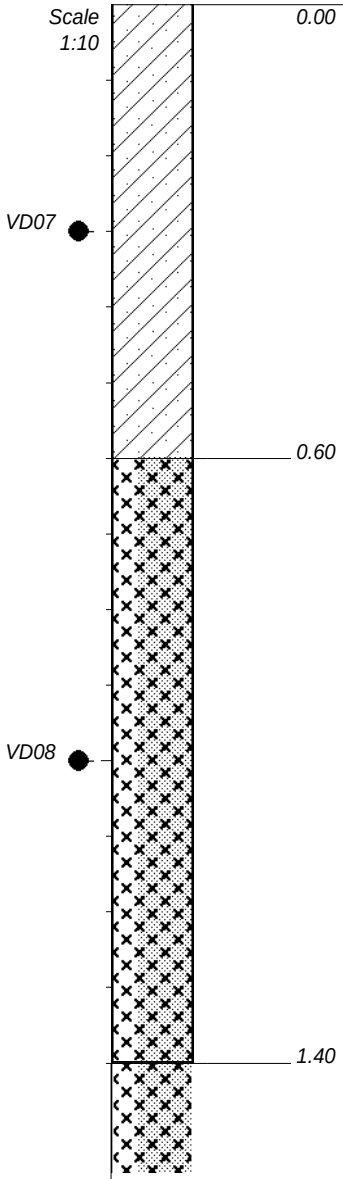
Simlab (PTY) LTD
GEOTECHNICAL SERVICES

PHETHOGO CONSULTING
TOWNSHIP DEVELOPMENT - VREDE

HOLE No: TP08
Sheet 1 of 1

JOB NUMBER: 2012/244/DOC.

Scale 1:10



0.00 Slightly moist dark brown stiff sandy clay.

0.60 Slightly moist orange dense weathered dolerite.

1.40 + 1.400 Orange dense weathered dolerite. Refusal

NOTES

1) Disturbed sample VD07 taken at 0.300m.

2) Disturbed sample VD08 taken at 1.000m.

3) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : F HOLDER
MACHINE : TLB
DRILLED BY : F HOLDER
PROFILED BY : SIMLAB (PTY) LIMITED

TYPE SET BY : S VD MERWE
SETUP FILE : STANDARD.SET

INCLINATION : VERTICAL
DIAM :
DATE : 20/11/2012
DATE : 11/03/2013

DATE : 19/03/13 11:33
TEXT : ..\Desktop\INSITU~1.TXT

ELEVATION : -
X-COORD : X3033844
Y-COORD : 29 Y-014266

HOLE No: TP08

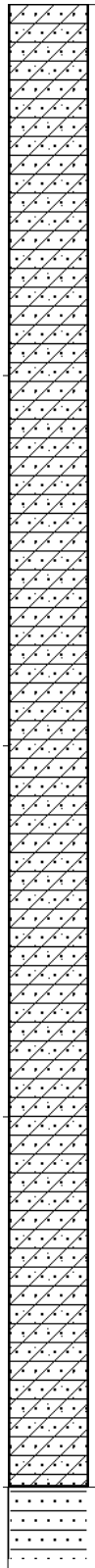
Simlab (PTY) LTD
GEOTECHNICAL SERVICES

PHETHOGO CONSULTING
TOWNSHIP DEVELOPMENT - VREDE

HOLE No: TP09
Sheet 1 of 1

JOB NUMBER: 2012/244/DOC.

Scale 1:2



0.00 Slightly moist dark brown stiff sandy clay and sandstone.

0.40 + 0.400 Soft rock / Yellow sandstone. Refusal

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : F HOLDER
MACHINE : TLB
DRILLED BY : F HOLDER
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM :
DATE : 20/11/2012
DATE : 11/03/2013

ELEVATION : -
X-COORD : X3033974
Y-COORD : 29 Y-014160

HOLE No: TP09

TYPE SET BY : S VD MERWE
SETUP FILE : STANDARD.SET

DATE : 19/03/13 11:33
TEXT : ..\Desktop\INSITU~1.TXT

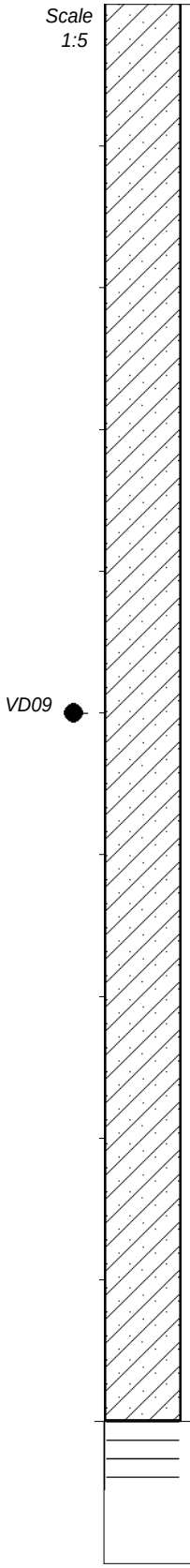
Simlab (PTY) LTD
GEOTECHNICAL SERVICES

PHETHOGO CONSULTING
TOWNSHIP DEVELOPMENT - VREDE

HOLE No: TP10
Sheet 1 of 1

JOB NUMBER: 2012/244/DOC.

Scale 1:5



0.00 Slightly moist dark brown stiff sandy clay.

1.00 + 1.000 Soft rock / Olive mudstone. Refusal

NOTES

1) Disturbed sample VD09 taken at 0.500m.

2) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : F HOLDER
MACHINE : TLB
DRILLED BY : F HOLDER
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM :
DATE : 20/11/2012
DATE : 11/03/2013

ELEVATION : -
X-COORD : X3034067
Y-COORD : 29 Y-014021

HOLE No: TP10

TYPE SET BY : S VD MERWE
SETUP FILE : STANDARD.SET

DATE : 19/03/13 11:33
TEXT : ..\Desktop\INSITU~1.TXT

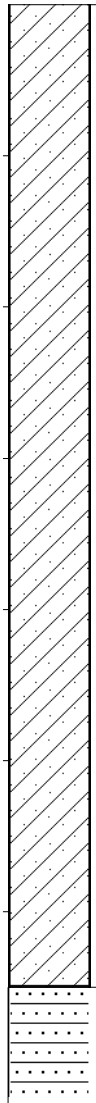
Simlab (PTY) LTD
GEOTECHNICAL SERVICES

PHETHOGO CONSULTING
TOWNSHIP DEVELOPMENT - VREDE

HOLE No: TP11
Sheet 1 of 1

JOB NUMBER: 2012/244/DOC.

Scale 1:5



0.00 Slightly moist dark brown stiff sandy clay.

0.65 + 0.650 Soft rock/ Yellow sandstone. Refusal

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : F HOLDER
MACHINE : TLB
DRILLED BY : F HOLDER
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM :
DATE : 20/11/2012
DATE : 11/03/2013

ELEVATION : -
X-COORD : X3034152
Y-COORD : 29 Y-013925

HOLE No: TP11

TYPE SET BY : S VD MERWE
SETUP FILE : STANDARD.SET

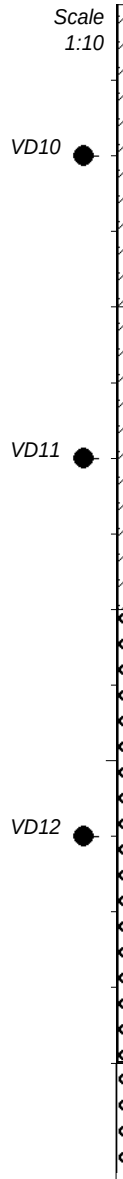
DATE : 19/03/13 11:33
TEXT : ..\Desktop\INSITU~1.TXT

Simlab (PTY) LTD
GEOTECHNICAL SERVICES

PHETHOGO CONSULTING
TOWNSHIP DEVELOPMENT - VREDE

HOLE No: TP12
Sheet 1 of 1

JOB NUMBER: 2012/244/DOC.



0.00 Slightly moist brown firm sandy clay.

0.40 Slightly moist red brown stiff sandy clay.

0.80 Slightly moist yellow dense weathered dolerite.

1.40 + 1.400 Slightly moist yellow dense weathered dolerite. Refusal

NOTES

1) Disturbed sample VD10 taken at 0.200m.

2) Disturbed sample VD11 taken at 0.600m.

3) Disturbed sample VD12 taken at 1.100m.

4) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : F HOLDER
MACHINE : TLB
DRILLED BY : F HOLDER
PROFILED BY : SIMLAB (PTY) LIMITED

TYPE SET BY : S VD MERWE
SETUP FILE : STANDARD.SET

INCLINATION : VERTICAL
DIAM :
DATE : 20/11/2012
DATE : 11/03/2013

DATE : 19/03/13 11:33
TEXT : ..\Desktop\INSITU~1.TXT

ELEVATION : -
X-COORD : X3034240
Y-COORD : 29 Y-013795

HOLE No: TP12

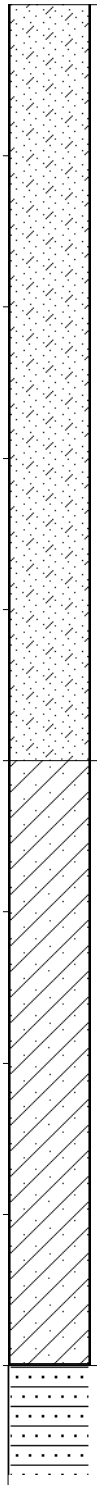
Simlab (PTY) LTD
GEOTECHNICAL SERVICES

PHETHOGO CONSULTING
TOWNSHIP DEVELOPMENT - VREDE

HOLE No: TP13
Sheet 1 of 1

JOB NUMBER: 2012/244/DOC.

Scale 1:5



0.00 Slightly moist dense clayey sand.

0.50 Slightly moist red brown stiff sandy clay.

0.90 + 0.900 Soft rock / Yellow sandstone.

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : F HOLDER
MACHINE : TLB
DRILLED BY : F HOLDER
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM :
DATE : 20/11/2012
DATE : 11/03/2013

ELEVATION : -
X-COORD : X3034367
Y-COORD : 29 Y-013679

HOLE No: TP13

TYPE SET BY : S VD MERWE
SETUP FILE : STANDARD.SET

DATE : 19/03/13 11:33
TEXT : ..\Desktop\INSITU~1.TXT

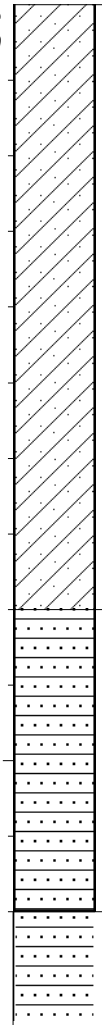
Simlab (PTY) LTD
GEOTECHNICAL SERVICES

PHETHOGO CONSULTING
TOWNSHIP DEVELOPMENT - VREDE

HOLE No: TP15
Sheet 1 of 1

JOB NUMBER: 2012/244/DOC.

Scale 1:10



0.00 Slightly moist dark brown stiff sandy clay.

0.80 Slightly moist yellow dense sandstone.

1.20 + 1.200 Soft rock / Yellow sandstone.

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : F HOLDER
MACHINE : TLB
DRILLED BY : F HOLDER
PROFILED BY : SIMLAB (PTY) LIMITED

TYPE SET BY : S VD MERWE
SETUP FILE : STANDARD.SET

INCLINATION : VERTICAL
DIAM :
DATE : 20/11/2012
DATE : 11/03/2013

DATE : 19/03/13 11:33
TEXT : ..\Desktop\INSITU~1.TXT

ELEVATION : -
X-COORD : X3034403
Y-COORD : 29 Y-013335

HOLE No: TP15

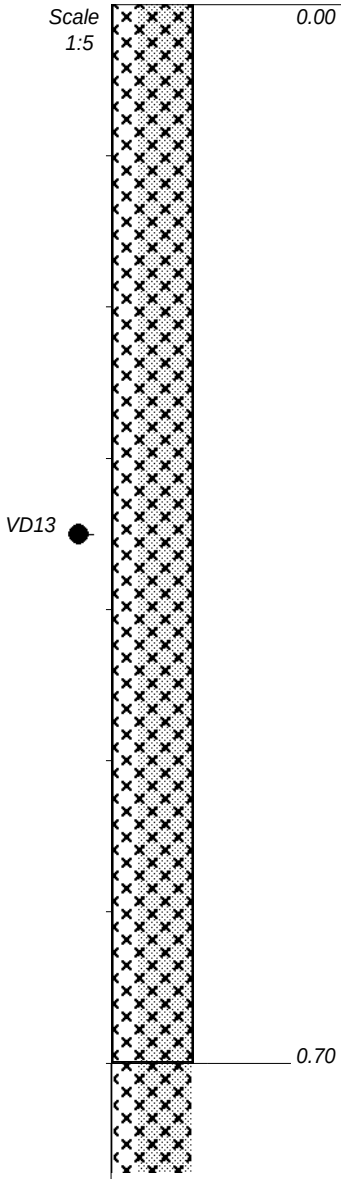
Simlab (PTY) LTD
GEOTECHNICAL SERVICES

PHETHOGO CONSULTING
TOWNSHIP DEVELOPMENT - VREDE

HOLE No: TP16
Sheet 1 of 1

JOB NUMBER: 2012/244/DOC.

Scale 1:5



0.00 Moist brown dense weathered dolerite.

0.70 + 0.700 Moist brown dense weathered dolerite. Refusal

NOTES

1) Disturbed sample VD13 taken at 0.350m.

2) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : F HOLDER
MACHINE : TLB
DRILLED BY : F HOLDER
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM :
DATE : 20/11/2012
DATE : 11/03/2013

ELEVATION : -
X-COORD : X3034268
Y-COORD : 29 Y-013502

HOLE No: TP16

TYPE SET BY : S VD MERWE
SETUP FILE : STANDARD.SET

DATE : 19/03/13 11:33
TEXT : ..\Desktop\INSITU~1.TXT

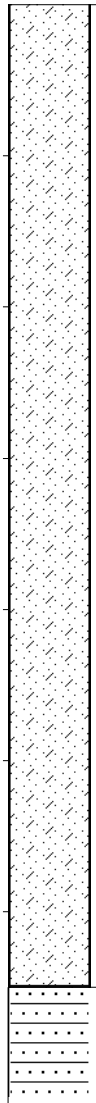
Simlab (PTY) LTD
GEOTECHNICAL SERVICES

PHETHOGO CONSULTING
TOWNSHIP DEVELOPMENT - VREDE

HOLE No: TP17
Sheet 1 of 1

JOB NUMBER: 2012/244/DOC.

Scale 1:5



0.00 Moist brown dense clayey sand.

0.65 + 0.650 Soft rock / Yellow sandstone. Refusal

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : F HOLDER
MACHINE : TLB
DRILLED BY : F HOLDER
PROFILED BY : SIMLAB (PTY) LIMITED

TYPE SET BY : S VD MERWE
SETUP FILE : STANDARD.SET

INCLINATION : VERTICAL
DIAM :
DATE : 14/11/2012
DATE : 11/03/2013

DATE : 19/03/13 11:33
TEXT : ..\Desktop\INSITU~1.TXT

ELEVATION : -
X-COORD : X3034145
Y-COORD : 29 Y-013645

HOLE No: TP17

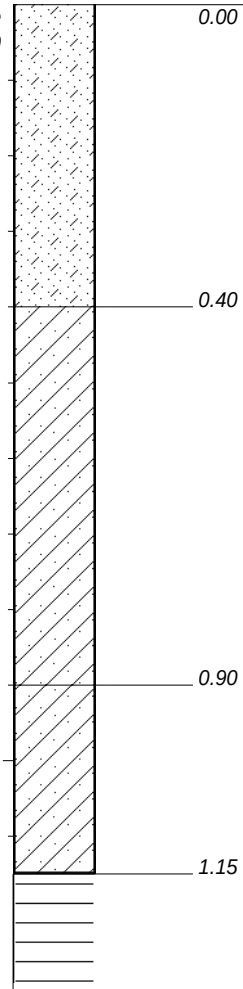
Simlab (PTY) LTD
GEOTECHNICAL SERVICES

PHETHOGO CONSULTING
TOWNSHIP DEVELOPMENT - VREDE

HOLE No: TP18
Sheet 1 of 1

JOB NUMBER: 2012/244/DOC.

Scale 1:10



0.00 Slightly moist brown dense clayey sand.

0.40 Slightly moist brown stiff sandy clay.

0.90 Slightly moist orange stiff sandy clay.

1.15 + 1.150 Soft rock / Olive mudstone. Refusal

NOTES

1) Disturbed sample VD14 taken at 0.650m.

2) Disturbed sample VD15 taken at 1.025m.

3) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : F HOLDER
MACHINE : TLB
DRILLED BY : F HOLDER
PROFILED BY : SIMLAB (PTY) LIMITED

TYPE SET BY : S VD MERWE
SETUP FILE : STANDARD.SET

INCLINATION : VERTICAL
DIAM :
DATE : 14/11/2012
DATE : 11/03/2013

DATE : 19/03/13 11:33
TEXT : ..\Desktop\INSITU~1.TXT

ELEVATION : -
X-COORD : X3034034
Y-COORD : 29 Y-013777

HOLE No: TP18

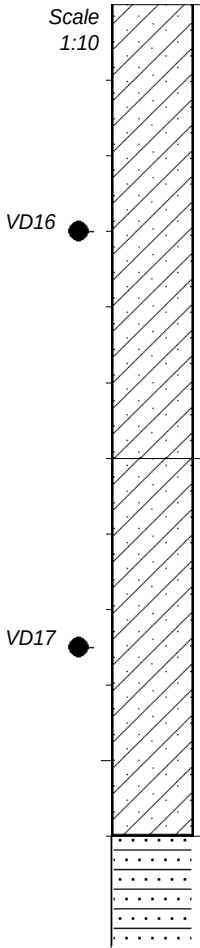
Simlab (PTY) LTD
GEOTECHNICAL SERVICES

PHETHOGO CONSULTING
TOWNSHIP DEVELOPMENT - VREDE

HOLE No: TP22
Sheet 1 of 1

JOB NUMBER: 2012/244/DOC.

Scale 1:10



0.00 Slightly moist brown firm sandy clay.

0.60 Slightly moist yellow stiff sandy clay.

1.10 + 1.100 Soft rock / Olive sandstone.

NOTES

1) Disturbed sample VD16 taken at 0.300m.

2) Disturbed sample VD17 taken at 0.850m.

3) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : F HOLDER
MACHINE : TLB
DRILLED BY : F HOLDER
PROFILED BY : SIMLAB (PTY) LIMITED

TYPE SET BY : S VD MERWE
SETUP FILE : STANDARD.SET

INCLINATION : VERTICAL
DIAM :
DATE : 14/11/2012
DATE : 11/03/2013

DATE : 19/03/13 11:33
TEXT : ..\Desktop\INSITU~1.TXT

ELEVATION : -
X-COORD : X3033775
Y-COORD : 29 Y-013859

HOLE No: TP22

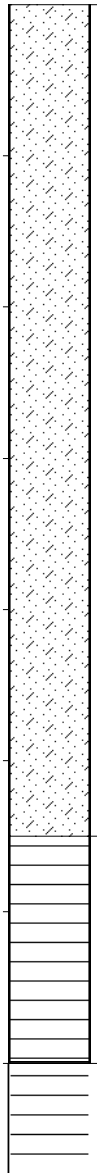
Simlab (PTY) LTD
GEOTECHNICAL SERVICES

PHETHOGO CONSULTING
TOWNSHIP DEVELOPMENT - VREDE

HOLE No: TP23
Sheet 1 of 1

JOB NUMBER: 2012/244/DOC.

Scale 1:5



0.00 Slightly moist brown dense clayey sand.

0.55 Slightly moist grey dense mudstone.

0.70 + 0.700 Soft rock / Grey mudstone.

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : F HOLDER
MACHINE : TLB
DRILLED BY : F HOLDER
PROFILED BY : SIMLAB (PTY) LIMITED

TYPE SET BY : S VD MERWE
SETUP FILE : STANDARD.SET

INCLINATION : VERTICAL
DIAM :
DATE : 14/11/2012
DATE : 11/03/2013

DATE : 19/03/13 11:33
TEXT : ..\Desktop\INSITU~1.TXT

ELEVATION : -
X-COORD : X3033848
Y-COORD : 29 Y-013763

HOLE No: TP23

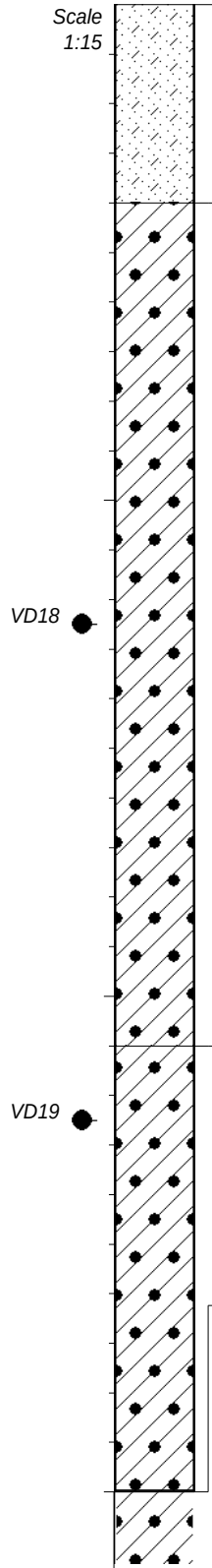
Simlab (PTY) LTD
GEOTECHNICAL SERVICES

PHETHOGO CONSULTING
TOWNSHIP DEVELOPMENT - VREDE

HOLE No: TP24
Sheet 1 of 1

JOB NUMBER: 2012/244/DOC.

Scale 1:15



0.00 Slightly moist brown dense clayey sand.

0.40 Slightly moist yellow orange stiff clay and ferricrete.

2.10 Moist yellow grey soft clay and ferricrete.

3.00 + 3.000 Moist yellow grey soft clay and ferricrete.

NOTES

1) Disturbed sample VD18 taken at 1.250m.

2) Disturbed sample VD19 taken at 2.250m.

3) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : F HOLDER
MACHINE : TLB
DRILLED BY : F HOLDER
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM :
DATE : 15/11/2012
DATE : 11/03/2013

ELEVATION : -
X-COORD : X3033930
Y-COORD : 29 Y-013659

HOLE No: TP24

TYPE SET BY : S VD MERWE
SETUP FILE : STANDARD.SET

DATE : 19/03/13 11:33
TEXT : ..\Desktop\INSITU~1.TXT

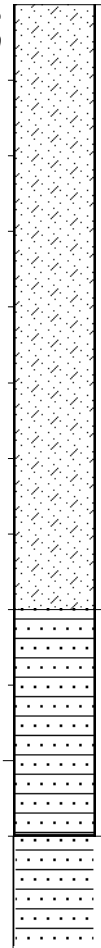
Simlab (PTY) LTD
GEOTECHNICAL SERVICES

PHETHOGO CONSULTING
TOWNSHIP DEVELOPMENT - VREDE

HOLE No: TP25
Sheet 1 of 1

JOB NUMBER: 2012/244/DOC.

Scale 1:10



0.00 Slightly moist yellow dense clayey sand.

0.80 Slightly moist yellow dense sandstone.

1.10 + 1.100 Soft rock / Yellow sandstone. Refusal

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : F HOLDER
MACHINE : TLB
DRILLED BY : F HOLDER
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM :
DATE : 15/11/2012
DATE : 11/03/2013

ELEVATION : -
X-COORD : X3034039
Y-COORD : 29 Y-013547

HOLE No: TP25

TYPE SET BY : S VD MERWE
SETUP FILE : STANDARD.SET

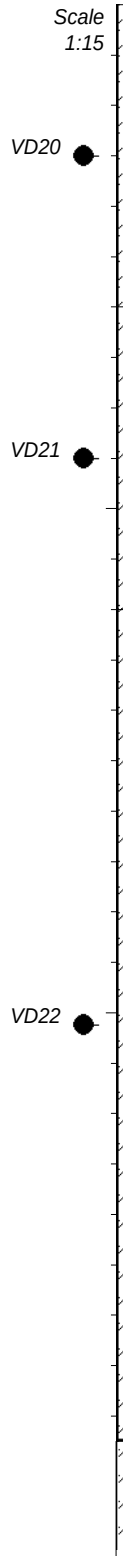
DATE : 19/03/13 11:33
TEXT : ..\Desktop\INSITU~1.TXT

Simlab (PTY) LTD
GEOTECHNICAL SERVICES

PHETHOGO CONSULTING
TOWNSHIP DEVELOPMENT - VREDE

HOLE No: TP28
Sheet 1 of 1

JOB NUMBER: 2012/244/DOC.



0.00 Slightly moist brown dense clayey sand.

0.60 Slightly moist brown stiff sandy clay.

1.20 Slightly moist olive stiff sandy clay.

2.85 + 2.850 Slightly moist olive stiff sandy clay.

NOTES

1) Disturbed sample VD20 taken at 0.300m.

2) Disturbed sample VD21 taken at 0.900m.

3) Disturbed sample VD22 taken at 2.0250m.

4) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : F HOLDER
MACHINE : TLB
DRILLED BY : F HOLDER
PROFILED BY : SIMLAB (PTY) LIMITED

TYPE SET BY : S VD MERWE
SETUP FILE : STANDARD.SET

INCLINATION : VERTICAL
DIAM :
DATE : 15/11/2012
DATE : 11/03/2013

DATE : 19/03/13 11:33
TEXT : ..\Desktop\INSITU~1.TXT

ELEVATION : -
X-COORD : X3034145
Y-COORD : 29 Y-013098

HOLE No: TP28

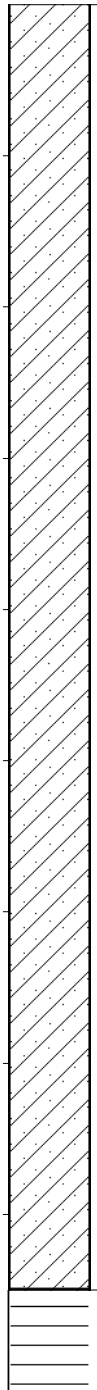
Simlab (PTY) LTD
GEOTECHNICAL SERVICES

PHETHOGO CONSULTING
TOWNSHIP DEVELOPMENT - VREDE

HOLE No: TP29
Sheet 1 of 1

JOB NUMBER: 2012/244/DOC.

Scale 1:5



0.00 Slightly moist brown stiff sandy clay.

0.85 + 0.850 Soft rock / Olive mudstone.

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : F HOLDER
MACHINE : TLB
DRILLED BY : F HOLDER
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM :
DATE : 15/11/2012
DATE : 11/03/2013

ELEVATION : -
X-COORD : X3034013
Y-COORD : 29 Y-013296

HOLE No: TP29

TYPE SET BY : S VD MERWE
SETUP FILE : STANDARD.SET

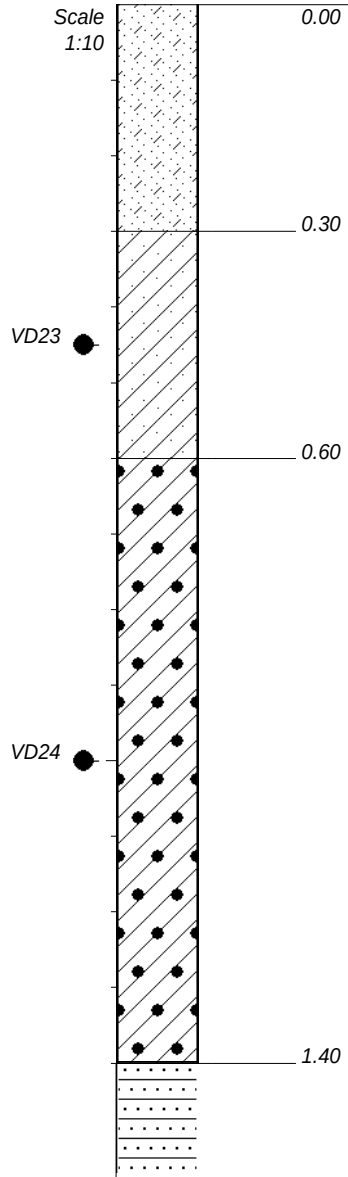
DATE : 19/03/13 11:33
TEXT : ..\Desktop\INSITU~1.TXT

Simlab (PTY) LTD
GEOTECHNICAL SERVICES

PHETHOGO CONSULTING
TOWNSHIP DEVELOPMENT - VREDE

HOLE No: TP30
Sheet 1 of 1

JOB NUMBER: 2012/244/DOC.



0.00 Slightly moist brown dense clayey sand.

0.30 Slightly moist orange brown stiff sandy clay.

0.60 Slightly moist yellow stiff clay and ferricrete.

1.40 + 1.400 Soft rock / Yellow sandstone.

NOTES

1) Disturbed sample VD23 taken at 0.450m.

2) Disturbed sample VD24 taken at 1.000m.

3) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : F HOLDER
MACHINE : TLB
DRILLED BY : F HOLDER
PROFILED BY : SIMLAB (PTY) LIMITED

TYPE SET BY : S VD MERWE
SETUP FILE : STANDARD.SET

INCLINATION : VERTICAL
DIAM :
DATE : 15/11/2012
DATE : 11/03/2013

DATE : 19/03/13 11:33
TEXT : ..\Desktop\INSITU~1.TXT

ELEVATION : -
X-COORD : X3033890
Y-COORD : 29 Y-013418

HOLE No: TP30

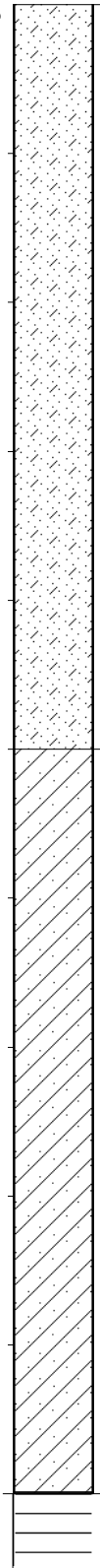
Simlab (PTY) LTD
GEOTECHNICAL SERVICES

PHETHOGO CONSULTING
TOWNSHIP DEVELOPMENT - VREDE

HOLE No: TP31
Sheet 1 of 1

JOB NUMBER: 2012/244/DOC.

Scale 1:5



0.00 Slightly moist brown dense clayey sand.

0.50 Slightly moist orange brown stiff sandy clay.

1.00 + 1.000 Soft rock / Olive mudstone.

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : F HOLDER
MACHINE : TLB
DRILLED BY : F HOLDER
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM :
DATE : 15/11/2012
DATE : 11/03/2013

ELEVATION : -
X-COORD : X3033810
Y-COORD : 29 Y-013555

HOLE No: TP31

TYPE SET BY : S VD MERWE
SETUP FILE : STANDARD.SET

DATE : 19/03/13 11:33
TEXT : ..\Desktop\INSITU~1.TXT

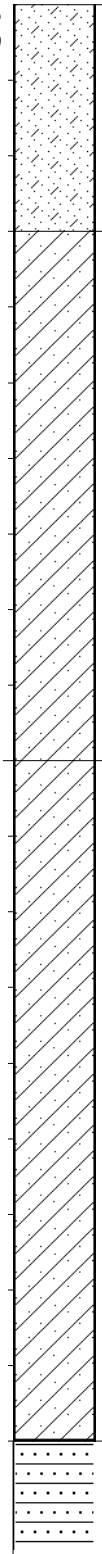
Simlab (PTY) LTD
GEOTECHNICAL SERVICES

PHETHOGO CONSULTING
TOWNSHIP DEVELOPMENT - VREDE

HOLE No: TP32
Sheet 1 of 1

JOB NUMBER: 2012/244/DOC.

Scale 1:10



0.00 Slightly moist brown dense clayey sand.

0.30 Slightly moist orange brown stiff sandy clay.

1.00 Slightly moist olive stiff sandy clay.

1.90 + 1.900 Soft rock / Yellow sandstone.

NOTES

1) Disturbed sample VD25 taken at 0.650m.

2) Disturbed sample VD26 taken at 1.450m.

3) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : F HOLDER
MACHINE : TLB
DRILLED BY : F HOLDER
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM :
DATE : 15/11/2012
DATE : 11/03/2013

ELEVATION : -
X-COORD : X3033714
Y-COORD : 29 Y-013656

HOLE No: TP32

TYPE SET BY : S VD MERWE
SETUP FILE : STANDARD.SET

DATE : 19/03/13 11:33
TEXT : ..\Desktop\INSITU~1.TXT

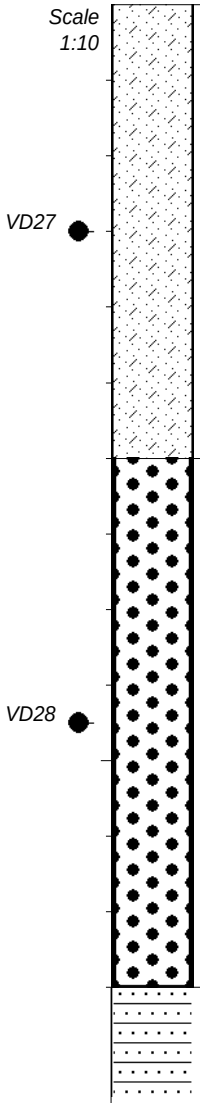
Simlab (PTY) LTD
GEOTECHNICAL SERVICES

PHETHOGO CONSULTING
TOWNSHIP DEVELOPMENT - VREDE

HOLE No: TP33
Sheet 1 of 1

JOB NUMBER: 2012/244/DOC.

Scale 1:10



0.00 Slightly moist brown dense clayey sand.

0.60 Slightly moist orange dense ferricrete.

1.30 + 1.300 Soft rock / Yellow sandstone.

NOTES

1) Disturbed sample VD27 taken at 0.300m.

2) Disturbed sample VD28 taken at 0.950m.

3) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : F HOLDER
MACHINE : TLB
DRILLED BY : F HOLDER
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM :
DATE : 15/11/2012
DATE : 11/03/2013

ELEVATION : -
X-COORD : X3033612
Y-COORD : 29 Y-013546

HOLE No: TP33

TYPE SET BY : S VD MERWE
SETUP FILE : STANDARD.SET

DATE : 19/03/13 11:33
TEXT : ..\Desktop\INSITU~1.TXT

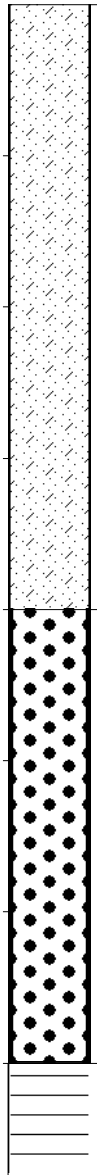
Simlab (PTY) LTD
GEOTECHNICAL SERVICES

PHETHOGO CONSULTING
TOWNSHIP DEVELOPMENT - VREDE

HOLE No: TP34
Sheet 1 of 1

JOB NUMBER: 2012/244/DOC.

Scale 1:5



0.00 Slightly moist brown dense clayey sand.

0.40 Slightly moist orange dense ferricrete.

0.70 + 0.700 Soft rock / Olive mudstone.

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : F HOLDER
MACHINE : TLB
DRILLED BY : F HOLDER
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM :
DATE : 15/11/2012
DATE : 11/03/2013

ELEVATION : -
X-COORD : X3033709
Y-COORD : 29 Y-013437

HOLE No: TP34

TYPE SET BY : S VD MERWE
SETUP FILE : STANDARD.SET

DATE : 19/03/13 11:33
TEXT : ..\Desktop\INSITU~1.TXT

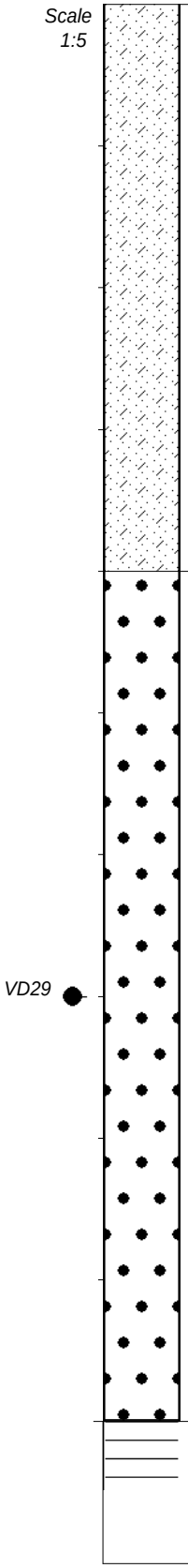
Simlab (PTY) LTD
GEOTECHNICAL SERVICES

PHETHOGO CONSULTING
TOWNSHIP DEVELOPMENT - VREDE

HOLE No: TP35
Sheet 1 of 1

JOB NUMBER: 2012/244/DOC.

Scale 1:5



0.00 Slightly moist brown dense clayey sand.

0.40 Slightly moist orange firm ferricrete.

1.00 + 1.000 Soft rock / Olive mudstone.

NOTES

1) Disturbed sample VD29 taken at 0.700m.

2) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : F HOLDER
MACHINE : TLB
DRILLED BY : F HOLDER
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM :
DATE : 15/11/2012
DATE : 11/03/2013

ELEVATION : -
X-COORD : X3033796
Y-COORD : 29 Y-013325

HOLE No: TP35

TYPE SET BY : S VD MERWE
SETUP FILE : STANDARD.SET

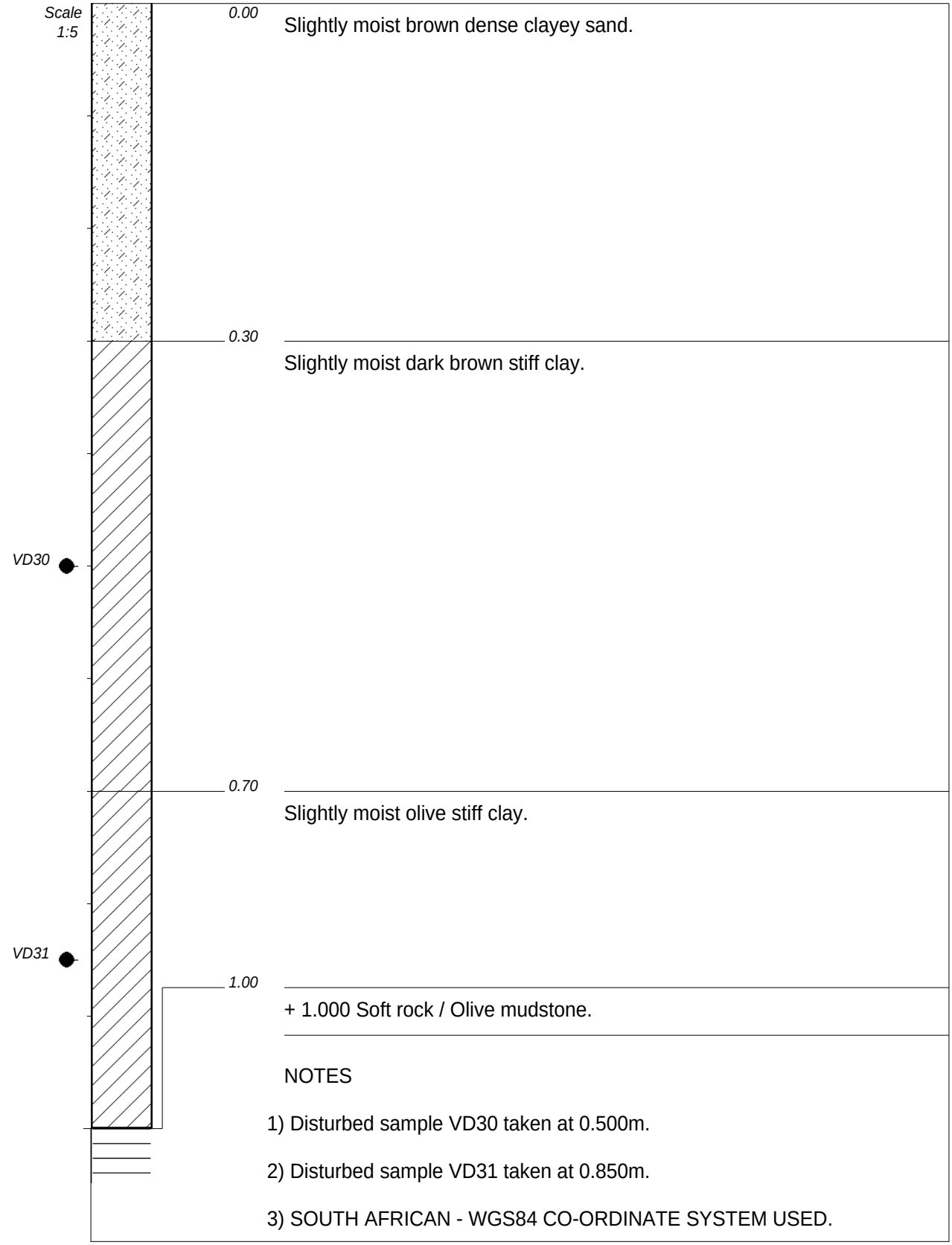
DATE : 19/03/13 11:33
TEXT : ..\Desktop\INSITU~1.TXT

Simlab (PTY) LTD
GEOTECHNICAL SERVICES

PHETHOGO CONSULTING
TOWNSHIP DEVELOPMENT - VREDE

HOLE No: TP36
Sheet 1 of 1

JOB NUMBER: 2012/244/DOC.



NOTES

1) Disturbed sample VD30 taken at 0.500m.

2) Disturbed sample VD31 taken at 0.850m.

3) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : F HOLDER
MACHINE : TLB
DRILLED BY : F HOLDER
PROFILED BY : SIMLAB (PTY) LIMITED

TYPE SET BY : S VD MERWE
SETUP FILE : STANDARD.SET

INCLINATION : VERTICAL
DIAM :
DATE : 15/11/2012
DATE : 11/03/2013

DATE : 19/03/13 11:33
TEXT : ..\Desktop\INSITU~1.TXT

ELEVATION : -
X-COORD : X3033893
Y-COORD : 29 Y-013189

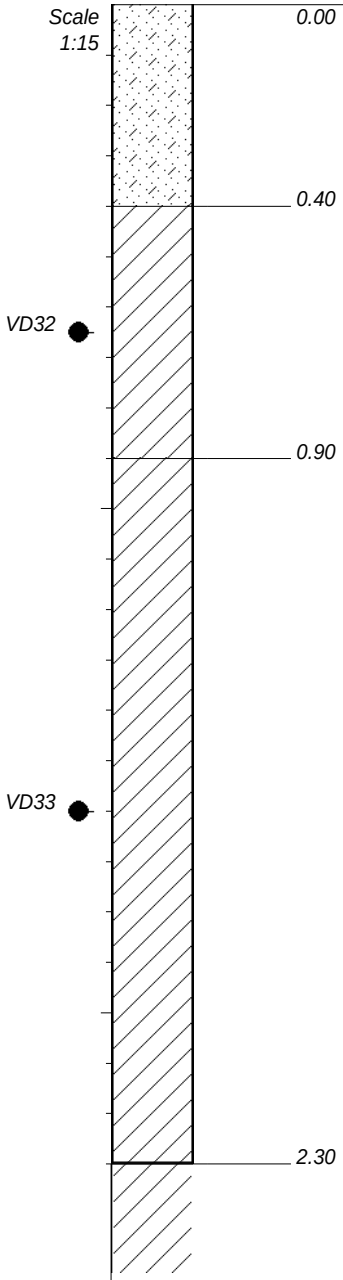
HOLE No: TP36

Simlab (PTY) LTD
GEOTECHNICAL SERVICES

PHETHOGO CONSULTING
TOWNSHIP DEVELOPMENT - VREDE

HOLE No: TP37
Sheet 1 of 1

JOB NUMBER: 2012/244/DOC.



0.00 Slightly moist brown dense clayey sand.

0.40 Slightly moist dark brown stiff clay.

0.90 Slightly moist olive stiff clay.

2.30 + 2.300 Slightly moist olive stiff clay. Refusal

NOTES

1) Disturbed sample VD32 taken at 0.650m.

2) Disturbed sample VD33 taken at 1.600m.

3) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : F HOLDER
MACHINE : TLB
DRILLED BY : F HOLDER
PROFILED BY : SIMLAB (PTY) LIMITED

TYPE SET BY : S VD MERWE
SETUP FILE : STANDARD.SET

INCLINATION : VERTICAL
DIAM :
DATE : 15/11/2012
DATE : 11/03/2013

DATE : 19/03/13 11:33
TEXT : ..\Desktop\INSITU~1.TXT

ELEVATION : -
X-COORD : X3034009
Y-COORD : 29 Y-013054

HOLE No: TP37

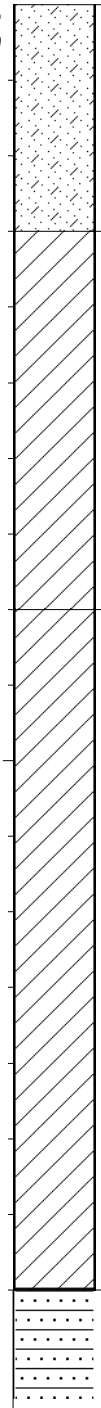
Simlab (PTY) LTD
GEOTECHNICAL SERVICES

PHETHOGO CONSULTING
TOWNSHIP DEVELOPMENT - VREDE

HOLE No: TP38
Sheet 1 of 1

JOB NUMBER: 2012/244/DOC.

Scale 1:10



0.00 Slightly moist brown dense clayey sand.

0.30 Slightly moist dark brown stiff clay.

0.80 Slightly moist olive stiff clay.

1.70 + 1.700 Soft rock / Yellow sandstone.

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : F HOLDER
MACHINE : TLB
DRILLED BY : F HOLDER
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM :
DATE : 14/11/2012
DATE : 11/03/2013

ELEVATION : -
X-COORD : X3033905
Y-COORD : 29 Y-012897

HOLE No: TP38

TYPE SET BY : S VD MERWE
SETUP FILE : STANDARD.SET

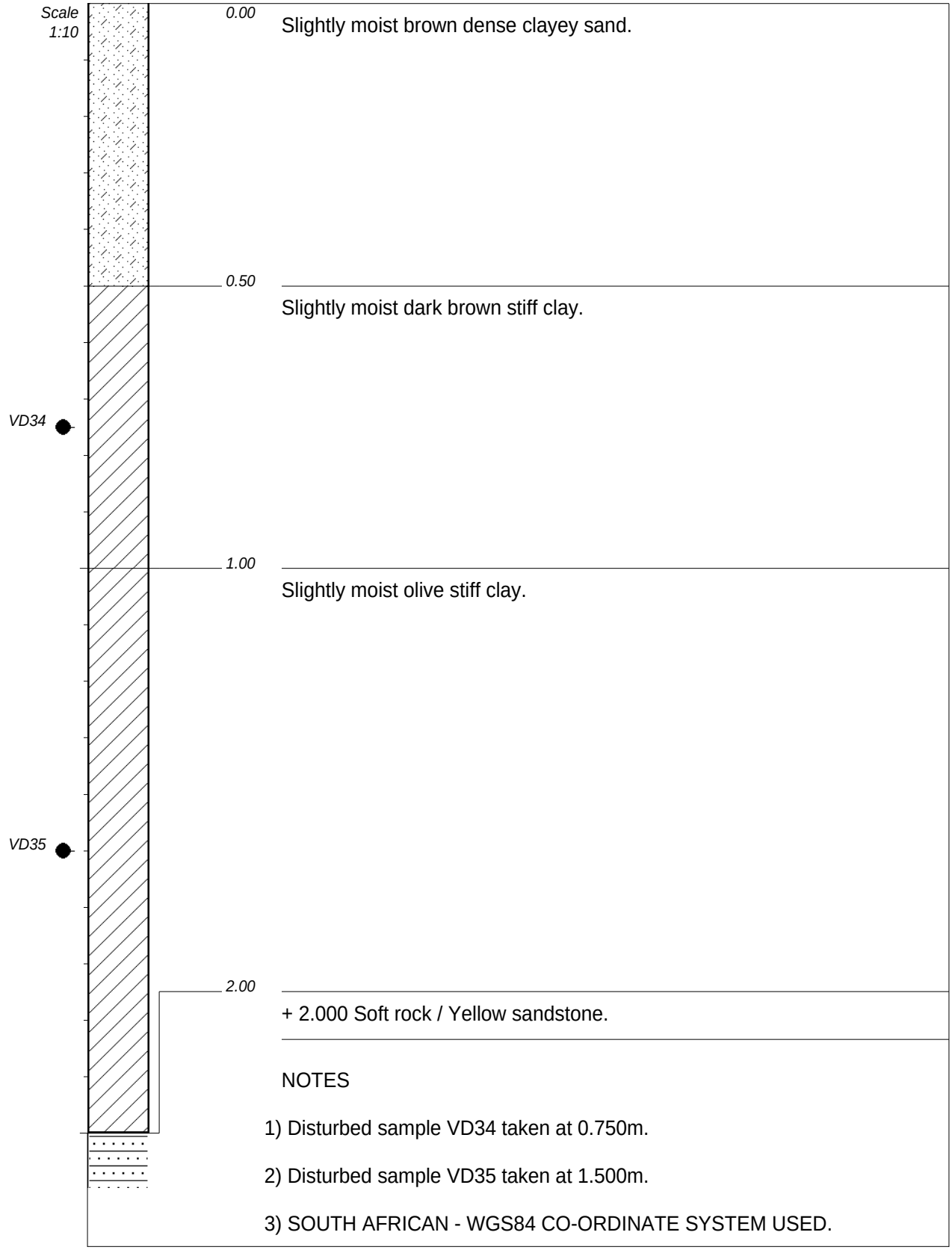
DATE : 19/03/13 11:33
TEXT : ..\Desktop\INSITU~1.TXT

Simlab (PTY) LTD
GEOTECHNICAL SERVICES

PHETHOGO CONSULTING
TOWNSHIP DEVELOPMENT - VREDE

HOLE No: TP39
Sheet 1 of 1

JOB NUMBER: 2012/244/DOC.



NOTES

1) Disturbed sample VD34 taken at 0.750m.

2) Disturbed sample VD35 taken at 1.500m.

3) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : F HOLDER
MACHINE : TLB
DRILLED BY : F HOLDER
PROFILED BY : SIMLAB (PTY) LIMITED

TYPE SET BY : S VD MERWE
SETUP FILE : STANDARD.SET

INCLINATION : VERTICAL
DIAM :
DATE : 14/11/2012
DATE : 11/03/2013

DATE : 19/03/13 11:33
TEXT : ..\Desktop\INSITU~1.TXT

ELEVATION : -
X-COORD : X3033782
Y-COORD : 29 Y-013028

HOLE No: TP39

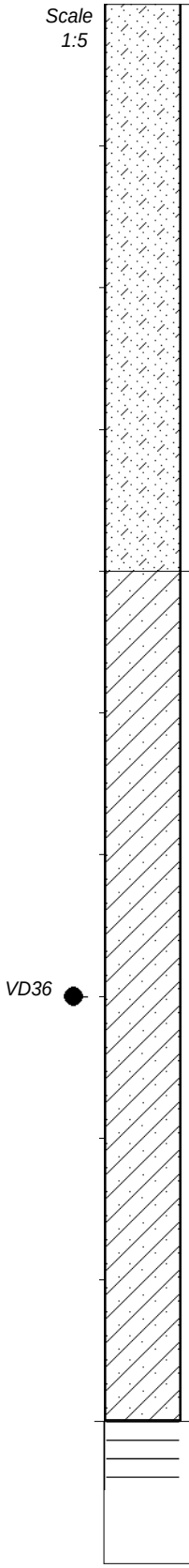
Simlab (PTY) LTD
GEOTECHNICAL SERVICES

PHETHOGO CONSULTING
TOWNSHIP DEVELOPMENT - VREDE

HOLE No: TP40
Sheet 1 of 1

JOB NUMBER: 2012/244/DOC.

Scale 1:5



0.00 Slightly moist brown dense clayey sand.

0.40 Slightly moist orange firm sandy clay.

1.00 + 1.000 Soft rock / Olive mudstone.

NOTES

1) Disturbed sample VD36 taken at 0.700m.

2) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : F HOLDER
MACHINE : TLB
DRILLED BY : F HOLDER
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM :
DATE : 14/11/2012
DATE : 11/03/2013

ELEVATION : -
X-COORD : X3033661
Y-COORD : 29 Y-013132

HOLE No: TP40

TYPE SET BY : S VD MERWE
SETUP FILE : STANDARD.SET

DATE : 19/03/13 11:33
TEXT : ..\Desktop\INSITU~1.TXT

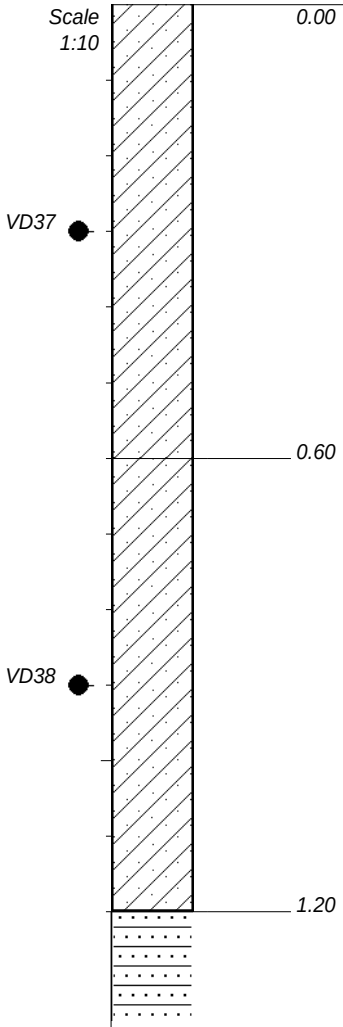
Simlab (PTY) LTD
GEOTECHNICAL SERVICES

PHETHOGO CONSULTING
TOWNSHIP DEVELOPMENT - VREDE

HOLE No: TP41
Sheet 1 of 1

JOB NUMBER: 2012/244/DOC.

Scale 1:10



0.00 Slightly moist brown stiff sandy clay.

0.60 Slightly moist yellow olive stiff sandy clay.

1.20 + 1.200 Soft rock / Yellow sandstone.

NOTES

1) Disturbed sample VD37 taken at 0.300m.

2) Disturbed sample VD38 taken at 0.900m.

3) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : F HOLDER
MACHINE : TLB
DRILLED BY : F HOLDER
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM :
DATE : 14/11/2012
DATE : 11/03/2013

ELEVATION : -
X-COORD : X3033552
Y-COORD : 29 Y-013245

HOLE No: TP41

TYPE SET BY : S VD MERWE
SETUP FILE : STANDARD.SET

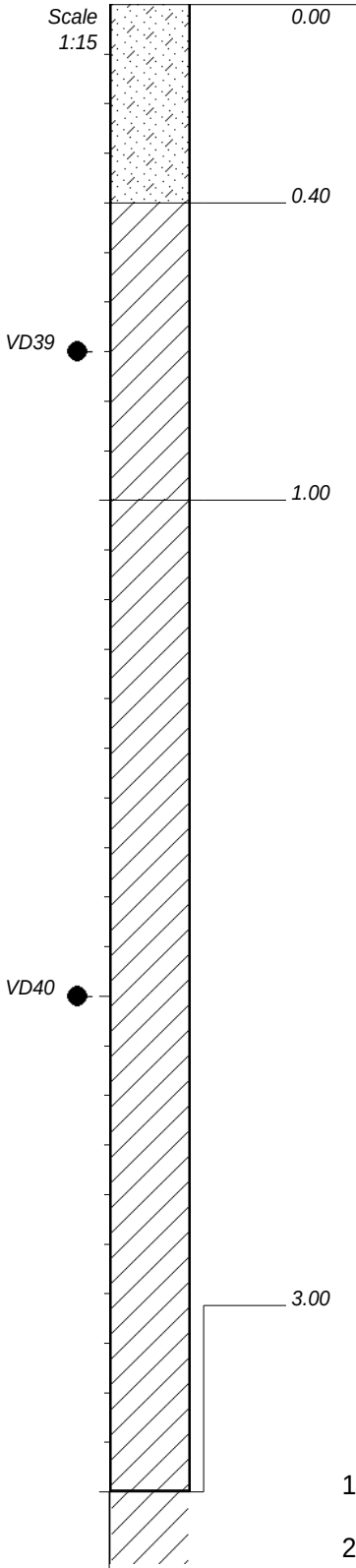
DATE : 19/03/13 11:33
TEXT : ..\Desktop\INSITU~1.TXT

Simlab (PTY) LTD
GEOTECHNICAL SERVICES

PHETHOGO CONSULTING
TOWNSHIP DEVELOPMENT - VREDE

HOLE No: TP42
Sheet 1 of 1

JOB NUMBER: 2012/244/DOC.



0.00 Slightly moist brown dense clayey sand.

0.40 Slightly moist dark brown stiff clay.

1.00 Slightly moist olive stiff clay.

3.00 + 3.000 Slightly moist olive stiff clay.

NOTES

1) Disturbed sample VD39 taken at 0.700m.

2) Disturbed sample VD40 taken at 2.000m.

3) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : F HOLDER
MACHINE : TLB
DRILLED BY : F HOLDER
PROFILED BY : SIMLAB (PTY) LIMITED

TYPE SET BY : S VD MERWE
SETUP FILE : STANDARD.SET

INCLINATION : VERTICAL
DIAM :
DATE : 14/11/2012
DATE : 11/03/2013

DATE : 19/03/13 11:33
TEXT : ..\Desktop\INSITU~1.TXT

ELEVATION : -
X-COORD : X3033458
Y-COORD : 29 Y-013021

HOLE No: TP42

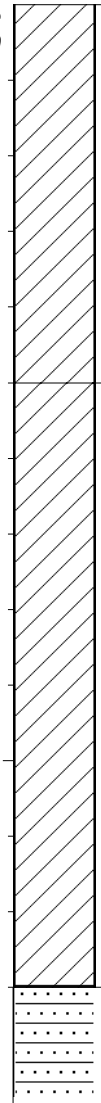
Simlab (PTY) LTD
GEOTECHNICAL SERVICES

PHETHOGO CONSULTING
TOWNSHIP DEVELOPMENT - VREDE

HOLE No: TP45
Sheet 1 of 1

JOB NUMBER: 2012/244/DOC.

Scale 1:10



0.00 Slightly moist brown stiff clay.

0.50 Slightly moist orange brown stiff clay.

1.30 + 1.300 Soft rock / Yellow sandstone.

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : F HOLDER
MACHINE : TLB
DRILLED BY : F HOLDER
PROFILED BY : SIMLAB (PTY) LIMITED

TYPE SET BY : S VD MERWE
SETUP FILE : STANDARD.SET

INCLINATION : VERTICAL
DIAM :
DATE : 14/11/2012
DATE : 11/03/2013

DATE : 19/03/13 11:33
TEXT : ..\Desktop\INSITU~1.TXT

ELEVATION : -
X-COORD : X3033721
Y-COORD : 29 Y-012787

HOLE No: TP45

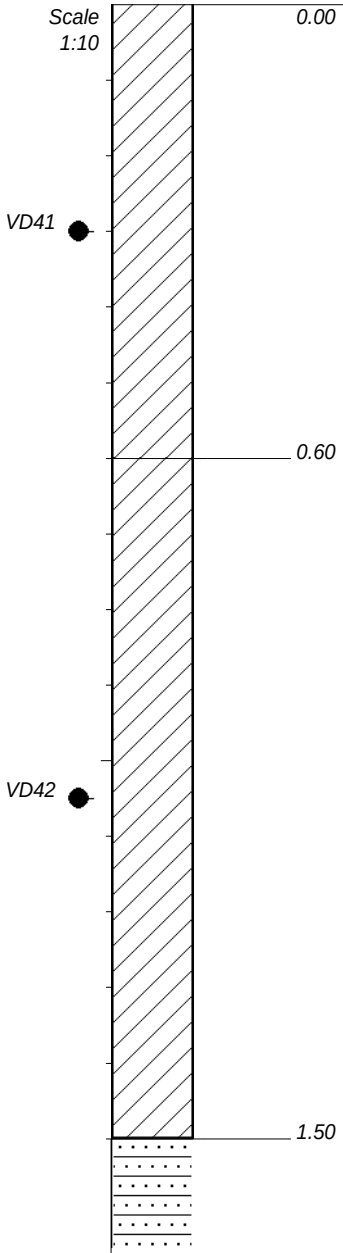
Simlab (PTY) LTD
GEOTECHNICAL SERVICES

PHETHOGO CONSULTING
TOWNSHIP DEVELOPMENT - VREDE

HOLE No: TP46
Sheet 1 of 1

JOB NUMBER: 2012/244/DOC.

Scale 1:10



0.00 Slightly moist brown stiff clay.

0.60 Slightly moist orange brown stiff clay.

1.50 + 1.500 Soft rock / Yellow sandstone.

NOTES

1) Disturbed sample VD41 taken at 0.300m.

2) Disturbed sample VD42 taken at 1.050m.

3) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : F HOLDER
MACHINE : TLB
DRILLED BY : F HOLDER
PROFILED BY : SIMLAB (PTY) LIMITED

TYPE SET BY : S VD MERWE
SETUP FILE : STANDARD.SET

INCLINATION : VERTICAL
DIAM :
DATE : 14/11/2012
DATE : 11/03/2013

DATE : 19/03/13 11:33
TEXT : ..\Desktop\INSITU~1.TXT

ELEVATION : -
X-COORD : X3033646
Y-COORD : 29 Y-012653

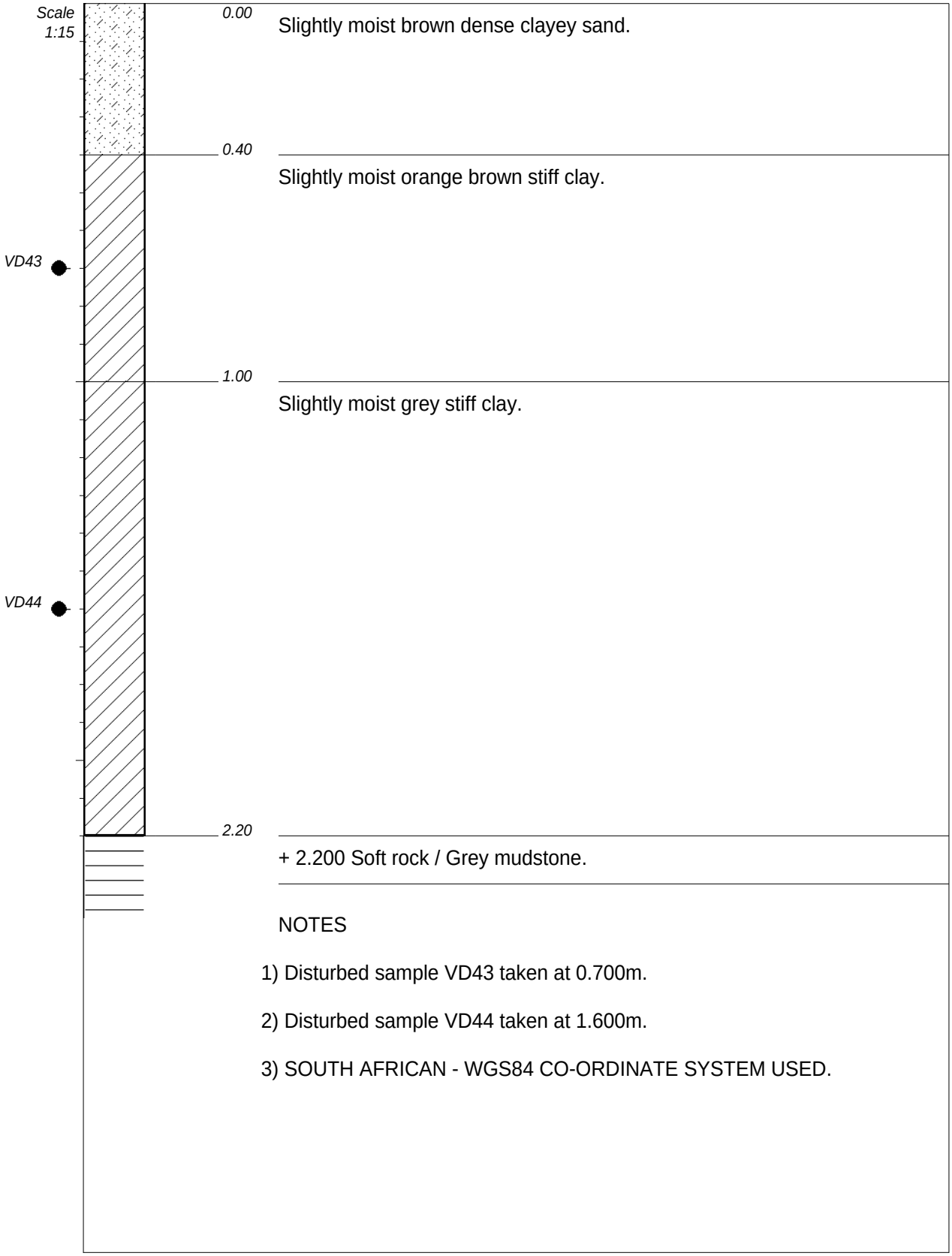
HOLE No: TP46

Simlab (PTY) LTD
GEOTECHNICAL SERVICES

PHETHOGO CONSULTING
TOWNSHIP DEVELOPMENT - VREDE

HOLE No: TP47
Sheet 1 of 1

JOB NUMBER: 2012/244/DOC.



NOTES

1) Disturbed sample VD43 taken at 0.700m.

2) Disturbed sample VD44 taken at 1.600m.

3) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : F HOLDER
MACHINE : TLB
DRILLED BY : F HOLDER
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM :
DATE : 14/11/2012
DATE : 11/03/2013

ELEVATION : -
X-COORD : X3033560
Y-COORD : 29 Y-012737

HOLE No: TP47

TYPE SET BY : S VD MERWE
SETUP FILE : STANDARD.SET

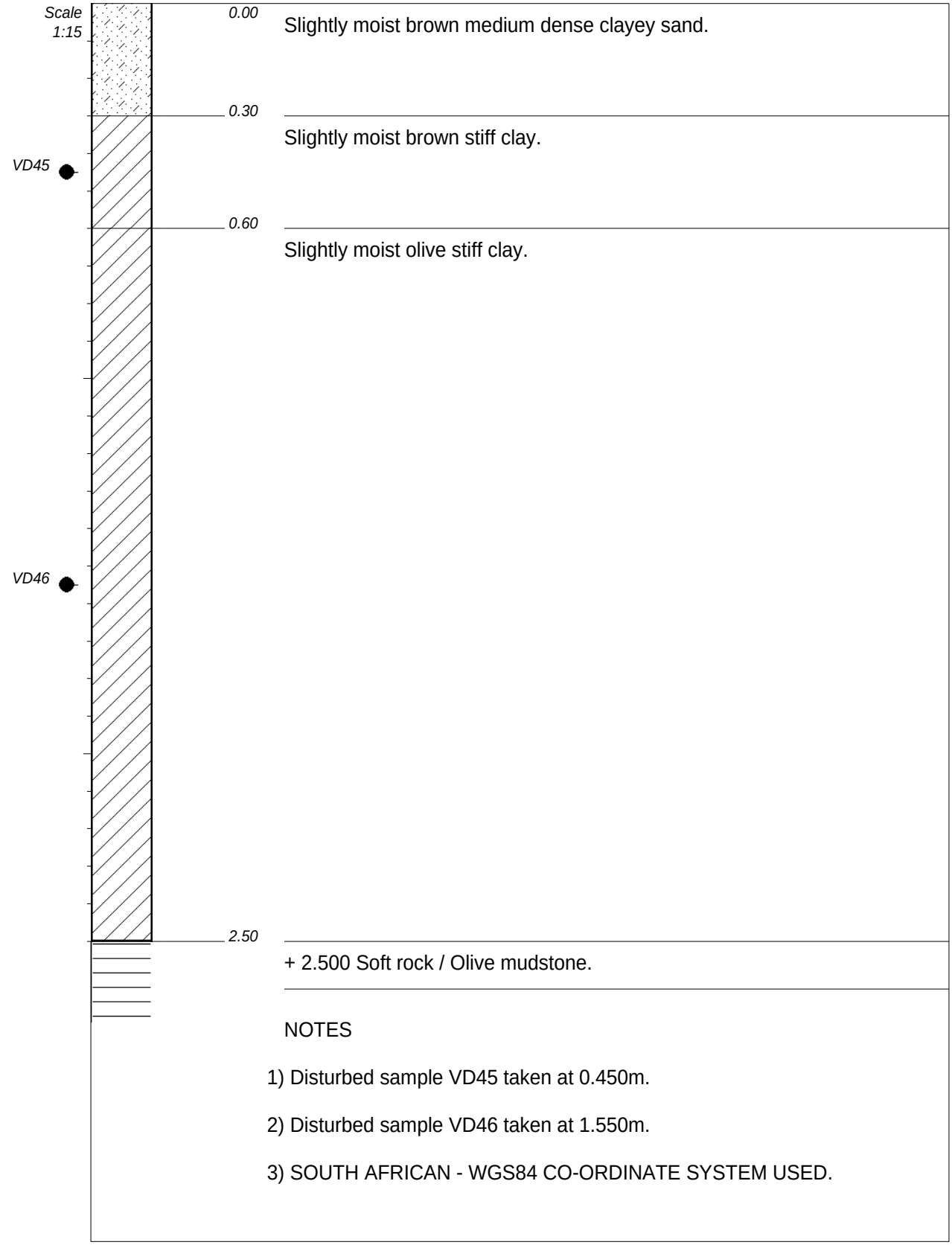
DATE : 19/03/13 11:33
TEXT : ..\Desktop\INSITU~1.TXT

Simlab (PTY) LTD
GEOTECHNICAL SERVICES

PHETHOGO CONSULTING
TOWNSHIP DEVELOPMENT - VREDE

HOLE No: TP48
Sheet 1 of 1

JOB NUMBER: 2012/244/DOC.



NOTES

1) Disturbed sample VD45 taken at 0.450m.

2) Disturbed sample VD46 taken at 1.550m.

3) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : F HOLDER
MACHINE : TLB
DRILLED BY : F HOLDER
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM :
DATE : 14/11/2012
DATE : 11/03/2013

ELEVATION : -
X-COORD : X3033455
Y-COORD : 29 Y-012821

HOLE No: TP48

TYPE SET BY : S VD MERWE
SETUP FILE : STANDARD.SET

DATE : 19/03/13 11:33
TEXT : ..\Desktop\INSITU~1.TXT

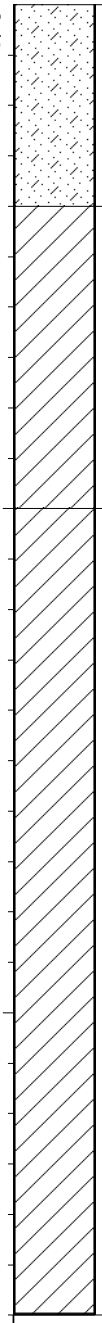
Simlab (PTY) LTD
GEOTECHNICAL SERVICES

PHETHOGO CONSULTING
TOWNSHIP DEVELOPMENT - VREDE

HOLE No: TP49
Sheet 1 of 1

JOB NUMBER: 2012/244/DOC.

Scale 1:15



0.00 Slightly moist brown medium dense clayey sand.

0.40 Slightly moist brown stiff clay.

1.00 Slightly moist olive stiff clay.

2.60 + 2.600 Soft rock / Olive mudstone.

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : F HOLDER
MACHINE : TLB
DRILLED BY : F HOLDER
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM :
DATE : 14/11/2012
DATE : 11/03/2013

ELEVATION : -
X-COORD : X3033366
Y-COORD : 29 Y-012725

HOLE No: TP49

TYPE SET BY : S VD MERWE
SETUP FILE : STANDARD.SET

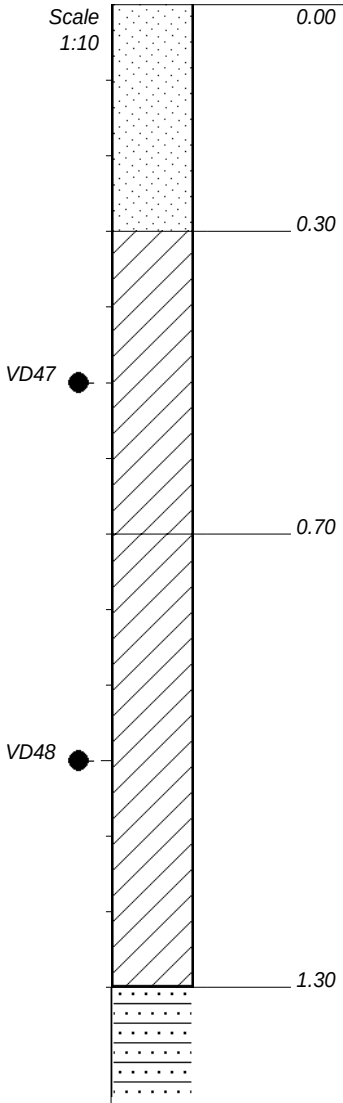
DATE : 19/03/13 11:33
TEXT : ..\Desktop\INSITU~1.TXT

Simlab (PTY) LTD
GEOTECHNICAL SERVICES

PHETHOGO CONSULTING
TOWNSHIP DEVELOPMENT - VREDE

HOLE No: TP50
Sheet 1 of 1

JOB NUMBER: 2012/244/DOC.



0.00 Slightly moist brown medium dense sand.

0.30 Slightly moist orange brown stiff clay.

0.70 Slightly moist yellow orange stiff clay.

1.30 + 1.300 Soft rock / Yellow sandstone.

NOTES

1) Disturbed sample VD47 taken at 0.500m.

2) Disturbed sample VD48 taken at 1.000m.

3) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : F HOLDER
MACHINE : TLB
DRILLED BY : F HOLDER
PROFILED BY : SIMLAB (PTY) LIMITED

TYPE SET BY : S VD MERWE
SETUP FILE : STANDARD.SET

INCLINATION : VERTICAL
DIAM :
DATE : 14/11/2012
DATE : 11/03/2013

DATE : 19/03/13 11:33
TEXT : ..\Desktop\INSITU~1.TXT

ELEVATION : -
X-COORD : X3033447
Y-COORD : 29 Y-012654

HOLE No: TP50

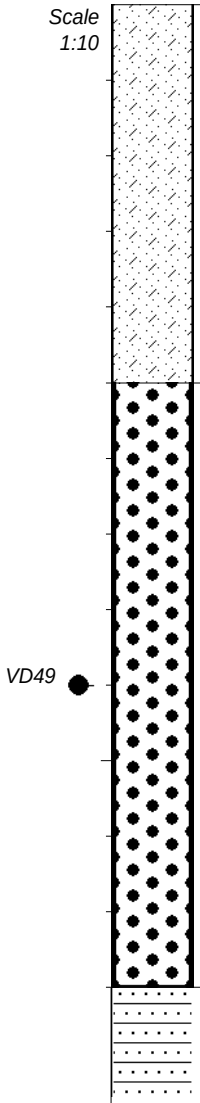
Simlab (PTY) LTD
GEOTECHNICAL SERVICES

PHETHOGO CONSULTING
TOWNSHIP DEVELOPMENT - VREDE

HOLE No: TP51
Sheet 1 of 1

JOB NUMBER: 2012/244/DOC.

Scale 1:10



0.00 Slightly moist brown medium dense clayey sand.

0.50 Slightly moist orange dense ferricrete.

1.30 + 1.300 Soft rock / Yellow sandstone.

NOTES

1) Disturbed sample VD49 taken at 0.900m.

2) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : F HOLDER
MACHINE : TLB
DRILLED BY : F HOLDER
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM :
DATE : 14/11/2012
DATE : 11/03/2013

ELEVATION : -
X-COORD : X3033545
Y-COORD : 29 Y-012566

HOLE No: TP51

TYPE SET BY : S VD MERWE
SETUP FILE : STANDARD.SET

DATE : 19/03/13 11:33
TEXT : ..\Desktop\INSITU~1.TXT

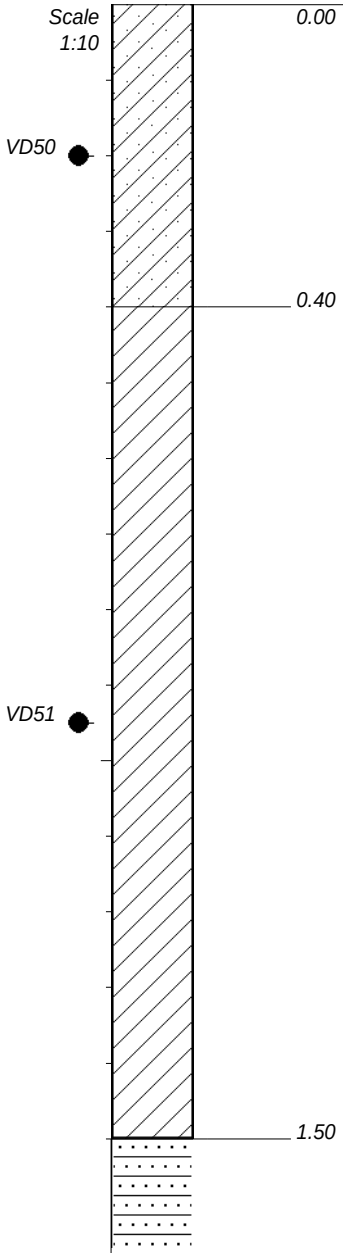
Simlab (PTY) LTD
GEOTECHNICAL SERVICES

PHETHOGO CONSULTING
TOWNSHIP DEVELOPMENT - VREDE

HOLE No: TP52
Sheet 1 of 1

JOB NUMBER: 2012/244/DOC.

Scale 1:10



0.00 Slightly moist brown stiff sandy clay.

0.40 Slightly moist orange grey stiff clay.

1.50 + 1.500 Soft rock / Yellow sandstone.

NOTES

1) Disturbed sample VD50 taken at 0.200m.

2) Disturbed sample VD51 taken at 0.950m.

3) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : F HOLDER
MACHINE : TLB
DRILLED BY : F HOLDER
PROFILED BY : SIMLAB (PTY) LIMITED

TYPE SET BY : S VD MERWE
SETUP FILE : STANDARD.SET

INCLINATION : VERTICAL
DIAM :
DATE : 14/11/2012
DATE : 11/03/2013

DATE : 19/03/13 11:33
TEXT : ..\Desktop\INSITU~1.TXT

ELEVATION : -
X-COORD : X3033420
Y-COORD : 29 Y-012550

HOLE No: TP52

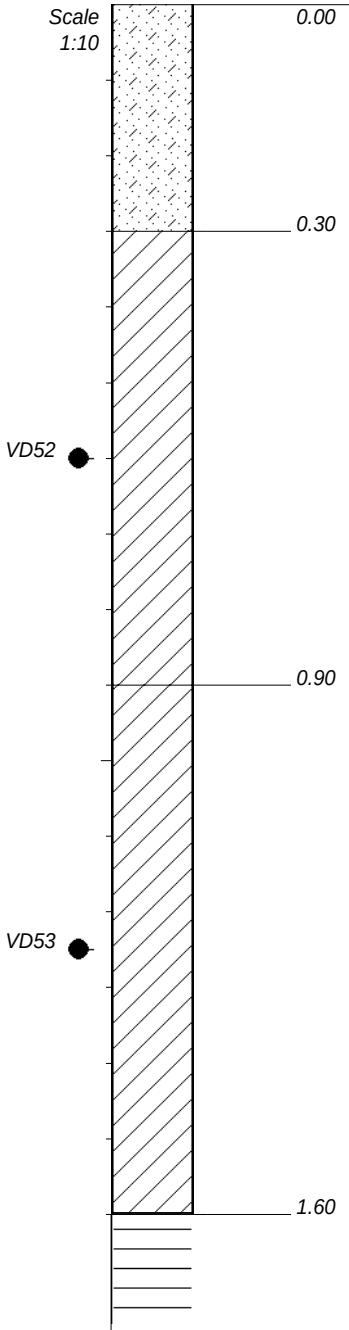
Simlab (PTY) LTD
GEOTECHNICAL SERVICES

PHETHOGO CONSULTING
TOWNSHIP DEVELOPMENT - VREDE

HOLE No: TP53
Sheet 1 of 1

JOB NUMBER: 2012/244/DOC.

Scale 1:10



0.00 Slightly moist brown medium dense clayey sand.

0.30 Slightly moist brown stiff clay.

0.90 Slightly moist grey stiff clay.

1.60 + 1.600 Soft rock / Olive mudstone.

NOTES

1) Disturbed sample VD52 taken at 0.600m.

2) Disturbed sample VD53 taken at 1.250m.

3) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : F HOLDER
MACHINE : TLB
DRILLED BY : F HOLDER
PROFILED BY : SIMLAB (PTY) LIMITED

TYPE SET BY : S VD MERWE
SETUP FILE : STANDARD.SET

INCLINATION : VERTICAL
DIAM :
DATE : 14/11/2012
DATE : 11/03/2013

DATE : 19/03/13 11:33
TEXT : ..\Desktop\INSITU~1.TXT

ELEVATION : -
X-COORD : X3033253
Y-COORD : 29 Y-012288

HOLE No: TP53

Simlab (PTY) LTD
GEOTECHNICAL SERVICES

PHETHOGO CONSULTING
TOWNSHIP DEVELOPMENT - VREDE

LEGEND
Sheet 1 of 1

JOB NUMBER: 2012/244/DOC.

	SAND	{SA04}
	SANDY	{SA05}
	CLAY	{SA08}
	CLAYEY	{SA09}
	SANDSTONE	{SA11}
	MUDSTONE	{SA12}
	DOLERITE	{SA18}{SA42}
	DENSE FERRICRETE	{SA23}{SA29}
	FERRICRETE	{SA24}
Name	DISTURBED SAMPLE	{SA38}

CONTRACTOR :
MACHINE :
DRILLED BY :
PROFILED BY :

INCLINATION :
DIAM :
DATE :
DATE :

ELEVATION :
X-COORD :
Y-COORD :

TYPE SET BY : S VD MERWE
SETUP FILE : STANDARD.SET

DATE : 19/03/13 11:33
TEXT : ..\Desktop\INSITU~1.TXT

LEGEND
SUMMARY OF SYMBOLS

APPENDIX C
LABORATORY TEST RESULTS

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

MATERIAL ANALYSIS

HOLE No. / KM			**TP1**			
MATERIAL DEPTH (mm)			0-700	700-1500	+1500	
SAMPLE / LAB. No.			**VD01 012/3572**	**VD02 012/3573**	**NS**	
MATERIAL DESCRIPTION			Slightly moist dark brown stiff sandy clay	Slightly moist yellow brown stiff sandy clay	Soft rock / Olive mudstone	
*** IN SITU FIELD MOISTURE (%)**			21.1	32.3		
AASHTO CLASSIFICATION						
UNIFIED SOIL CLASSIFICATION						
TRH14 / * COLTO CLASSIFICATION						
SIEVE ANALYSIS, PERCENTAGE OF MATERIAL PASSING 0.075 mm SIEVE (TMH 1 :1986, Method A1 (a), A5) - % PASSING SIEVES						
SIEVE ANALYSIS	**63.0 mm**					
	53.0 mm					
	37.5 mm					
	26.5 mm					
	19.0 mm					
	13.2 mm		100	100		
	4.75 mm		98	91		
	2.00 mm		97	85		
	0.425 mm		89	80		
	0.075 mm		68	68		
	*** 0.002 mm**		34	26		
SOIL MORTAR	**COARSE SAND**		8	6		
	FINE SAND		6 / 8 / 7	4 / 6 / 4		
	MATERIAL<0.075 mm		70	80		
GRADING MODULUS (GM)			0.45	0.51		
*** pH / CONDUCTIVITY Sm^{-1}**			6.20 / 0.0218	7.81 / 0.4474		
ATTERBERG LIMITS ANALYSIS (TMH 1 :1986, Method A2, A3, & A4)						
ATTERBERG LIMITS PASSING SIEVE (mm) >0.425		**L.L**	44	58		
		P.I. / L.S.	23 / 10.6	24 / 12.1		
POTENTIAL EXPANSIVENESS (mm)			Medium / 11.0mm	Medium / 9.40mm		
MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT, CALIFORNIA BEARING RATIO ANALYSIS (TMH 1 :1986, Method A7 & A8) UNCONFINED COMPRESSIVE STRENGTH & INDIRECT TENSILE STRENGTH OF STABILISED MATERIAL (TMH 1 :1986, Method A14 & A16T)						
CBR / * UCS / ITS DETERMINATION	MOD AASHTO	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		COMP MOISTURE (%)				
		DRY DENSITY (kg/m^3)				
		CBR (%) / * UCS / ITS (KPa)				
		SWELL (%)				
	NRB	**DRY DENSITY (kg/m^3)**				
		CBR (%)				
	PROCTOR	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		CBR (%)				
CBR / * UCS / ITS	**100%**					
	98%					
	95%					
	93%					
	90%					

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

MATERIAL ANALYSIS

HOLE No. / KM			**TP2**			
MATERIAL DEPTH (mm)			0-900	900-1500	+1500	
SAMPLE / LAB. No.			**NS**	**VD03 012/3574**	**NS**	
MATERIAL DESCRIPTION			Slightly moist dark brown stiff sandy clay	Slightly moist light brown stiff sandy clay	Hard weathered dolerite	
*** IN SITU FIELD MOISTURE (%)**				35.8		
AASHTO CLASSIFICATION						
UNIFIED SOIL CLASSIFICATION						
TRH14 / * COLTO CLASSIFICATION						
SIEVE ANALYSIS, PERCENTAGE OF MATERIAL PASSING 0.075 mm SIEVE (TMH 1 :1986, Method A1 (a), A5) - % PASSING SIEVES						
SIEVE ANALYSIS	**63.0 mm**					
	53.0 mm					
	37.5 mm					
	26.5 mm					
	19.0 mm					
	13.2 mm			100		
	4.75 mm			99		
	2.00 mm			98		
	0.425 mm			95		
	0.075 mm			81		
	*** 0.002 mm**			40		
SOIL MORTAR	**COARSE SAND**			3		
	FINE SAND			4 / 5 / 5		
	MATERIAL<0.075 mm			82		
GRADING MODULUS (GM)				0.27		
*** pH / CONDUCTIVITY Sm^{-1}**				5.86 / 0.3404		
ATTERBERG LIMITS ANALYSIS (TMH 1 :1986, Method A2, A3, & A4)						
ATTERBERG LIMITS PASSING SIEVE (mm) >0.425	**L.L**			71		
	P.I. / L.S.			32 / 14.6		
POTENTIAL EXPANSIVENESS (mm)			Medium / 13.0mm	High / 14.5mm		
MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT, CALIFORNIA BEARING RATIO ANALYSIS (TMH 1 :1986, Method A7 & A8)						
UNCONFINED COMPRESSIVE STRENGTH & INDIRECT TENSILE STRENGTH OF STABILISED MATERIAL (TMH 1 :1986, Method A14 & A16T)						
CBR / * UCS / ITS DETERMINATION	MOD AASHTO	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		COMP MOISTURE (%)				
		DRY DENSITY (kg/m^3)				
		CBR (%) / * UCS / ITS (KPa)				
		SWELL (%)				
	NRB	**DRY DENSITY (kg/m^3)**				
		CBR (%)				
	PROCTOR	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		CBR (%)				
CBR / * UCS / ITS	**100%**					
	98%					
	95%					
	93%					
	90%					

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

MATERIAL ANALYSIS

HOLE No. / KM			**TP3**			
MATERIAL DEPTH (mm)			0-400	400-700	+700	
SAMPLE / LAB. No.			**NS**	**NS**	**NS**	
MATERIAL DESCRIPTION *** IN SITU FIELD MOISTURE (%)**			Slightly moist light brown stiff sandy clay	Slightly moist olive dense mudstone	Soft rock / Olive mudstone	
AASHTO CLASSIFICATION						
UNIFIED SOIL CLASSIFICATION						
TRH14 / * COLTO CLASSIFICATION						
SIEVE ANALYSIS, PERCENTAGE OF MATERIAL PASSING 0.075 mm SIEVE (TMH 1 :1986, Method A1 (a), A5) - % PASSING SIEVES						
SIEVE ANALYSIS	**63.0 mm**					
	53.0 mm					
	37.5 mm					
	26.5 mm					
	19.0 mm					
	13.2 mm					
	4.75 mm					
	2.00 mm					
	0.425 mm					
	0.075 mm					
	*** 0.002 mm**					
SOIL MORTAR	**COARSE SAND**					
	FINE SAND					
	MATERIAL<0.075 mm					
GRADING MODULUS (GM)						
*** pH / CONDUCTIVITY Sm^{-1}**						
ATTERBERG LIMITS ANALYSIS (TMH 1 :1986, Method A2, A3, & A4)						
ATTERBERG LIMITS PASSING SIEVE (mm) >0.425		**L.L**				
		P.I. / L.S.				
POTENTIAL EXPANSIVENESS (mm)			Medium / 7.0mm	Low		
MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT, CALIFORNIA BEARING RATIO ANALYSIS (TMH 1 :1986, Method A7 & A8) **UNCONFINED COMPRESSIVE STRENGTH & INDIRECT TENSILE STRENGTH OF STABILISED MATERIAL (TMH 1 :1986, Method A14 & A16T)**						
CBR / * UCS / ITS DETERMINATION	**MOD AASHTO**	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		COMP MOISTURE (%)				
		DRY DENSITY (kg/m^3)				
		CBR (%) / * UCS / ITS (KPa)				
		SWELL (%)				
	NRB	**DRY DENSITY (kg/m^3)**				
		CBR (%)				
	PROCTOR	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		CBR (%)				
CBR / * UCS / ITS	**100%**					
	98%					
	95%					
	93%					
	90%					

REG. No. 1987/004282/07
Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
SAASIL/SAACEL No. 208
sanas Testing Laboratory T0455
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

MATERIAL ANALYSIS

HOLE No. / KM		**TP4**			
MATERIAL DEPTH (mm)		0-500	500-700	+700	
SAMPLE / LAB. No.		**NS**	**NS**	**NS**	
MATERIAL DESCRIPTION *** IN SITU FIELD MOISTURE (%)**		Slightly moist dark brown stiff sandy clay	Slightly moist olive dense mudstone	Soft rock / Olive mudstone	
AASHTO CLASSIFICATION					
UNIFIED SOIL CLASSIFICATION					
TRH14 / * COLTO CLASSIFICATION					
SIEVE ANALYSIS, PERCENTAGE OF MATERIAL PASSING 0.075 mm SIEVE (TMH 1 :1986, Method A1 (a), A5) - % PASSING SIEVES					
SIEVE ANALYSIS	**63.0 mm**				
	53.0 mm				
	37.5 mm				
	26.5 mm				
	19.0 mm				
	13.2 mm				
	4.75 mm				
	2.00 mm				
	0.425 mm				
	0.075 mm				
	*** 0.002 mm**				
SOIL MORTAR	**COARSE SAND**				
	FINE SAND				
	MATERIAL<0.075 mm				
GRADING MODULUS (GM)					
*** pH / CONDUCTIVITY Sm^{-1}**					
ATTERBERG LIMITS ANALYSIS (TMH 1 :1986, Method A2, A3, & A4)					
ATTERBERG LIMITS PASSING SIEVE (mm) >0.425	**L.L**				
	P.I. / L.S.				
POTENTIAL EXPANSIVENESS (mm)		Medium / 9.0mm	Low		
MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT, CALIFORNIA BEARING RATIO ANALYSIS (TMH 1 :1986, Method A7 & A8)					
UNCONFINED COMPRESSIVE STRENGTH & INDIRECT TENSILE STRENGTH OF STABILISED MATERIAL (TMH 1 :1986, Method A14 & A16T)					
CBR / * UCS / ITS DETERMINATION	MOD AASHTO	**MAX DRY DENSITY (kg/m^3)**			
		OPT MOISTURE (%)			
		COMP MOISTURE (%)			
		DRY DENSITY (kg/m^3)			
		CBR (%) / * UCS / ITS (KPa)			
		SWELL (%)			
	NRB	**DRY DENSITY (kg/m^3)**			
		CBR (%)			
	PROCTOR	**MAX DRY DENSITY (kg/m^3)**			
		OPT MOISTURE (%)			
		CBR (%)			
CBR / * UCS / ITS	**100%**				
	98%				
	95%				
	93%				
	90%				

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

MATERIAL ANALYSIS

HOLE No. / KM			**TP5**			
MATERIAL DEPTH (mm)			0-600	600-1000	+1000	
SAMPLE / LAB. No.			**NS**	**VD04 012/3575**	**NS**	
MATERIAL DESCRIPTION			Slightly moist dark brown stiff sandy clay	Slightly moist orange dense weathered dolerite	Slightly moist orange dense weathered dolerite	
*** IN SITU FIELD MOISTURE (%)**				11.6		
AASHTO CLASSIFICATION						
UNIFIED SOIL CLASSIFICATION						
TRH14 / * COLTO CLASSIFICATION						
SIEVE ANALYSIS, PERCENTAGE OF MATERIAL PASSING 0.075 mm SIEVE (TMH 1 :1986, Method A1 (a), A5) - % PASSING SIEVES						
SIEVE ANALYSIS	**63.0 mm**					
	53.0 mm					
	37.5 mm					
	26.5 mm					
	19.0 mm					
	13.2 mm					
	4.75 mm			100		
	2.00 mm			81		
	0.425 mm			40		
	0.075 mm			28		
	*** 0.002 mm**			11		
SOIL MORTAR	**COARSE SAND**			51		
	FINE SAND			6 / 5 / 4		
	MATERIAL<0.075 mm			35		
GRADING MODULUS (GM)				1.52		
*** pH / CONDUCTIVITY Sm^{-1}**				6.16 / 0.3307		
ATTERBERG LIMITS ANALYSIS (TMH 1 :1986, Method A2, A3, & A4)						
ATTERBERG LIMITS PASSING SIEVE (mm) >0.425	**L.L**			45		
	P.I. / L.S.			22 / 10.8		
POTENTIAL EXPANSIVENESS (mm)			Medium / 10.0mm	Low		
MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT, CALIFORNIA BEARING RATIO ANALYSIS (TMH 1 :1986, Method A7 & A8)						
UNCONFINED COMPRESSIVE STRENGTH & INDIRECT TENSILE STRENGTH OF STABILISED MATERIAL (TMH 1 :1986, Method A14 & A16T)						
CBR / * UCS / ITS DETERMINATION	**MOD AASHTO**	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		COMP MOISTURE (%)				
		DRY DENSITY (kg/m^3)				
		CBR (%) / * UCS / ITS (KPa)				
		SWELL (%)				
	NRB	**DRY DENSITY (kg/m^3)**				
		CBR (%)				
	PROCTOR	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		CBR (%)				
CBR / * UCS / ITS	**100%**					
	98%					
	95%					
	93%					
	90%					

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

MATERIAL ANALYSIS

HOLE No. / KM		**TP6**			
MATERIAL DEPTH (mm)		0-500	500-800	+800	
SAMPLE / LAB. No.		**NS**	**NS**	**NS**	
MATERIAL DESCRIPTION *** IN SITU FIELD MOISTURE (%)**		Slightly moist dark brown stiff sandy clay	Slightly moist orange dense weathered dolerite	Slightly moist orange dense weathered dolerite	
AASHTO CLASSIFICATION					
UNIFIED SOIL CLASSIFICATION					
TRH14 / * COLTO CLASSIFICATION					
SIEVE ANALYSIS, PERCENTAGE OF MATERIAL PASSING 0.075 mm SIEVE (TMH 1 :1986, Method A1 (a), A5) - % PASSING SIEVES					
SIEVE ANALYSIS	**63.0 mm**				
	53.0 mm				
	37.5 mm				
	26.5 mm				
	19.0 mm				
	13.2 mm				
	4.75 mm				
	2.00 mm				
	0.425 mm				
	0.075 mm				
	*** 0.002 mm**				
SOIL MORTAR	**COARSE SAND**				
	FINE SAND				
	MATERIAL<0.075 mm				
GRADING MODULUS (GM)					
*** pH / CONDUCTIVITY Sm^{-1}**					
ATTERBERG LIMITS ANALYSIS (TMH 1 :1986, Method A2, A3, & A4)					
ATTERBERG LIMITS PASSING SIEVE (mm) >0.425	**L.L**				
	P.I. / L.S.				
POTENTIAL EXPANSIVENESS (mm)		Medium / 9.0mm	Low		
MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT, CALIFORNIA BEARING RATIO ANALYSIS (TMH 1 :1986, Method A7 & A8)					
UNCONFINED COMPRESSIVE STRENGTH & INDIRECT TENSILE STRENGTH OF STABILISED MATERIAL (TMH 1 :1986, Method A14 & A16T)					
CBR / * UCS / ITS DETERMINATION	**MOD AASHTO**	**MAX DRY DENSITY (kg/m^3)**			
		OPT MOISTURE (%)			
		COMP MOISTURE (%)			
		DRY DENSITY (kg/m^3)			
		CBR (%) / * UCS / ITS (KPa)			
		SWELL (%)			
	NRB	**DRY DENSITY (kg/m^3)**			
		CBR (%)			
	PROCTOR	**MAX DRY DENSITY (kg/m^3)**			
		OPT MOISTURE (%)			
		CBR (%)			
CBR / * UCS / ITS	**100%**				
	98%				
	95%				
	93%				
	90%				

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

MATERIAL ANALYSIS

HOLE No. / KM			**TP7**			
MATERIAL DEPTH (mm)			0-600	600-1200	+1200	
SAMPLE / LAB. No.			**VD05 012/3576**	**VD06 012/3577**	**NS**	
MATERIAL DESCRIPTION			Slightly moist dark brown stiff sandy clay	Slightly moist orange dense weathered dolerite	Orange dense weathered dolerite Refusal	
*** IN SITU FIELD MOISTURE (%)**			35.1	33.0		
AASHTO CLASSIFICATION						
UNIFIED SOIL CLASSIFICATION						
TRH14 / * COLTO CLASSIFICATION						
SIEVE ANALYSIS, PERCENTAGE OF MATERIAL PASSING 0.075 mm SIEVE (TMH 1 :1986, Method A1 (a), A5) - % PASSING SIEVES						
SIEVE ANALYSIS	**63.0 mm**					
	53.0 mm					
	37.5 mm					
	26.5 mm					
	19.0 mm					
	13.2 mm			100		
	4.75 mm			98		
	2.00 mm		100	97		
	0.425 mm		96	95		
	0.075 mm		86	39		
	*** 0.002 mm**		19	25		
SOIL MORTAR	**COARSE SAND**		3	3		
	FINE SAND		3 / 4 / 4	2 / 4 / 52		
	MATERIAL<0.075 mm		87	40		
GRADING MODULUS (GM)			0.18	0.69		
*** pH / CONDUCTIVITY Sm^{-1}**						
ATTERBERG LIMITS ANALYSIS (TMH 1 :1986, Method A2, A3, & A4)						
ATTERBERG LIMITS PASSING SIEVE (mm) >0.425		**L.L**	60	52		
		P.I. / L.S.	31 / 15.4	29 / 13.9		
POTENTIAL EXPANSIVENESS (mm)			High / 20.00mm	High / 15.8mm		
MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT, CALIFORNIA BEARING RATIO ANALYSIS (TMH 1 :1986, Method A7 & A8)						
UNCONFINED COMPRESSIVE STRENGTH & INDIRECT TENSILE STRENGTH OF STABILISED MATERIAL (TMH 1 :1986, Method A14 & A16T)						
CBR / * UCS / ITS DETERMINATION	**MOD AASHTO**	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		COMP MOISTURE (%)				
		DRY DENSITY (kg/m^3)				
		CBR (%) / * UCS / ITS (KPa)				
		SWELL (%)				
	NRB	**DRY DENSITY (kg/m^3)**				
		CBR (%)				
	PROCTOR	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		CBR (%)				
CBR / * UCS / ITS	**100%**					
	98%					
	95%					
	93%					
	90%					

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

MATERIAL ANALYSIS

HOLE No. / KM			**TP8**			
MATERIAL DEPTH (mm)			0-600	600-1400	+1400	
SAMPLE / LAB. No.			**VD07 012/3578**	**VD08 012/3579**	**NS**	
MATERIAL DESCRIPTION			Slightly moist dark brown stiff sandy clay	Slightly moist orange dense weathered dolerite	Orange dense weathered dolerite Refusal	
*** IN SITU FIELD MOISTURE (%)**			8.0	11.0		
AASHTO CLASSIFICATION						
UNIFIED SOIL CLASSIFICATION						
TRH14 / * COLTO CLASSIFICATION						
SIEVE ANALYSIS, PERCENTAGE OF MATERIAL PASSING 0.075 mm SIEVE (TMH 1 :1986, Method A1 (a), A5) - % PASSING SIEVES						
SIEVE ANALYSIS	**63.0 mm**					
	53.0 mm					
	37.5 mm					
	26.5 mm					
	19.0 mm			100		
	13.2 mm		100	61		
	4.75 mm		98	60		
	2.00 mm		64	52		
	0.425 mm		21	33		
	0.075 mm		14	22		
	*** 0.002 mm**		1	0		
SOIL MORTAR	**COARSE SAND**		66	37		
	FINE SAND		4 / 4 / 4	4 / 10 / 6		
	MATERIAL<0.075 mm		22	43		
GRADING MODULUS (GM)			0.34	1.92		
*** pH / CONDUCTIVITY Sm^{-1}**						
ATTERBERG LIMITS ANALYSIS (TMH 1 :1986, Method A2, A3, & A4)						
ATTERBERG LIMITS PASSING SIEVE (mm) >0.425		**L.L**	30	42		
		P.I. / L.S.	18 / 8.8	10 / 5.5		
POTENTIAL EXPANSIVENESS (mm)			Low	Low		
MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT, CALIFORNIA BEARING RATIO ANALYSIS (TMH 1 :1986, Method A7 & A8) UNCONFINED COMPRESSIVE STRENGTH & INDIRECT TENSILE STRENGTH OF STABILISED MATERIAL (TMH 1 :1986, Method A14 & A16T)						
CBR / * UCS / ITS DETERMINATION	MOD AASHTO	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		COMP MOISTURE (%)				
		DRY DENSITY (kg/m^3)				
		CBR (%) / * UCS / ITS (KPa)				
		SWELL (%)				
	NRB	**DRY DENSITY (kg/m^3)**				
		CBR (%)				
	PROCTOR	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		CBR (%)				
CBR / * UCS / ITS	**100%**					
	98%					
	95%					
	93%					
	90%					

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

MATERIAL ANALYSIS

HOLE No. / KM			**TP9**			
MATERIAL DEPTH (mm)			0-400	+400		
SAMPLE / LAB. No.			**NS**	**NS**		
MATERIAL DESCRIPTION *** IN SITU FIELD MOISTURE (%)**			Slightly moist dark brown stiff sandy clay and sandstone	Soft rock / Yellow sandstone Refusal		
AASHTO CLASSIFICATION						
UNIFIED SOIL CLASSIFICATION						
TRH14 / * COLTO CLASSIFICATION						
SIEVE ANALYSIS, PERCENTAGE OF MATERIAL PASSING 0.075 mm SIEVE (TMH 1 :1986, Method A1 (a), A5) - % PASSING SIEVES						
SIEVE ANALYSIS	**63.0 mm**					
	53.0 mm					
	37.5 mm					
	26.5 mm					
	19.0 mm					
	13.2 mm					
	4.75 mm					
	2.00 mm					
	0.425 mm					
	0.075 mm					
	*** 0.002 mm**					
SOIL MORTAR	**COARSE SAND**					
	FINE SAND					
	MATERIAL<0.075 mm					
GRADING MODULUS (GM)						
*** pH / CONDUCTIVITY Sm^{-1}**						
ATTERBERG LIMITS ANALYSIS (TMH 1 :1986, Method A2, A3, & A4)						
ATTERBERG LIMITS PASSING SIEVE (mm) >0.425		**L.L**				
		P.I. / L.S.				
POTENTIAL EXPANSIVENESS (mm)			Low			
MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT, CALIFORNIA BEARING RATIO ANALYSIS (TMH 1 :1986, Method A7 & A8) **UNCONFINED COMPRESSIVE STRENGTH & INDIRECT TENSILE STRENGTH OF STABILISED MATERIAL (TMH 1 :1986, Method A14 & A16T)**						
CBR / * UCS / ITS DETERMINATION	**MOD AASHTO**	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		COMP MOISTURE (%)				
		DRY DENSITY (kg/m^3)				
		CBR (%) / * UCS / ITS (KPa)				
		SWELL (%)				
	NRB	**DRY DENSITY (kg/m^3)**				
		CBR (%)				
	PROCTOR	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		CBR (%)				
CBR / * UCS / ITS	**100%**					
	98%					
	95%					
	93%					
	90%					

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

MATERIAL ANALYSIS

HOLE No. / KM			**TP10**			
MATERIAL DEPTH (mm)			0-1000	+1000		
SAMPLE / LAB. No.			**VD09 012/3580**	**NS**		
MATERIAL DESCRIPTION			Slightly moist dark brown stiff sandy clay	Soft rock / Olive mudstone Refusal		
*** IN SITU FIELD MOISTURE (%)**			20.8			
AASHTO CLASSIFICATION						
UNIFIED SOIL CLASSIFICATION						
TRH14 / * COLTO CLASSIFICATION						
SIEVE ANALYSIS, PERCENTAGE OF MATERIAL PASSING 0.075 mm SIEVE (TMH 1 :1986, Method A1 (a), A5) - % PASSING SIEVES						
SIEVE ANALYSIS	**63.0 mm**					
	53.0 mm					
	37.5 mm					
	26.5 mm					
	19.0 mm					
	13.2 mm					
	4.75 mm		100			
	2.00 mm		99			
	0.425 mm		96			
	0.075 mm		81			
	*** 0.002 mm**		42			
SOIL MORTAR	**COARSE SAND**		3			
	FINE SAND		3 / 5 / 7			
	MATERIAL<0.075 mm		82			
GRADING MODULUS (GM)			0.23			
*** pH / CONDUCTIVITY Sm^{-1}**			5.95 / 0.3793			
ATTERBERG LIMITS ANALYSIS (TMH 1 :1986, Method A2, A3, & A4)						
ATTERBERG LIMITS PASSING SIEVE (mm) >0.425		**L.L**	46			
		P.I. / L.S.	23 / 11.7			
POTENTIAL EXPANSIVENESS (mm)			Medium / 14.5mm			
MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT, CALIFORNIA BEARING RATIO ANALYSIS (TMH 1 :1986, Method A7 & A8) UNCONFINED COMPRESSIVE STRENGTH & INDIRECT TENSILE STRENGTH OF STABILISED MATERIAL (TMH 1 :1986, Method A14 & A16T)						
CBR / * UCS / ITS DETERMINATION	MOD AASHTO	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		COMP MOISTURE (%)				
		DRY DENSITY (kg/m^3)				
		CBR (%) / * UCS / ITS (KPa)				
		SWELL (%)				
	NRB	**DRY DENSITY (kg/m^3)**				
		CBR (%)				
	PROCTOR	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		CBR (%)				
CBR / * UCS / ITS	**100%**					
	98%					
	95%					
	93%					
	90%					

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

MATERIAL ANALYSIS

HOLE No. / KM			**TP11**			
MATERIAL DEPTH (mm)			0-650	+650		
SAMPLE / LAB. No.			**NS**	**NS**		
MATERIAL DESCRIPTION *** IN SITU FIELD MOISTURE (%)**			Slightly moist dark brown stiff sandy clay	Soft rock/ Yellow sandstone Refusal		
AASHTO CLASSIFICATION						
UNIFIED SOIL CLASSIFICATION						
TRH14 / * COLTO CLASSIFICATION						
SIEVE ANALYSIS, PERCENTAGE OF MATERIAL PASSING 0.075 mm SIEVE (TMH 1 :1986, Method A1 (a), A5) - % PASSING SIEVES						
SIEVE ANALYSIS	**63.0 mm**					
	53.0 mm					
	37.5 mm					
	26.5 mm					
	19.0 mm					
	13.2 mm					
	4.75 mm					
	2.00 mm					
	0.425 mm					
	0.075 mm					
	*** 0.002 mm**					
SOIL MORTAR	**COARSE SAND**					
	FINE SAND					
	MATERIAL<0.075 mm					
GRADING MODULUS (GM)						
*** pH / CONDUCTIVITY Sm^{-1}**						
ATTERBERG LIMITS ANALYSIS (TMH 1 :1986, Method A2, A3, & A4)						
ATTERBERG LIMITS PASSING SIEVE (mm) >0.425		**L.L**				
		P.I. / L.S.				
POTENTIAL EXPANSIVENESS (mm)			Medium / 10.0mm			
MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT, CALIFORNIA BEARING RATIO ANALYSIS (TMH 1 :1986, Method A7 & A8)						
UNCONFINED COMPRESSIVE STRENGTH & INDIRECT TENSILE STRENGTH OF STABILISED MATERIAL (TMH 1 :1986, Method A14 & A16T)						
CBR / * UCS / ITS DETERMINATION	**MOD AASHTO**	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		COMP MOISTURE (%)				
		DRY DENSITY (kg/m^3)				
		CBR (%) / * UCS / ITS (KPa)				
		SWELL (%)				
	NRB	**DRY DENSITY (kg/m^3)**				
		CBR (%)				
	PROCTOR	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		CBR (%)				
CBR / * UCS / ITS	**100%**					
	98%					
	95%					
	93%					
	90%					

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

MATERIAL ANALYSIS

HOLE No. / KM			**TP12**			
MATERIAL DEPTH (mm)			0-400	400-800	800-1400	+1400
SAMPLE / LAB. No.			**VD10 012/3581**	**VD11 012/3582**	**VD12 012/3583**	**NS**
MATERIAL DESCRIPTION			Slightly moist brown firm sandy clay	Slightly moist red brown stiff sandy clay	Slightly moist yellow dense weathered dolerite	Slightly moist yellow dense weathered dolerite Refusal
*** IN SITU FIELD MOISTURE (%)**			18.0	4.9	7.7	
AASHTO CLASSIFICATION						
UNIFIED SOIL CLASSIFICATION						
TRH14 / * COLTO CLASSIFICATION			**NC**	**NC**		
SIEVE ANALYSIS, PERCENTAGE OF MATERIAL PASSING 0.075 mm SIEVE (TMH 1 :1986, Method A1 (a), A5) - % PASSING SIEVES						
SIEVE ANALYSIS		**63.0 mm**				
		53.0 mm				
		37.5 mm				
		26.5 mm				
		19.0 mm				
		13.2 mm		100	100	
		4.75 mm	100	99	98	
		2.00 mm	99	97	76	
		0.425 mm	92	88	41	
		0.075 mm	63	70	31	
		*** 0.002 mm**	20	35	2	
SOIL MORTAR		**COARSE SAND**	8	9	45	
		FINE SAND	8 / 10 / 11	4 / 7 / 8	4 / 4 / 5	
		MATERIAL<0.075 mm	63	72	41	
GRADING MODULUS (GM)			0.46	0.45	1.51	
*** pH / CONDUCTIVITY Sm^{-1}**			7.72 / 0.2237	8.11 / 0.4950		
ATTERBERG LIMITS ANALYSIS (TMH 1 :1986, Method A2, A3, & A4)						
ATTERBERG LIMITS PASSING SIEVE (mm) >0.425		**L.L**	31	41	38	
		P.I. / L.S.	14 / 6.5	20 / 10.4	16 / 8.0	
POTENTIAL EXPANSIVENESS (mm)			Medium / 7.2mm	Medium / 6.0mm	Low	
MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT, CALIFORNIA BEARING RATIO ANALYSIS (TMH 1 :1986, Method A7 & A8)						
UNCONFINED COMPRESSIVE STRENGTH & INDIRECT TENSILE STRENGTH OF STABILISED MATERIAL (TMH 1 :1986, Method A14 & A16T)						
CBR / * UCS / ITS DETERMINATION	**MOD AASHTO**	**MAX DRY DENSITY (kg/m^3)**	1765	1595	1970	
		OPT MOISTURE (%)	13.0	17.1	6.7	
		COMP MOISTURE (%)	12.9	17.1	6.6	
		DRY DENSITY (kg/m^3)	1765	1542	1970	
		CBR (%) / * UCS / ITS (KPa)	7	6	30	
		SWELL (%)	6.1	7.1	0.9	
	NRB	**DRY DENSITY (kg/m^3)**	1661	1496	1866	
		CBR (%)	5	5	21	
	PROCTOR	**MAX DRY DENSITY (kg/m^3)**	1546	1387	1779	
		OPT MOISTURE (%)	-	-	-	
		CBR (%)	3	4	15	
CBR / * UCS / ITS		**100%**	7	7	30	
		98%	6	6	26	
		95%	5	6	21	
		93%	4	5	18	
		90%	4	5	15	

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

MATERIAL ANALYSIS

HOLE No. / KM			**TP13**			
MATERIAL DEPTH (mm)			0-500	500-900	+900	
SAMPLE / LAB. No.			**NS**	**NS**	**NS**	
MATERIAL DESCRIPTION *** IN SITU FIELD MOISTURE (%)**			Slightly moist dense clayey sand	Slightly moist red brown stiff sandy clay	Soft rock / Yellow sandstone	
AASHTO CLASSIFICATION						
UNIFIED SOIL CLASSIFICATION						
TRH14 / * COLTO CLASSIFICATION						
SIEVE ANALYSIS, PERCENTAGE OF MATERIAL PASSING 0.075 mm SIEVE (TMH 1 :1986, Method A1 (a), A5) - % PASSING SIEVES						
SIEVE ANALYSIS	**63.0 mm**					
	53.0 mm					
	37.5 mm					
	26.5 mm					
	19.0 mm					
	13.2 mm					
	4.75 mm					
	2.00 mm					
	0.425 mm					
	0.075 mm					
	*** 0.002 mm**					
SOIL MORTAR	**COARSE SAND**					
	FINE SAND					
	MATERIAL<0.075 mm					
GRADING MODULUS (GM)						
*** pH / CONDUCTIVITY Sm^{-1}**						
ATTERBERG LIMITS ANALYSIS (TMH 1 :1986, Method A2, A3, & A4)						
ATTERBERG LIMITS PASSING SIEVE (mm) >0.425		**L.L**				
		P.I. / L.S.				
POTENTIAL EXPANSIVENESS (mm)			Medium / 9.0mm	Medium / 7.0mm		
MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT, CALIFORNIA BEARING RATIO ANALYSIS (TMH 1 :1986, Method A7 & A8) **UNCONFINED COMPRESSIVE STRENGTH & INDIRECT TENSILE STRENGTH OF STABILISED MATERIAL (TMH 1 :1986, Method A14 & A16T)**						
CBR / * UCS / ITS DETERMINATION	**MOD AASHTO**	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		COMP MOISTURE (%)				
		DRY DENSITY (kg/m^3)				
		CBR (%) / * UCS / ITS (KPa)				
		SWELL (%)				
	NRB	**DRY DENSITY (kg/m^3)**				
		CBR (%)				
	PROCTOR	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		CBR (%)				
CBR / * UCS / ITS	**100%**					
	98%					
	95%					
	93%					
	90%					

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

MATERIAL ANALYSIS

HOLE No. / KM			**TP14**	**TP15**		
MATERIAL DEPTH (mm)			Outcrop	0-800	800-1200	+1200
SAMPLE / LAB. No.			**NS**	**NS**	**NS**	**NS**
MATERIAL DESCRIPTION *** IN SITU FIELD MOISTURE (%)**			Soft rock / Yellow sandstone	Slightly moist dark brown stiff sandy clay	Slightly moist yellow dense sandstone	Soft rock / Yellow sandstone
AASHTO CLASSIFICATION						
UNIFIED SOIL CLASSIFICATION						
TRH14 / * COLTO CLASSIFICATION						
SIEVE ANALYSIS, PERCENTAGE OF MATERIAL PASSING 0.075 mm SIEVE (TMH 1 :1986, Method A1 (a), A5) - % PASSING SIEVES						
SIEVE ANALYSIS	**63.0 mm**					
	53.0 mm					
	37.5 mm					
	26.5 mm					
	19.0 mm					
	13.2 mm					
	4.75 mm					
	2.00 mm					
	0.425 mm					
	0.075 mm					
	*** 0.002 mm**					
SOIL MORTAR	**COARSE SAND**					
	FINE SAND					
	MATERIAL<0.075 mm					
GRADING MODULUS (GM)						
*** pH / CONDUCTIVITY Sm^{-1}**						
ATTERBERG LIMITS ANALYSIS (TMH 1 :1986, Method A2, A3, & A4)						
ATTERBERG LIMITS PASSING SIEVE (mm) >0.425		**L.L**				
		P.I. / L.S.				
POTENTIAL EXPANSIVENESS (mm)				Medium / 12.0mm	Low	
MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT, CALIFORNIA BEARING RATIO ANALYSIS (TMH 1 :1986, Method A7 & A8)						
UNCONFINED COMPRESSIVE STRENGTH & INDIRECT TENSILE STRENGTH OF STABILISED MATERIAL (TMH 1 :1986, Method A14 & A16T)						
CBR / * UCS / ITS DETERMINATION	**MOD AASHTO**	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		COMP MOISTURE (%)				
		DRY DENSITY (kg/m^3)				
		CBR (%) / * UCS / ITS (KPa)				
		SWELL (%)				
	NRB	**DRY DENSITY (kg/m^3)**				
		CBR (%)				
	PROCTOR	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		CBR (%)				
CBR / * UCS / ITS	**100%**					
	98%					
	95%					
	93%					
	90%					

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

MATERIAL ANALYSIS

HOLE No. / KM			**TP16**			
MATERIAL DEPTH (mm)			0-700	+700		
SAMPLE / LAB. No.			**VD13 012/3584**	**NS**		
MATERIAL DESCRIPTION			Moist brown dense weathered dolerite	Moist brown dense weathered dolerite Refusal		
*** IN SITU FIELD MOISTURE (%)**			11.7			
AASHTO CLASSIFICATION						
UNIFIED SOIL CLASSIFICATION						
TRH14 / * COLTO CLASSIFICATION						
SIEVE ANALYSIS, PERCENTAGE OF MATERIAL PASSING 0.075 mm SIEVE (TMH 1 :1986, Method A1 (a), A5) - % PASSING SIEVES						
SIEVE ANALYSIS	**63.0 mm**					
	53.0 mm					
	37.5 mm		100			
	26.5 mm		89			
	19.0 mm		71			
	13.2 mm		55			
	4.75 mm		34			
	2.00 mm		26			
	0.425 mm		19			
	0.075 mm		11			
	*** 0.002 mm**		3			
SOIL MORTAR	**COARSE SAND**		27			
	FINE SAND		9 / 10 / 10			
	MATERIAL<0.075 mm		44			
GRADING MODULUS (GM)			2.44			
*** pH / CONDUCTIVITY Sm^{-1}**			7.58 / 0.4668			
ATTERBERG LIMITS ANALYSIS (TMH 1 :1986, Method A2, A3, & A4)						
ATTERBERG LIMITS PASSING SIEVE (mm) >0.425		**L.L**	49			
		P.I. / L.S.	26 / 23.2			
POTENTIAL EXPANSIVENESS (mm)			Low			
MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT, CALIFORNIA BEARING RATIO ANALYSIS (TMH 1 :1986, Method A7 & A8)						
UNCONFINED COMPRESSIVE STRENGTH & INDIRECT TENSILE STRENGTH OF STABILISED MATERIAL (TMH 1 :1986, Method A14 & A16T)						
CBR / * UCS / ITS DETERMINATION	MOD AASHTO	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		COMP MOISTURE (%)				
		DRY DENSITY (kg/m^3)				
		CBR (%) / * UCS / ITS (KPa)				
		SWELL (%)				
	NRB	**DRY DENSITY (kg/m^3)**				
		CBR (%)				
	PROCTOR	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		CBR (%)				
CBR / * UCS / ITS	**100%**					
	98%					
	95%					
	93%					
	90%					

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

MATERIAL ANALYSIS

HOLE No. / KM			**TP17**			
MATERIAL DEPTH (mm)			0-650	+650		
SAMPLE / LAB. No.			**NS**	**NS**		
MATERIAL DESCRIPTION *** IN SITU FIELD MOISTURE (%)**			Moist brown dense clayey sand	Soft rock / Yellow sandstone Refusal		
AASHTO CLASSIFICATION						
UNIFIED SOIL CLASSIFICATION						
TRH14 / * COLTO CLASSIFICATION						
SIEVE ANALYSIS, PERCENTAGE OF MATERIAL PASSING 0.075 mm SIEVE (TMH 1 :1986, Method A1 (a), A5) - % PASSING SIEVES						
SIEVE ANALYSIS	**63.0 mm**					
	53.0 mm					
	37.5 mm					
	26.5 mm					
	19.0 mm					
	13.2 mm					
	4.75 mm					
	2.00 mm					
	0.425 mm					
	0.075 mm					
	*** 0.002 mm**					
SOIL MORTAR	**COARSE SAND**					
	FINE SAND					
	MATERIAL<0.075 mm					
GRADING MODULUS (GM)						
*** pH / CONDUCTIVITY Sm^{-1}**						
ATTERBERG LIMITS ANALYSIS (TMH 1 :1986, Method A2, A3, & A4)						
ATTERBERG LIMITS PASSING SIEVE (mm) >0.425		**L.L**				
		P.I. / L.S.				
POTENTIAL EXPANSIVENESS (mm)			Low			
MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT, CALIFORNIA BEARING RATIO ANALYSIS (TMH 1 :1986, Method A7 & A8) **UNCONFINED COMPRESSIVE STRENGTH & INDIRECT TENSILE STRENGTH OF STABILISED MATERIAL (TMH 1 :1986, Method A14 & A16T)**						
CBR / * UCS / ITS DETERMINATION	**MOD AASHTO**	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		COMP MOISTURE (%)				
		DRY DENSITY (kg/m^3)				
		CBR (%) / * UCS / ITS (KPa)				
		SWELL (%)				
	NRB	**DRY DENSITY (kg/m^3)**				
		CBR (%)				
	PROCTOR	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		CBR (%)				
CBR / * UCS / ITS	**100%**					
	98%					
	95%					
	93%					
	90%					

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

MATERIAL ANALYSIS

HOLE No. / KM			**TP18**			
MATERIAL DEPTH (mm)			0-400	400-900	900-1150	+1150
SAMPLE / LAB. No.			**NS**	**VD14 012/3585**	**VD15 012/3586**	**NS**
MATERIAL DESCRIPTION			Slightly moist brown dense clayey sand	Slightly moist brown stiff sandy clay	Slightly moist orange stiff sandy clay	Soft rock / Olive mudstone Refusal
*** IN SITU FIELD MOISTURE (%)**				12.3	19.5	
AASHTO CLASSIFICATION						
UNIFIED SOIL CLASSIFICATION						
TRH14 / * COLTO CLASSIFICATION						
SIEVE ANALYSIS, PERCENTAGE OF MATERIAL PASSING 0.075 mm SIEVE (TMH 1 :1986, Method A1 (a), A5) - % PASSING SIEVES						
SIEVE ANALYSIS	**63.0 mm**					
	53.0 mm					
	37.5 mm					
	26.5 mm					
	19.0 mm					
	13.2 mm					
	4.75 mm			100	100	
	2.00 mm			98	98	
	0.425 mm			83	90	
	0.075 mm			50	72	
	*** 0.002 mm**			17	34	
SOIL MORTAR	**COARSE SAND**			15	8	
	FINE SAND			11 / 12 / 10	5 / 7 / 7	
	MATERIAL<0.075 mm			51	73	
GRADING MODULUS (GM)				0.70	0.40	
*** pH / CONDUCTIVITY Sm^{-1}**				7.06 / 0.1305	8.38 / 0.3015	
ATTERBERG LIMITS ANALYSIS (TMH 1 :1986, Method A2, A3, & A4)						
ATTERBERG LIMITS PASSING SIEVE (mm) >0.425	**L.L**			24	46	
	P.I. / L.S.			10 / 5.1	21 / 9.5	
POTENTIAL EXPANSIVENESS (mm)			Medium / 7.0mm	Low	Medium / 4.7mm	
MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT, CALIFORNIA BEARING RATIO ANALYSIS (TMH 1 :1986, Method A7 & A8) UNCONFINED COMPRESSIVE STRENGTH & INDIRECT TENSILE STRENGTH OF STABILISED MATERIAL (TMH 1 :1986, Method A14 & A16T)						
CBR / * UCS / ITS DETERMINATION	**MOD AASHTO**	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		COMP MOISTURE (%)				
		DRY DENSITY (kg/m^3)				
		CBR (%) / * UCS / ITS (KPa)				
		SWELL (%)				
	NRB	**DRY DENSITY (kg/m^3)**				
		CBR (%)				
	PROCTOR	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		CBR (%)				
CBR / * UCS / ITS	**100%**					
	98%					
	95%					
	93%					
	90%					

REG. No. 1987/004282/07
Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
SAASIL/SAACEL No. 208
sanas Testing Laboratory T0455
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

MATERIAL ANALYSIS

HOLE No. / KM		**TP19**	**TP20**	**TP21**	
MATERIAL DEPTH (mm)		-	-	-	
SAMPLE / LAB. No.		**NS**	**NS**	**NS**	
MATERIAL DESCRIPTION *** IN SITU FIELD MOISTURE (%)**		Located in stream	Located in stream	Located in stream	
AASHTO CLASSIFICATION					
UNIFIED SOIL CLASSIFICATION					
TRH14 / * COLTO CLASSIFICATION					
SIEVE ANALYSIS, PERCENTAGE OF MATERIAL PASSING 0.075 mm SIEVE (TMH 1 :1986, Method A1 (a), A5) - % PASSING SIEVES					
SIEVE ANALYSIS	**63.0 mm**				
	53.0 mm				
	37.5 mm				
	26.5 mm				
	19.0 mm				
	13.2 mm				
	4.75 mm				
	2.00 mm				
	0.425 mm				
	0.075 mm				
	*** 0.002 mm**				
SOIL MORTAR	**COARSE SAND**				
	FINE SAND				
	MATERIAL<0.075 mm				
GRADING MODULUS (GM)					
*** pH / CONDUCTIVITY Sm^{-1}**					
ATTERBERG LIMITS ANALYSIS (TMH 1 :1986, Method A2, A3, & A4)					
ATTERBERG LIMITS PASSING SIEVE (mm) >0.425	**L.L**				
	P.I. / L.S.				
POTENTIAL EXPANSIVENESS (mm)					
MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT, CALIFORNIA BEARING RATIO ANALYSIS (TMH 1 :1986, Method A7 & A8) **UNCONFINED COMPRESSIVE STRENGTH & INDIRECT TENSILE STRENGTH OF STABILISED MATERIAL (TMH 1 :1986, Method A14 & A16T)**					
CBR / * UCS / ITS DETERMINATION	MOD AASHTO	**MAX DRY DENSITY (kg/m^3)**			
		OPT MOISTURE (%)			
		COMP MOISTURE (%)			
		DRY DENSITY (kg/m^3)			
		CBR (%) / * UCS / ITS (KPa)			
		SWELL (%)			
	NRB	**DRY DENSITY (kg/m^3)**			
		CBR (%)			
	PROCTOR	**MAX DRY DENSITY (kg/m^3)**			
		OPT MOISTURE (%)			
		CBR (%)			
CBR / * UCS / ITS	**100%**				
	98%				
	95%				
	93%				
	90%				

REG. No. 1987/004282/07
Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
SAASIL/SAACEL No. 208
sanas Testing Laboratory T0455
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

MATERIAL ANALYSIS

HOLE No. / KM			**TP22**			
MATERIAL DEPTH (mm)			0-600	600-1100	+1100	
SAMPLE / LAB. No.			**VD16 012/3587**	**VD17 012/3588**	**NS**	
MATERIAL DESCRIPTION			Slightly moist brown firm sandy clay	Slightly moist yellow stiff sandy clay	Soft rock / Olive sandstone	
*** IN SITU FIELD MOISTURE (%)**			15.3	17.9		
AASHTO CLASSIFICATION						
UNIFIED SOIL CLASSIFICATION						
TRH14 / * COLTO CLASSIFICATION						
SIEVE ANALYSIS, PERCENTAGE OF MATERIAL PASSING 0.075 mm SIEVE (TMH 1 :1986, Method A1 (a), A5) - % PASSING SIEVES						
SIEVE ANALYSIS	**63.0 mm**					
	53.0 mm					
	37.5 mm					
	26.5 mm			100		
	19.0 mm			96		
	13.2 mm			94		
	4.75 mm		100	89		
	2.00 mm		99	82		
	0.425 mm		89	74		
	0.075 mm		58	59		
	*** 0.002 mm**		18	27		
SOIL MORTAR	**COARSE SAND**		10	10		
	FINE SAND		6 / 11 / 15	4 / 5 / 9		
	MATERIAL<0.075 mm		58	72		
GRADING MODULUS (GM)			0.55	0.85		
*** pH / CONDUCTIVITY Sm^{-1}**			6.97 / 0.1751	8.73 / 0.2723		
ATTERBERG LIMITS ANALYSIS (TMH 1 :1986, Method A2, A3, & A4)						
ATTERBERG LIMITS PASSING SIEVE (mm) >0.425		**L.L**	24	36		
		P.I. / L.S.	10 / 4.8	20 / 9.8		
POTENTIAL EXPANSIVENESS (mm)			Low	Medium / 6.9mm		
MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT, CALIFORNIA BEARING RATIO ANALYSIS (TMH 1 :1986, Method A7 & A8)						
UNCONFINED COMPRESSIVE STRENGTH & INDIRECT TENSILE STRENGTH OF STABILISED MATERIAL (TMH 1 :1986, Method A14 & A16T)						
CBR / * UCS / ITS DETERMINATION	MOD AASHTO	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		COMP MOISTURE (%)				
		DRY DENSITY (kg/m^3)				
		CBR (%) / * UCS / ITS (KPa)				
		SWELL (%)				
	NRB	**DRY DENSITY (kg/m^3)**				
		CBR (%)				
	PROCTOR	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		CBR (%)				
CBR / * UCS / ITS	**100%**					
	98%					
	95%					
	93%					
	90%					

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

MATERIAL ANALYSIS

HOLE No. / KM		**TP23**			
MATERIAL DEPTH (mm)		0-550	550-700	+700	
SAMPLE / LAB. No.		**NS**	**NS**	**NS**	
MATERIAL DESCRIPTION *** IN SITU FIELD MOISTURE (%)**		Slightly moist brown dense clayey sand	Slightly moist grey dense mudstone	Soft rock / Grey mudstone	
AASHTO CLASSIFICATION					
UNIFIED SOIL CLASSIFICATION					
TRH14 / * COLTO CLASSIFICATION					
SIEVE ANALYSIS, PERCENTAGE OF MATERIAL PASSING 0.075 mm SIEVE (TMH 1 :1986, Method A1 (a), A5) - % PASSING SIEVES					
SIEVE ANALYSIS	**63.0 mm**				
	53.0 mm				
	37.5 mm				
	26.5 mm				
	19.0 mm				
	13.2 mm				
	4.75 mm				
	2.00 mm				
	0.425 mm				
	0.075 mm				
	*** 0.002 mm**				
SOIL MORTAR	**COARSE SAND**				
	FINE SAND				
	MATERIAL<0.075 mm				
GRADING MODULUS (GM)					
*** pH / CONDUCTIVITY Sm^{-1}**					
ATTERBERG LIMITS ANALYSIS (TMH 1 :1986, Method A2, A3, & A4)					
ATTERBERG LIMITS PASSING SIEVE (mm) >0.425	**L.L**				
	P.I. / L.S.				
POTENTIAL EXPANSIVENESS (mm)		Low	Low		
MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT, CALIFORNIA BEARING RATIO ANALYSIS (TMH 1 :1986, Method A7 & A8)					
UNCONFINED COMPRESSIVE STRENGTH & INDIRECT TENSILE STRENGTH OF STABILISED MATERIAL (TMH 1 :1986, Method A14 & A16T)					
CBR / * UCS / ITS DETERMINATION	**MOD AASHTO**	**MAX DRY DENSITY (kg/m^3)**			
		OPT MOISTURE (%)			
		COMP MOISTURE (%)			
		DRY DENSITY (kg/m^3)			
		CBR (%) / * UCS / ITS (KPa)			
		SWELL (%)			
	NRB	**DRY DENSITY (kg/m^3)**			
		CBR (%)			
	PROCTOR	**MAX DRY DENSITY (kg/m^3)**			
		OPT MOISTURE (%)			
		CBR (%)			
CBR / * UCS / ITS	**100%**				
	98%				
	95%				
	93%				
	90%				

REG. No. 1987/004282/07
Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
SAASIL/SAACEL No. 208
T0455
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

MATERIAL ANALYSIS

HOLE No. / KM		**TP24**			
MATERIAL DEPTH (mm)		0-400	400-2100	2100-3000	+3000
SAMPLE / LAB. No.		**NS**	**VD18 012/3589**	**VD19 012/3590**	**NS**
MATERIAL DESCRIPTION		Slightly moist brown dense clayey sand	Slightly moist yellow orange stiff clay and ferricrete	Moist yellow grey soft clay and ferricrete	Moist yellow grey soft clay and ferricrete
*** IN SITU FIELD MOISTURE (%)**			20.5	18.9	
AASHTO CLASSIFICATION					
UNIFIED SOIL CLASSIFICATION					
TRH14 / * COLTO CLASSIFICATION					
SIEVE ANALYSIS, PERCENTAGE OF MATERIAL PASSING 0.075 mm SIEVE (TMH 1 :1986, Method A1 (a), A5) - % PASSING SIEVES					
SIEVE ANALYSIS	**63.0 mm**				
	53.0 mm				
	37.5 mm				
	26.5 mm				
	19.0 mm				
	13.2 mm		100	100	
	4.75 mm		99	95	
	2.00 mm		97	93	
	0.425 mm		88	84	
	0.075 mm		67	66	
	*** 0.002 mm**		35	30	
SOIL MORTAR	**COARSE SAND**		9	10	
	FINE SAND		8 / 7 / 7	7 / 7 / 5	
	MATERIAL<0.075 mm		69	71	
GRADING MODULUS (GM)			0.47	0.59	
*** pH / CONDUCTIVITY Sm^{-1}**			8.44 / 0.2626	7.10 / 0.2626	
ATTERBERG LIMITS ANALYSIS (TMH 1 :1986, Method A2, A3, & A4)					
ATTERBERG LIMITS PASSING SIEVE (mm) >0.425	**L.L**		44	43	
	P.I. / L.S.		21 / 9.9	16 / 8.0	
POTENTIAL EXPANSIVENESS (mm)		Low	Medium / 21.0mm	Low	
MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT, CALIFORNIA BEARING RATIO ANALYSIS (TMH 1 :1986, Method A7 & A8)					
UNCONFINED COMPRESSIVE STRENGTH & INDIRECT TENSILE STRENGTH OF STABILISED MATERIAL (TMH 1 :1986, Method A14 & A16T)					
CBR / * UCS / ITS DETERMINATION	**MOD AASHTO**	**MAX DRY DENSITY (kg/m^3)**			
		OPT MOISTURE (%)			
		COMP MOISTURE (%)			
		DRY DENSITY (kg/m^3)			
		CBR (%) / * UCS / ITS (KPa)			
		SWELL (%)			
	NRB	**DRY DENSITY (kg/m^3)**			
		CBR (%)			
	PROCTOR	**MAX DRY DENSITY (kg/m^3)**			
		OPT MOISTURE (%)			
		CBR (%)			
CBR / * UCS / ITS	**100%**				
	98%				
	95%				
	93%				
	90%				

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

MATERIAL ANALYSIS

HOLE No. / KM			**TP25**			
MATERIAL DEPTH (mm)			0-800	800-1100	+1100	
SAMPLE / LAB. No.			**NS**	**NS**	**NS**	
MATERIAL DESCRIPTION *** IN SITU FIELD MOISTURE (%)**			Slightly moist yellow dense clayey sand	Slightly moist yellow dense sandstone	Soft rock / Yellow sandstone Refusal	
AASHTO CLASSIFICATION						
UNIFIED SOIL CLASSIFICATION						
TRH14 / * COLTO CLASSIFICATION						
SIEVE ANALYSIS, PERCENTAGE OF MATERIAL PASSING 0.075 mm SIEVE (TMH 1 :1986, Method A1 (a), A5) - % PASSING SIEVES						
SIEVE ANALYSIS		**63.0 mm**				
		53.0 mm				
		37.5 mm				
		26.5 mm				
		19.0 mm				
		13.2 mm				
		4.75 mm				
		2.00 mm				
		0.425 mm				
		0.075 mm				
		*** 0.002 mm**				
SOIL MORTAR		**COARSE SAND**				
		FINE SAND				
		MATERIAL<0.075 mm				
GRADING MODULUS (GM)						
*** pH / CONDUCTIVITY Sm^{-1}**						
ATTERBERG LIMITS ANALYSIS (TMH 1 :1986, Method A2, A3, & A4)						
ATTERBERG LIMITS PASSING SIEVE (mm) >0.425		**L.L**				
		P.I. / L.S.				
POTENTIAL EXPANSIVENESS (mm)			Low	Low		
MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT, CALIFORNIA BEARING RATIO ANALYSIS (TMH 1 :1986, Method A7 & A8) **UNCONFINED COMPRESSIVE STRENGTH & INDIRECT TENSILE STRENGTH OF STABILISED MATERIAL (TMH 1 :1986, Method A14 & A16T)**						
CBR / * UCS / ITS DETERMINATION	**MOD AASHTO**	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		COMP MOISTURE (%)				
		DRY DENSITY (kg/m^3)				
		CBR (%) / * UCS / ITS (KPa)				
		SWELL (%)				
	NRB	**DRY DENSITY (kg/m^3)**				
		CBR (%)				
	PROCTOR	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		CBR (%)				
CBR / * UCS / ITS		**100%**				
		98%				
		95%				
		93%				
		90%				

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

MATERIAL ANALYSIS

HOLE No. / KM			**TP26**	**TP27**		
MATERIAL DEPTH (mm)			Outcrop	Outcrop		
SAMPLE / LAB. No.			**NS**	**NS**		
MATERIAL DESCRIPTION *** IN SITU FIELD MOISTURE (%)**			Soft rock / Yellow sandstone	Soft rock / Yellow sandstone		
AASHTO CLASSIFICATION						
UNIFIED SOIL CLASSIFICATION						
TRH14 / * COLTO CLASSIFICATION						
SIEVE ANALYSIS, PERCENTAGE OF MATERIAL PASSING 0.075 mm SIEVE (TMH 1 :1986, Method A1 (a), A5) - % PASSING SIEVES						
SIEVE ANALYSIS	**63.0 mm**					
	53.0 mm					
	37.5 mm					
	26.5 mm					
	19.0 mm					
	13.2 mm					
	4.75 mm					
	2.00 mm					
	0.425 mm					
	0.075 mm					
	*** 0.002 mm**					
SOIL MORTAR	**COARSE SAND**					
	FINE SAND					
	MATERIAL<0.075 mm					
GRADING MODULUS (GM)						
*** pH / CONDUCTIVITY Sm^{-1}**						
ATTERBERG LIMITS ANALYSIS (TMH 1 :1986, Method A2, A3, & A4)						
ATTERBERG LIMITS PASSING SIEVE (mm) >0.425	**L.L**					
	P.I. / L.S.					
POTENTIAL EXPANSIVENESS (mm)						
MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT, CALIFORNIA BEARING RATIO ANALYSIS (TMH 1 :1986, Method A7 & A8) **UNCONFINED COMPRESSIVE STRENGTH & INDIRECT TENSILE STRENGTH OF STABILISED MATERIAL (TMH 1 :1986, Method A14 & A16T)**						
CBR / * UCS / ITS DETERMINATION	**MOD AASHTO**	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		COMP MOISTURE (%)				
		DRY DENSITY (kg/m^3)				
		CBR (%) / * UCS / ITS (KPa)				
		SWELL (%)				
	NRB	**DRY DENSITY (kg/m^3)**				
		CBR (%)				
	PROCTOR	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		CBR (%)				
CBR / * UCS / ITS	**100%**					
	98%					
	95%					
	93%					
	90%					

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

MATERIAL ANALYSIS

HOLE No. / KM			**TP28**			
MATERIAL DEPTH (mm)			0-600	600-1200	1200-2850	+2850
SAMPLE / LAB. No.			**VD20 012/3591**	**VD21 012/3592**	**VD22 012/3593**	**NS**
MATERIAL DESCRIPTION			Slightly moist brown dense clayey sand	Slightly moist brown stiff sandy clay	Slightly moist olive stiff sandy clay	Slightly moist olive stiff sandy clay
*** IN SITU FIELD MOISTURE (%)**			13.1	21.4	19.8	
AASHTO CLASSIFICATION						
UNIFIED SOIL CLASSIFICATION						
TRH14 / * COLTO CLASSIFICATION						
SIEVE ANALYSIS, PERCENTAGE OF MATERIAL PASSING 0.075 mm SIEVE (TMH 1 :1986, Method A1 (a), A5) - % PASSING SIEVES						
SIEVE ANALYSIS	**63.0 mm**					
	53.0 mm					
	37.5 mm					
	26.5 mm					
	19.0 mm					
	13.2 mm					
	4.75 mm		100	100	100	
	2.00 mm		99	97	99	
	0.425 mm		82	86	92	
	0.075 mm		54	69	72	
	*** 0.002 mm**		18	40	37	
SOIL MORTAR	**COARSE SAND**		18	11	7	
	FINE SAND		10 / 11 / 7	6 / 7 / 5	6 / 8 / 6	
	MATERIAL<0.075 mm		54	72	73	
GRADING MODULUS (GM)			0.65	0.48	0.37	
*** pH / CONDUCTIVITY Sm^{-1}**						
ATTERBERG LIMITS ANALYSIS (TMH 1 :1986, Method A2, A3, & A4)						
ATTERBERG LIMITS PASSING SIEVE (mm) >0.425		**L.L**	26	54	51	
		P.I. / L.S.	13 / 6.0	27 / 12.4	24 / 10.4	
POTENTIAL EXPANSIVENESS (mm)			Low	High / 16.0mm	Medium / 15.0mm	
MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT, CALIFORNIA BEARING RATIO ANALYSIS (TMH 1 :1986, Method A7 & A8)						
UNCONFINED COMPRESSIVE STRENGTH & INDIRECT TENSILE STRENGTH OF STABILISED MATERIAL (TMH 1 :1986, Method A14 & A16T)						
CBR / * UCS / ITS DETERMINATION	**MOD AASHTO**	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		COMP MOISTURE (%)				
		DRY DENSITY (kg/m^3)				
		CBR (%) / * UCS / ITS (KPa)				
		SWELL (%)				
	NRB	**DRY DENSITY (kg/m^3)**				
		CBR (%)				
	PROCTOR	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		CBR (%)				
CBR / * UCS / ITS	**100%**					
	98%					
	95%					
	93%					
	90%					

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

MATERIAL ANALYSIS

HOLE No. / KM			**TP29**			
MATERIAL DEPTH (mm)			0-850	+850		
SAMPLE / LAB. No.			**NS**	**NS**		
MATERIAL DESCRIPTION *** IN SITU FIELD MOISTURE (%)**			Slightly moist brown stiff sandy clay	Soft rock / Olive mudstone		
AASHTO CLASSIFICATION						
UNIFIED SOIL CLASSIFICATION						
TRH14 / * COLTO CLASSIFICATION						
SIEVE ANALYSIS, PERCENTAGE OF MATERIAL PASSING 0.075 mm SIEVE (TMH 1 :1986, Method A1 (a), A5) - % PASSING SIEVES						
SIEVE ANALYSIS	**63.0 mm**					
	53.0 mm					
	37.5 mm					
	26.5 mm					
	19.0 mm					
	13.2 mm					
	4.75 mm					
	2.00 mm					
	0.425 mm					
	0.075 mm					
	*** 0.002 mm**					
SOIL MORTAR	**COARSE SAND**					
	FINE SAND					
	MATERIAL<0.075 mm					
GRADING MODULUS (GM)						
*** pH / CONDUCTIVITY Sm^{-1}**						
ATTERBERG LIMITS ANALYSIS (TMH 1 :1986, Method A2, A3, & A4)						
ATTERBERG LIMITS PASSING SIEVE (mm) >0.425		**L.L**				
		P.I. / L.S.				
POTENTIAL EXPANSIVENESS (mm)			Low			
MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT, CALIFORNIA BEARING RATIO ANALYSIS (TMH 1 :1986, Method A7 & A8) **UNCONFINED COMPRESSIVE STRENGTH & INDIRECT TENSILE STRENGTH OF STABILISED MATERIAL (TMH 1 :1986, Method A14 & A16T)**						
CBR / * UCS / ITS DETERMINATION	**MOD AASHTO**	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		COMP MOISTURE (%)				
		DRY DENSITY (kg/m^3)				
		CBR (%) / * UCS / ITS (KPa)				
		SWELL (%)				
	NRB	**DRY DENSITY (kg/m^3)**				
		CBR (%)				
	PROCTOR	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		CBR (%)				
CBR / * UCS / ITS	**100%**					
	98%					
	95%					
	93%					
	90%					

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

MATERIAL ANALYSIS

HOLE No. / KM			**TP30**			
MATERIAL DEPTH (mm)			0-300	300-600	600-1400	+1400
SAMPLE / LAB. No.			**NS**	**VD23 012/3594**	**VD24 012/3595**	**NS**
MATERIAL DESCRIPTION			Slightly moist brown dense clayey sand	Slightly moist orange brown stiff sandy clay	Slightly moist yellow stiff clay and ferricrete	Soft rock / Yellow sandstone
*** IN SITU FIELD MOISTURE (%)**				21.6	13.8	
AASHTO CLASSIFICATION						
UNIFIED SOIL CLASSIFICATION						
TRH14 / * COLTO CLASSIFICATION						
SIEVE ANALYSIS, PERCENTAGE OF MATERIAL PASSING 0.075 mm SIEVE (TMH 1 :1986, Method A1 (a), A5) - % PASSING SIEVES						
SIEVE ANALYSIS	**63.0 mm**					
	53.0 mm					
	37.5 mm					
	26.5 mm					
	19.0 mm					
	13.2 mm				100	
	4.75 mm			100	98	
	2.00 mm			99	93	
	0.425 mm			90	83	
	0.075 mm			67	64	
	*** 0.002 mm**			38	33	
SOIL MORTAR	**COARSE SAND**			9	11	
	FINE SAND			7 / 9 / 7	6 / 7 / 7	
	MATERIAL<0.075 mm			68	69	
GRADING MODULUS (GM)				0.44	0.60	
*** pH / CONDUCTIVITY Sm^{-1}**				8.64 / 0.2529	8.03 / 0.2626	
ATTERBERG LIMITS ANALYSIS (TMH 1 :1986, Method A2, A3, & A4)						
ATTERBERG LIMITS PASSING SIEVE (mm) >0.425		**L.L**		49	41	
		P.I. / L.S.		26 / 11.7	15 / 10.4	
POTENTIAL EXPANSIVENESS (mm)			Low	High / 10.0mm	Low	
MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT, CALIFORNIA BEARING RATIO ANALYSIS (TMH 1 :1986, Method A7 & A8)						
UNCONFINED COMPRESSIVE STRENGTH & INDIRECT TENSILE STRENGTH OF STABILISED MATERIAL (TMH 1 :1986, Method A14 & A16T)						
CBR / * UCS / ITS DETERMINATION	**MOD AASHTO**	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		COMP MOISTURE (%)				
		DRY DENSITY (kg/m^3)				
		CBR (%) / * UCS / ITS (KPa)				
		SWELL (%)				
	NRB	**DRY DENSITY (kg/m^3)**				
		CBR (%)				
	PROCTOR	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		CBR (%)				
CBR / * UCS / ITS	**100%**					
	98%					
	95%					
	93%					
	90%					

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

MATERIAL ANALYSIS

HOLE No. / KM			**TP31**			
MATERIAL DEPTH (mm)			0-500	500-1000	+1000	
SAMPLE / LAB. No.			**NS**	**NS**	**NS**	
MATERIAL DESCRIPTION *** IN SITU FIELD MOISTURE (%)**			Slightly moist brown dense clayey sand	Slightly moist orange brown stiff sandy clay	Soft rock / Olive mudstone	
AASHTO CLASSIFICATION						
UNIFIED SOIL CLASSIFICATION						
TRH14 / * COLTO CLASSIFICATION						
SIEVE ANALYSIS, PERCENTAGE OF MATERIAL PASSING 0.075 mm SIEVE (TMH 1 :1986, Method A1 (a), A5) - % PASSING SIEVES						
SIEVE ANALYSIS	**63.0 mm**					
	53.0 mm					
	37.5 mm					
	26.5 mm					
	19.0 mm					
	13.2 mm					
	4.75 mm					
	2.00 mm					
	0.425 mm					
	0.075 mm					
	*** 0.002 mm**					
SOIL MORTAR	**COARSE SAND**					
	FINE SAND					
	MATERIAL<0.075 mm					
GRADING MODULUS (GM)						
*** pH / CONDUCTIVITY Sm^{-1}**						
ATTERBERG LIMITS ANALYSIS (TMH 1 :1986, Method A2, A3, & A4)						
ATTERBERG LIMITS PASSING SIEVE (mm) >0.425		**L.L**				
		P.I. / L.S.				
POTENTIAL EXPANSIVENESS (mm)			Low	Medium / 5.8mm		
MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT, CALIFORNIA BEARING RATIO ANALYSIS (TMH 1 :1986, Method A7 & A8) **UNCONFINED COMPRESSIVE STRENGTH & INDIRECT TENSILE STRENGTH OF STABILISED MATERIAL (TMH 1 :1986, Method A14 & A16T)**						
CBR / * UCS / ITS DETERMINATION	**MOD AASHTO**	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		COMP MOISTURE (%)				
		DRY DENSITY (kg/m^3)				
		CBR (%) / * UCS / ITS (KPa)				
		SWELL (%)				
	NRB	**DRY DENSITY (kg/m^3)**				
		CBR (%)				
	PROCTOR	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		CBR (%)				
CBR / * UCS / ITS	**100%**					
	98%					
	95%					
	93%					
	90%					

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

MATERIAL ANALYSIS

HOLE No. / KM			**TP32**			
MATERIAL DEPTH (mm)			0-300	300-1000	1000-1900	+1900
SAMPLE / LAB. No.			**NS**	**VD25 012/3596**	**VD26 012/3597**	**NS**
MATERIAL DESCRIPTION			Slightly moist brown dense clayey sand	Slightly moist orange brown stiff sandy clay	Slightly moist olive stiff sandy clay	Soft rock / Yellow sandstone
*** IN SITU FIELD MOISTURE (%)**				22.6	23.5	
AASHTO CLASSIFICATION						
UNIFIED SOIL CLASSIFICATION						
TRH14 / * COLTO CLASSIFICATION						
SIEVE ANALYSIS, PERCENTAGE OF MATERIAL PASSING 0.075 mm SIEVE (TMH 1 :1986, Method A1 (a), A5) - % PASSING SIEVES						
SIEVE ANALYSIS		**63.0 mm**				
		53.0 mm				
		37.5 mm				
		26.5 mm				
		19.0 mm				
		13.2 mm		100	100	
		4.75 mm		98	98	
		2.00 mm		97	90	
		0.425 mm		89	75	
		0.075 mm		74	58	
		*** 0.002 mm**		41	38	
SOIL MORTAR		**COARSE SAND**		8	17	
		FINE SAND		1 / 8 / 7	5 / 8 / 6	
		MATERIAL<0.075 mm		76	64	
GRADING MODULUS (GM)				0.41	0.77	
*** pH / CONDUCTIVITY Sm^{-1}**						
ATTERBERG LIMITS ANALYSIS (TMH 1 :1986, Method A2, A3, & A4)						
ATTERBERG LIMITS PASSING SIEVE (mm) >0.425		**L.L**		44	57	
		P.I. / L.S.		20 / 9.7	25 / 12.0	
POTENTIAL EXPANSIVENESS (mm)			Low	Low	Medium / 9.5mm	
MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT, CALIFORNIA BEARING RATIO ANALYSIS (TMH 1 :1986, Method A7 & A8)						
UNCONFINED COMPRESSIVE STRENGTH & INDIRECT TENSILE STRENGTH OF STABILISED MATERIAL (TMH 1 :1986, Method A14 & A16T)						
CBR / * UCS / ITS DETERMINATION	MOD AASHTO	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		COMP MOISTURE (%)				
		DRY DENSITY (kg/m^3)				
		CBR (%) / * UCS / ITS (KPa)				
		SWELL (%)				
	NRB	**DRY DENSITY (kg/m^3)**				
		CBR (%)				
	PROCTOR	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		CBR (%)				
CBR / * UCS / ITS		**100%**				
		98%				
		95%				
		93%				
		90%				

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

MATERIAL ANALYSIS

HOLE No. / KM			**TP33**			
MATERIAL DEPTH (mm)			0-600	600-1300	+1300	
SAMPLE / LAB. No.			**VD27 012/3598**	**VD28 012/3599**	**NS**	
MATERIAL DESCRIPTION			Slightly moist brown dense clayey sand	Slightly moist orange dense ferricrete	Soft rock / Yellow sandstone	
*** IN SITU FIELD MOISTURE (%)**			13.6	20.6		
AASHTO CLASSIFICATION						
UNIFIED SOIL CLASSIFICATION						
TRH14 / * COLTO CLASSIFICATION			**NC**			
SIEVE ANALYSIS, PERCENTAGE OF MATERIAL PASSING 0.075 mm SIEVE (TMH 1 :1986, Method A1 (a), A5) - % PASSING SIEVES						
SIEVE ANALYSIS	**63.0 mm**					
	53.0 mm					
	37.5 mm					
	26.5 mm					
	19.0 mm					
	13.2 mm			100		
	4.75 mm			89		
	2.00 mm		100	73		
	0.425 mm		83	69		
	0.075 mm		50	44		
	*** 0.002 mm**		20	15		
SOIL MORTAR	**COARSE SAND**		17	5		
	FINE SAND		10 / 13 / 10	8 / 14 / 13		
	MATERIAL<0.075 mm		50	60		
GRADING MODULUS (GM)			0.67	0.95		
*** pH / CONDUCTIVITY Sm^{-1}**			8.11 / 0.2042	6.15 / 0.2042		
ATTERBERG LIMITS ANALYSIS (TMH 1 :1986, Method A2, A3, & A4)						
ATTERBERG LIMITS PASSING SIEVE (mm) >0.425	**L.L**		25	32		
	P.I. / L.S.		12 / 5.7	18 / 7.5		
POTENTIAL EXPANSIVENESS (mm)			Low	Medium / 8.7mm		
MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT, CALIFORNIA BEARING RATIO ANALYSIS (TMH 1 :1986, Method A7 & A8)						
UNCONFINED COMPRESSIVE STRENGTH & INDIRECT TENSILE STRENGTH OF STABILISED MATERIAL (TMH 1 :1986, Method A14 & A16T)						
CBR / * UCS / ITS DETERMINATION	**MOD AASHTO**	**MAX DRY DENSITY (kg/m^3)**	1928			
		OPT MOISTURE (%)	10.3			
		COMP MOISTURE (%)	10.3			
		DRY DENSITY (kg/m^3)	1928			
		CBR (%) / * UCS / ITS (KPa)	36			
		SWELL (%)	0.0			
	NRB	**DRY DENSITY (kg/m^3)**	1849			
		CBR (%)	23			
	PROCTOR	**MAX DRY DENSITY (kg/m^3)**	1719			
		OPT MOISTURE (%)	-			
		CBR (%)	11			
CBR / * UCS / ITS	**100%**		36			
	98%		29			
	95%		21			
	93%		17			
	90%		12			

REG. No. 1987/004282/07
Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
SAASIL/SAACEL No. 208
T0455
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

MATERIAL ANALYSIS

HOLE No. / KM			**TP34**			
MATERIAL DEPTH (mm)			0-400	400-700	+700	
SAMPLE / LAB. No.			**NS**	**NS**	**NS**	
MATERIAL DESCRIPTION *** IN SITU FIELD MOISTURE (%)**			Slightly moist brown dense clayey sand	Slightly moist orange dense ferricrete	Soft rock / Olive mudstone	
AASHTO CLASSIFICATION						
UNIFIED SOIL CLASSIFICATION						
TRH14 / * COLTO CLASSIFICATION						
SIEVE ANALYSIS, PERCENTAGE OF MATERIAL PASSING 0.075 mm SIEVE (TMH 1 :1986, Method A1 (a), A5) - % PASSING SIEVES						
SIEVE ANALYSIS	**63.0 mm**					
	53.0 mm					
	37.5 mm					
	26.5 mm					
	19.0 mm					
	13.2 mm					
	4.75 mm					
	2.00 mm					
	0.425 mm					
	0.075 mm					
	*** 0.002 mm**					
SOIL MORTAR	**COARSE SAND**					
	FINE SAND					
	MATERIAL<0.075 mm					
GRADING MODULUS (GM)						
*** pH / CONDUCTIVITY Sm^{-1}**						
ATTERBERG LIMITS ANALYSIS (TMH 1 :1986, Method A2, A3, & A4)						
ATTERBERG LIMITS PASSING SIEVE (mm) >0.425		**L.L**				
		P.I. / L.S.				
POTENTIAL EXPANSIVENESS (mm)			Low	Medium / 4.8mm		
MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT, CALIFORNIA BEARING RATIO ANALYSIS (TMH 1 :1986, Method A7 & A8) **UNCONFINED COMPRESSIVE STRENGTH & INDIRECT TENSILE STRENGTH OF STABILISED MATERIAL (TMH 1 :1986, Method A14 & A16T)**						
CBR / * UCS / ITS DETERMINATION	MOD AASHTO	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		COMP MOISTURE (%)				
		DRY DENSITY (kg/m^3)				
		CBR (%) / * UCS / ITS (KPa)				
		SWELL (%)				
	NRB	**DRY DENSITY (kg/m^3)**				
		CBR (%)				
	PROCTOR	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		CBR (%)				
CBR / * UCS / ITS	**100%**					
	98%					
	95%					
	93%					
	90%					

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

MATERIAL ANALYSIS

HOLE No. / KM			**TP35**			
MATERIAL DEPTH (mm)			0-400	400-1000	+1000	
SAMPLE / LAB. No.			**NS**	**VD29 012/3600**	**NS**	
MATERIAL DESCRIPTION			Slightly moist brown dense clayey sand	Slightly moist orange firm ferricrete	Soft rock / Olive mudstone	
*** IN SITU FIELD MOISTURE (%)**				20.3		
AASHTO CLASSIFICATION						
UNIFIED SOIL CLASSIFICATION						
TRH14 / * COLTO CLASSIFICATION						
SIEVE ANALYSIS, PERCENTAGE OF MATERIAL PASSING 0.075 mm SIEVE (TMH 1 :1986, Method A1 (a), A5) - % PASSING SIEVES						
SIEVE ANALYSIS	**63.0 mm**					
	53.0 mm					
	37.5 mm					
	26.5 mm					
	19.0 mm					
	13.2 mm					
	4.75 mm			100		
	2.00 mm			98		
	0.425 mm			85		
	0.075 mm			64		
	*** 0.002 mm**			34		
SOIL MORTAR	**COARSE SAND**			13		
	FINE SAND			6 / 8 / 8		
	MATERIAL<0.075 mm			65		
GRADING MODULUS (GM)				0.53		
*** pH / CONDUCTIVITY Sm^{-1}**				7.19 / 0.1653		
ATTERBERG LIMITS ANALYSIS (TMH 1 :1986, Method A2, A3, & A4)						
ATTERBERG LIMITS PASSING SIEVE (mm) >0.425	**L.L**			34		
	P.I. / L.S.			16 / 8.1		
POTENTIAL EXPANSIVENESS (mm)			Low	Low		
MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT, CALIFORNIA BEARING RATIO ANALYSIS (TMH 1 :1986, Method A7 & A8)						
UNCONFINED COMPRESSIVE STRENGTH & INDIRECT TENSILE STRENGTH OF STABILISED MATERIAL (TMH 1 :1986, Method A14 & A16T)						
CBR / * UCS / ITS DETERMINATION	MOD AASHTO	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		COMP MOISTURE (%)				
		DRY DENSITY (kg/m^3)				
		CBR (%) / * UCS / ITS (KPa)				
		SWELL (%)				
	NRB	**DRY DENSITY (kg/m^3)**				
		CBR (%)				
	PROCTOR	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		CBR (%)				
CBR / * UCS / ITS	**100%**					
	98%					
	95%					
	93%					
	90%					

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

MATERIAL ANALYSIS

HOLE No. / KM			**TP36**			
MATERIAL DEPTH (mm)			0-300	300-700	700-1000	+1000
SAMPLE / LAB. No.			**NS**	**VD30 012/3601**	**VD31 012/3602**	**NS**
MATERIAL DESCRIPTION			Slightly moist brown dense clayey sand	Slightly moist dark brown stiff clay	Slightly moist olive stiff clay	Soft rock / Olive mudstone
*** IN SITU FIELD MOISTURE (%)**				19.8	20.3	
AASHTO CLASSIFICATION						
UNIFIED SOIL CLASSIFICATION						
TRH14 / * COLTO CLASSIFICATION						
SIEVE ANALYSIS, PERCENTAGE OF MATERIAL PASSING 0.075 mm SIEVE (TMH 1 :1986, Method A1 (a), A5) - % PASSING SIEVES						
SIEVE ANALYSIS	**63.0 mm**					
	53.0 mm					
	37.5 mm					
	26.5 mm					
	19.0 mm					
	13.2 mm			100	100	
	4.75 mm			99	99	
	2.00 mm			91	93	
	0.425 mm			90	84	
	0.075 mm			70	71	
	*** 0.002 mm**			40	42	
SOIL MORTAR	**COARSE SAND**			1	10	
	FINE SAND			'7 / 9 / 6	4 / 4 / 5	
	MATERIAL<0.075 mm			77	77	
GRADING MODULUS (GM)				0.49	0.80	
*** pH / CONDUCTIVITY Sm^{-1}**					7.04 / 0.3404	
ATTERBERG LIMITS ANALYSIS (TMH 1 :1986, Method A2, A3, & A4)						
ATTERBERG LIMITS PASSING SIEVE (mm) >0.425		**L.L**		46	46	
		P.I. / L.S.		22 / 10.7	22 / 10.7	
POTENTIAL EXPANSIVENESS (mm)			Low	Medium / 6.4mm	Low	
MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT, CALIFORNIA BEARING RATIO ANALYSIS (TMH 1 :1986, Method A7 & A8) UNCONFINED COMPRESSIVE STRENGTH & INDIRECT TENSILE STRENGTH OF STABILISED MATERIAL (TMH 1 :1986, Method A14 & A16T)						
CBR / * UCS / ITS DETERMINATION	**MOD AASHTO**	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		COMP MOISTURE (%)				
		DRY DENSITY (kg/m^3)				
		CBR (%) / * UCS / ITS (KPa)				
		SWELL (%)				
	NRB	**DRY DENSITY (kg/m^3)**				
		CBR (%)				
	PROCTOR	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		CBR (%)				
CBR / * UCS / ITS	**100%**					
	98%					
	95%					
	93%					
	90%					

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

MATERIAL ANALYSIS

HOLE No. / KM			**TP37**			
MATERIAL DEPTH (mm)			0-400	400-900	900-2300	+2300
SAMPLE / LAB. No.			**NS**	**VD32 012/3603**	**VD33 012/3604**	**NS**
MATERIAL DESCRIPTION			Slightly moist brown dense clayey sand	Slightly moist dark brown stiff clay	Slightly moist olive stiff clay	Slightly moist olive stiff clay Refusal
*** IN SITU FIELD MOISTURE (%)**				19.0	19.9	
AASHTO CLASSIFICATION						
UNIFIED SOIL CLASSIFICATION						
TRH14 / * COLTO CLASSIFICATION						
SIEVE ANALYSIS, PERCENTAGE OF MATERIAL PASSING 0.075 mm SIEVE (TMH 1 :1986, Method A1 (a), A5) - % PASSING SIEVES						
SIEVE ANALYSIS	**63.0 mm**					
	53.0 mm					
	37.5 mm					
	26.5 mm					
	19.0 mm					
	13.2 mm				100	
	4.75 mm				99	
	2.00 mm			100	98	
	0.425 mm			90	92	
	0.075 mm			66	78	
	*** 0.002 mm**			31	33	
SOIL MORTAR	**COARSE SAND**			10	6	
	FINE SAND			7 / 8 / 9	3 / 4 / 7	
	MATERIAL<0.075 mm			66	80	
GRADING MODULUS (GM)				0.44	0.33	
*** pH / CONDUCTIVITY Sm^{-1}**						
ATTERBERG LIMITS ANALYSIS (TMH 1 :1986, Method A2, A3, & A4)						
ATTERBERG LIMITS PASSING SIEVE (mm) >0.425		**L.L**		35	43	
		P.I. / L.S.		21 / 9.5	16 / 7.9	
POTENTIAL EXPANSIVENESS (mm)			Low	Medium / 7.3mm	Low	
MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT, CALIFORNIA BEARING RATIO ANALYSIS (TMH 1 :1986, Method A7 & A8)						
UNCONFINED COMPRESSIVE STRENGTH & INDIRECT TENSILE STRENGTH OF STABILISED MATERIAL (TMH 1 :1986, Method A14 & A16T)						
CBR / * UCS / ITS DETERMINATION	**MOD AASHTO**	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		COMP MOISTURE (%)				
		DRY DENSITY (kg/m^3)				
		CBR (%) / * UCS / ITS (KPa)				
		SWELL (%)				
	NRB	**DRY DENSITY (kg/m^3)**				
		CBR (%)				
	PROCTOR	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		CBR (%)				
CBR / * UCS / ITS	**100%**					
	98%					
	95%					
	93%					
	90%					

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

MATERIAL ANALYSIS

HOLE No. / KM		**TP38**			
MATERIAL DEPTH (mm)		0-300	300-800	800-1700	+1700
SAMPLE / LAB. No.		**NS**	**NS**	**NS**	**NS**
MATERIAL DESCRIPTION *** IN SITU FIELD MOISTURE (%)**		Slightly moist brown dense clayey sand	Slightly moist dark brown stiff clay	Slightly moist olive stiff clay	Soft rock / Yellow sandstone
AASHTO CLASSIFICATION					
UNIFIED SOIL CLASSIFICATION					
TRH14 / * COLTO CLASSIFICATION					
SIEVE ANALYSIS, PERCENTAGE OF MATERIAL PASSING 0.075 mm SIEVE (TMH 1 :1986, Method A1 (a), A5) - % PASSING SIEVES					
SIEVE ANALYSIS	**63.0 mm**				
	53.0 mm				
	37.5 mm				
	26.5 mm				
	19.0 mm				
	13.2 mm				
	4.75 mm				
	2.00 mm				
	0.425 mm				
	0.075 mm				
	*** 0.002 mm**				
SOIL MORTAR	**COARSE SAND**				
	FINE SAND				
	MATERIAL<0.075 mm				
GRADING MODULUS (GM)					
*** pH / CONDUCTIVITY Sm^{-1}**					
ATTERBERG LIMITS ANALYSIS (TMH 1 :1986, Method A2, A3, & A4)					
ATTERBERG LIMITS PASSING SIEVE (mm) >0.425	**L.L**				
	P.I. / L.S.				
POTENTIAL EXPANSIVENESS (mm)		Low	Medium / 7.5mm	Medium / 10.0mm	
MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT, CALIFORNIA BEARING RATIO ANALYSIS (TMH 1 :1986, Method A7 & A8)					
UNCONFINED COMPRESSIVE STRENGTH & INDIRECT TENSILE STRENGTH OF STABILISED MATERIAL (TMH 1 :1986, Method A14 & A16T)					
CBR / * UCS / ITS DETERMINATION	**MOD AASHTO**	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		COMP MOISTURE (%)				
		DRY DENSITY (kg/m^3)				
		CBR (%) / * UCS / ITS (KPa)				
		SWELL (%)				
	NRB	**DRY DENSITY (kg/m^3)**				
		CBR (%)				
	PROCTOR	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		CBR (%)				
CBR / * UCS / ITS	**100%**				
	98%				
	95%				
	93%				
	90%				

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

MATERIAL ANALYSIS

HOLE No. / KM			**TP39**			
MATERIAL DEPTH (mm)			0-500	500-1000	1000-2000	+2000
SAMPLE / LAB. No.			**NS**	**VD34 012/3605**	**VD35 012/3606**	**NS**
MATERIAL DESCRIPTION			Slightly moist brown dense clayey sand	Slightly moist dark brown stiff clay	Slightly moist olive stiff clay	Soft rock / Yellow sandstone
*** IN SITU FIELD MOISTURE (%)**				22.6	27.8	
AASHTO CLASSIFICATION						
UNIFIED SOIL CLASSIFICATION						
TRH14 / * COLTO CLASSIFICATION						
SIEVE ANALYSIS, PERCENTAGE OF MATERIAL PASSING 0.075 mm SIEVE (TMH 1 :1986, Method A1 (a), A5) - % PASSING SIEVES						
SIEVE ANALYSIS	**63.0 mm**					
	53.0 mm					
	37.5 mm					
	26.5 mm					
	19.0 mm					
	13.2 mm					
	4.75 mm			100	100	
	2.00 mm			99	99	
	0.425 mm			88	89	
	0.075 mm			65	67	
	*** 0.002 mm**			35	37	
SOIL MORTAR	**COARSE SAND**			11	10	
	FINE SAND			6 / 7 / 10	7 / 7 / 8	
	MATERIAL<0.075 mm			65	68	
GRADING MODULUS (GM)				0.48	0.45	
*** pH / CONDUCTIVITY Sm^{-1}**						
ATTERBERG LIMITS ANALYSIS (TMH 1 :1986, Method A2, A3, & A4)						
ATTERBERG LIMITS PASSING SIEVE (mm) >0.425		**L.L**		40	42	
		P.I. / L.S.		17 / 7.9	20 / 10.1	
POTENTIAL EXPANSIVENESS (mm)			Low	Low	Medium / 10.4mm	
MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT, CALIFORNIA BEARING RATIO ANALYSIS (TMH 1 :1986, Method A7 & A8)						
UNCONFINED COMPRESSIVE STRENGTH & INDIRECT TENSILE STRENGTH OF STABILISED MATERIAL (TMH 1 :1986, Method A14 & A16T)						
CBR / * UCS / ITS DETERMINATION	MOD AASHTO	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		COMP MOISTURE (%)				
		DRY DENSITY (kg/m^3)				
		CBR (%) / * UCS / ITS (KPa)				
		SWELL (%)				
	NRB	**DRY DENSITY (kg/m^3)**				
		CBR (%)				
	PROCTOR	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		CBR (%)				
CBR / * UCS / ITS	**100%**					
	98%					
	95%					
	93%					
	90%					

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

MATERIAL ANALYSIS

HOLE No. / KM			**TP40**			
MATERIAL DEPTH (mm)			0-400	400-1000	+1000	
SAMPLE / LAB. No.			**NS**	**VD36 012/3607**	**NS**	
MATERIAL DESCRIPTION			Slightly moist brown dense clayey sand	Slightly moist orange firm sandy clay	Soft rock / Olive mudstone	
*** IN SITU FIELD MOISTURE (%)**				18.1		
AASHTO CLASSIFICATION						
UNIFIED SOIL CLASSIFICATION						
TRH14 / * COLTO CLASSIFICATION						
SIEVE ANALYSIS, PERCENTAGE OF MATERIAL PASSING 0.075 mm SIEVE (TMH 1 :1986, Method A1 (a), A5) - % PASSING SIEVES						
SIEVE ANALYSIS	**63.0 mm**					
	53.0 mm					
	37.5 mm					
	26.5 mm					
	19.0 mm					
	13.2 mm			100		
	4.75 mm			99		
	2.00 mm			97		
	0.425 mm			78		
	0.075 mm			51		
	*** 0.002 mm**			22		
SOIL MORTAR	**COARSE SAND**			18		
	FINE SAND			9 / 10 / 10		
	MATERIAL<0.075 mm			53		
GRADING MODULUS (GM)				0.72		
*** pH / CONDUCTIVITY Sm^{-1}**				5.83 / 0.1945		
ATTERBERG LIMITS ANALYSIS (TMH 1 :1986, Method A2, A3, & A4)						
ATTERBERG LIMITS PASSING SIEVE (mm) >0.425	**L.L**			30		
	P.I. / L.S.			12 / 6.4		
POTENTIAL EXPANSIVENESS (mm)			Low	Low		
MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT, CALIFORNIA BEARING RATIO ANALYSIS (TMH 1 :1986, Method A7 & A8) UNCONFINED COMPRESSIVE STRENGTH & INDIRECT TENSILE STRENGTH OF STABILISED MATERIAL (TMH 1 :1986, Method A14 & A16T)						
CBR / * UCS / ITS DETERMINATION	**MOD AASHTO**	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		COMP MOISTURE (%)				
		DRY DENSITY (kg/m^3)				
		CBR (%) / * UCS / ITS (KPa)				
		SWELL (%)				
	NRB	**DRY DENSITY (kg/m^3)**				
		CBR (%)				
	PROCTOR	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		CBR (%)				
CBR / * UCS / ITS	**100%**					
	98%					
	95%					
	93%					
	90%					

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

MATERIAL ANALYSIS

HOLE No. / KM			**TP41**			
MATERIAL DEPTH (mm)			0-600	600-1200	+1200	
SAMPLE / LAB. No.			**VD37 012/3608**	**VD38 012/3609**	**NS**	
MATERIAL DESCRIPTION			Slightly moist brown stiff sandy clay	Slightly moist yellow olive stiff sandy clay	Soft rock / Yellow sandstone	
*** IN SITU FIELD MOISTURE (%)**			14.7	15.4		
AASHTO CLASSIFICATION						
UNIFIED SOIL CLASSIFICATION						
TRH14 / * COLTO CLASSIFICATION						
SIEVE ANALYSIS, PERCENTAGE OF MATERIAL PASSING 0.075 mm SIEVE (TMH 1 :1986, Method A1 (a), A5) - % PASSING SIEVES						
SIEVE ANALYSIS	**63.0 mm**					
	53.0 mm					
	37.5 mm					
	26.5 mm					
	19.0 mm					
	13.2 mm					
	4.75 mm		100	100		
	2.00 mm		99	99		
	0.425 mm		88	91		
	0.075 mm		57	67		
	*** 0.002 mm**		23	33		
SOIL MORTAR	**COARSE SAND**		11	9		
	FINE SAND		8 / 10 / 13	5 / 8 / 11		
	MATERIAL<0.075 mm		57	67		
GRADING MODULUS (GM)			0.57	0.44		
*** pH / CONDUCTIVITY Sm^{-1}**						
ATTERBERG LIMITS ANALYSIS (TMH 1 :1986, Method A2, A3, & A4)						
ATTERBERG LIMITS PASSING SIEVE (mm) >0.425		**L.L**	27	37		
		P.I. / L.S.	15 / 6.9	19 / 9.0		
POTENTIAL EXPANSIVENESS (mm)			Medium / 9.5mm	Medium / 7.8mm		
MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT, CALIFORNIA BEARING RATIO ANALYSIS (TMH 1 :1986, Method A7 & A8) UNCONFINED COMPRESSIVE STRENGTH & INDIRECT TENSILE STRENGTH OF STABILISED MATERIAL (TMH 1 :1986, Method A14 & A16T)						
CBR / * UCS / ITS DETERMINATION	**MOD AASHTO**	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		COMP MOISTURE (%)				
		DRY DENSITY (kg/m^3)				
		CBR (%) / * UCS / ITS (KPa)				
		SWELL (%)				
	NRB	**DRY DENSITY (kg/m^3)**				
		CBR (%)				
	PROCTOR	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		CBR (%)				
CBR / * UCS / ITS	**100%**					
	98%					
	95%					
	93%					
	90%					

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

MATERIAL ANALYSIS

HOLE No. / KM			**TP42**			
MATERIAL DEPTH (mm)			0-400	400-1000	1000-3000	+3000
SAMPLE / LAB. No.			**NS**	**VD39 012/3610**	**VD40 012/3611**	**NS**
MATERIAL DESCRIPTION			Slightly moist brown dense clayey sand	Slightly moist dark brown stiff clay	Slightly moist olive stiff clay	Slightly moist olive stiff clay
*** IN SITU FIELD MOISTURE (%)**				18.0	26.8	
AASHTO CLASSIFICATION						
UNIFIED SOIL CLASSIFICATION						
TRH14 / * COLTO CLASSIFICATION						
SIEVE ANALYSIS, PERCENTAGE OF MATERIAL PASSING 0.075 mm SIEVE (TMH 1 :1986, Method A1 (a), A5) - % PASSING SIEVES						
SIEVE ANALYSIS	**63.0 mm**					
	53.0 mm					
	37.5 mm					
	26.5 mm					
	19.0 mm					
	13.2 mm				100	
	4.75 mm			100	99	
	2.00 mm			99	95	
	0.425 mm			85	86	
	0.075 mm			67	59	
	*** 0.002 mm**			29	26	
SOIL MORTAR	**COARSE SAND**			14	9	
	FINE SAND			6 / 6 / 7	8 / 9 / 11	
	MATERIAL<0.075 mm			67	62	
GRADING MODULUS (GM)				0.48	0.60	
*** pH / CONDUCTIVITY Sm^{-1}**						
ATTERBERG LIMITS ANALYSIS (TMH 1 :1986, Method A2, A3, & A4)						
ATTERBERG LIMITS PASSING SIEVE (mm) >0.425		**L.L**		41	33	
		P.I. / L.S.		20 / 10.3	18 / 8.8	
POTENTIAL EXPANSIVENESS (mm)			Low	Medium / 8.3mm	Medium / 19.0mm	
MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT, CALIFORNIA BEARING RATIO ANALYSIS (TMH 1 :1986, Method A7 & A8)						
UNCONFINED COMPRESSIVE STRENGTH & INDIRECT TENSILE STRENGTH OF STABILISED MATERIAL (TMH 1 :1986, Method A14 & A16T)						
CBR / * UCS / ITS DETERMINATION	MOD AASHTO	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		COMP MOISTURE (%)				
		DRY DENSITY (kg/m^3)				
		CBR (%) / * UCS / ITS (KPa)				
		SWELL (%)				
	NRB	**DRY DENSITY (kg/m^3)**				
		CBR (%)				
	PROCTOR	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		CBR (%)				
CBR / * UCS / ITS	**100%**					
	98%					
	95%					
	93%					
	90%					

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

MATERIAL ANALYSIS

HOLE No. / KM			**TP43**	**TP44**		
MATERIAL DEPTH (mm)			-	-		
SAMPLE / LAB. No.			**NS**	**NS**		
MATERIAL DESCRIPTION *** IN SITU FIELD MOISTURE (%)**			Marshy conditions	Dam		
AASHTO CLASSIFICATION						
UNIFIED SOIL CLASSIFICATION						
TRH14 / * COLTO CLASSIFICATION						
SIEVE ANALYSIS, PERCENTAGE OF MATERIAL PASSING 0.075 mm SIEVE (TMH 1 :1986, Method A1 (a), A5) - % PASSING SIEVES						
SIEVE ANALYSIS	**63.0 mm**					
	53.0 mm					
	37.5 mm					
	26.5 mm					
	19.0 mm					
	13.2 mm					
	4.75 mm					
	2.00 mm					
	0.425 mm					
	0.075 mm					
	*** 0.002 mm**					
SOIL MORTAR	**COARSE SAND**					
	FINE SAND					
	MATERIAL<0.075 mm					
GRADING MODULUS (GM)						
*** pH / CONDUCTIVITY Sm^{-1}**						
ATTERBERG LIMITS ANALYSIS (TMH 1 :1986, Method A2, A3, & A4)						
ATTERBERG LIMITS PASSING SIEVE (mm) >0.425	**L.L**					
	P.I. / L.S.					
POTENTIAL EXPANSIVENESS (mm)						
MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT, CALIFORNIA BEARING RATIO ANALYSIS (TMH 1 :1986, Method A7 & A8)						
UNCONFINED COMPRESSIVE STRENGTH & INDIRECT TENSILE STRENGTH OF STABILISED MATERIAL (TMH 1 :1986, Method A14 & A16T)						
CBR / * UCS / ITS DETERMINATION	**MOD AASHTO**	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		COMP MOISTURE (%)				
		DRY DENSITY (kg/m^3)				
		CBR (%) / * UCS / ITS (KPa)				
		SWELL (%)				
	NRB	**DRY DENSITY (kg/m^3)**				
		CBR (%)				
	PROCTOR	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		CBR (%)				
CBR / * UCS / ITS	**100%**					
	98%					
	95%					
	93%					
	90%					

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

MATERIAL ANALYSIS

HOLE No. / KM			**TP45**			
MATERIAL DEPTH (mm)			0-500	500-1300	+1300	
SAMPLE / LAB. No.			**NS**	**NS**	**NS**	
MATERIAL DESCRIPTION *** IN SITU FIELD MOISTURE (%)**			Slightly moist brown stiff clay	Slightly moist orange brown stiff clay	Soft rock / Yellow sandstone	
AASHTO CLASSIFICATION						
UNIFIED SOIL CLASSIFICATION						
TRH14 / * COLTO CLASSIFICATION						
SIEVE ANALYSIS, PERCENTAGE OF MATERIAL PASSING 0.075 mm SIEVE (TMH 1 :1986, Method A1 (a), A5) - % PASSING SIEVES						
SIEVE ANALYSIS		**63.0 mm**				
		53.0 mm				
		37.5 mm				
		26.5 mm				
		19.0 mm				
		13.2 mm				
		4.75 mm				
		2.00 mm				
		0.425 mm				
		0.075 mm				
		*** 0.002 mm**				
SOIL MORTAR		**COARSE SAND**				
		FINE SAND				
		MATERIAL<0.075 mm				
GRADING MODULUS (GM)						
*** pH / CONDUCTIVITY Sm^{-1}**						
ATTERBERG LIMITS ANALYSIS (TMH 1 :1986, Method A2, A3, & A4)						
ATTERBERG LIMITS PASSING SIEVE (mm) >0.425		**L.L**				
		P.I. / L.S.				
POTENTIAL EXPANSIVENESS (mm)			Medium / 9.0mm	Medium / 10.0mm		
MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT, CALIFORNIA BEARING RATIO ANALYSIS (TMH 1 :1986, Method A7 & A8) **UNCONFINED COMPRESSIVE STRENGTH & INDIRECT TENSILE STRENGTH OF STABILISED MATERIAL (TMH 1 :1986, Method A14 & A16T)**						
CBR / * UCS / ITS DETERMINATION	**MOD AASHTO**	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		COMP MOISTURE (%)				
		DRY DENSITY (kg/m^3)				
		CBR (%) / * UCS / ITS (KPa)				
		SWELL (%)				
	NRB	**DRY DENSITY (kg/m^3)**				
		CBR (%)				
	PROCTOR	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		CBR (%)				
CBR / * UCS / ITS		**100%**				
		98%				
		95%				
		93%				
		90%				

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

MATERIAL ANALYSIS

HOLE No. / KM			**TP46**			
MATERIAL DEPTH (mm)			0-600	600-1500	+1500	
SAMPLE / LAB. No.			**VD41 012/3612**	**VD42 012/3613**	**NS**	
MATERIAL DESCRIPTION			Slightly moist brown stiff clay	Slightly moist orange brown stiff clay	Soft rock / Yellow sandstone	
*** IN SITU FIELD MOISTURE (%)**			19.4	20.9		
AASHTO CLASSIFICATION						
UNIFIED SOIL CLASSIFICATION						
TRH14 / * COLTO CLASSIFICATION						
SIEVE ANALYSIS, PERCENTAGE OF MATERIAL PASSING 0.075 mm SIEVE (TMH 1 :1986, Method A1 (a), A5) - % PASSING SIEVES						
SIEVE ANALYSIS	**63.0 mm**					
	53.0 mm					
	37.5 mm					
	26.5 mm					
	19.0 mm					
	13.2 mm		100			
	4.75 mm		99	100		
	2.00 mm		96	98		
	0.425 mm		83	88		
	0.075 mm		59	69		
	*** 0.002 mm**		27	35		
SOIL MORTAR	**COARSE SAND**		13	10		
	FINE SAND		6 / 8 / 11	5 / 6 / 7		
	MATERIAL<0.075 mm		62	71		
GRADING MODULUS (GM)			0.62	0.45		
*** pH / CONDUCTIVITY Sm^{-1}**				7.52 / 0.3598		
ATTERBERG LIMITS ANALYSIS (TMH 1 :1986, Method A2, A3, & A4)						
ATTERBERG LIMITS PASSING SIEVE (mm) >0.425		**L.L**	36	50		
		P.I. / L.S.	21 / 9.2	24 / 11.0		
POTENTIAL EXPANSIVENESS (mm)			Medium / 9.5mm	Medium / 11.1mm		
MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT, CALIFORNIA BEARING RATIO ANALYSIS (TMH 1 :1986, Method A7 & A8)						
UNCONFINED COMPRESSIVE STRENGTH & INDIRECT TENSILE STRENGTH OF STABILISED MATERIAL (TMH 1 :1986, Method A14 & A16T)						
CBR / * UCS / ITS DETERMINATION	MOD AASHTO	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		COMP MOISTURE (%)				
		DRY DENSITY (kg/m^3)				
		CBR (%) / * UCS / ITS (KPa)				
		SWELL (%)				
	NRB	**DRY DENSITY (kg/m^3)**				
		CBR (%)				
	PROCTOR	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		CBR (%)				
CBR / * UCS / ITS	**100%**					
	98%					
	95%					
	93%					
	90%					

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

MATERIAL ANALYSIS

HOLE No. / KM			**TP47**			
MATERIAL DEPTH (mm)			0-400	400-1000	1000-2200	+2200
SAMPLE / LAB. No.			**NS**	**VD43 012/3614**	**VD44 012/3615**	**NS**
MATERIAL DESCRIPTION			Slightly moist brown dense clayey sand	Slightly moist orange brown stiff clay	Slightly moist grey stiff clay	Soft rock / Grey mudstone
*** IN SITU FIELD MOISTURE (%)**				21.3	21.1	
AASHTO CLASSIFICATION						
UNIFIED SOIL CLASSIFICATION						
TRH14 / * COLTO CLASSIFICATION						
SIEVE ANALYSIS, PERCENTAGE OF MATERIAL PASSING 0.075 mm SIEVE (TMH 1 :1986, Method A1 (a), A5) - % PASSING SIEVES						
SIEVE ANALYSIS	**63.0 mm**					
	53.0 mm					
	37.5 mm					
	26.5 mm					
	19.0 mm					
	13.2 mm					
	4.75 mm				100	
	2.00 mm			100	99	
	0.425 mm			89	88	
	0.075 mm			66	66	
	*** 0.002 mm**			32	28	
SOIL MORTAR	**COARSE SAND**			11	11	
	FINE SAND			7 / 7 / 9	7 / 7 / 9	
	MATERIAL<0.075 mm			67	66	
GRADING MODULUS (GM)				0.46	0.47	
*** pH / CONDUCTIVITY Sm^{-1}**					7.96 / 0.3987	
ATTERBERG LIMITS ANALYSIS (TMH 1 :1986, Method A2, A3, & A4)						
ATTERBERG LIMITS PASSING SIEVE (mm) >0.425		**L.L**		41	46	
		P.I. / L.S.		24 / 11.2	19 / 9.2	
POTENTIAL EXPANSIVENESS (mm)			Low	Medium / 8.3mm	Medium / 12.2mm	
MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT, CALIFORNIA BEARING RATIO ANALYSIS (TMH 1 :1986, Method A7 & A8)						
UNCONFINED COMPRESSIVE STRENGTH & INDIRECT TENSILE STRENGTH OF STABILISED MATERIAL (TMH 1 :1986, Method A14 & A16T)						
CBR / * UCS / ITS DETERMINATION	MOD AASHTO	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		COMP MOISTURE (%)				
		DRY DENSITY (kg/m^3)				
		CBR (%) / * UCS / ITS (KPa)				
		SWELL (%)				
	NRB	**DRY DENSITY (kg/m^3)**				
		CBR (%)				
	PROCTOR	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		CBR (%)				
CBR / * UCS / ITS	**100%**					
	98%					
	95%					
	93%					
	90%					

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

MATERIAL ANALYSIS

HOLE No. / KM			**TP48**			
MATERIAL DEPTH (mm)			0-300	300-600	600-2500	+2500
SAMPLE / LAB. No.			**NS**	**VD45 012/3626**	**VD46 012/3617**	**NS**
MATERIAL DESCRIPTION			Slightly moist brown medium dense clayey sand	Slightly moist brown stiff clay	Slightly moist olive stiff clay	Soft rock / Olive mudstone
*** IN SITU FIELD MOISTURE (%)**				19.0	20.0	
AASHTO CLASSIFICATION						
UNIFIED SOIL CLASSIFICATION						
TRH14 / * COLTO CLASSIFICATION						
SIEVE ANALYSIS, PERCENTAGE OF MATERIAL PASSING 0.075 mm SIEVE (TMH 1 :1986, Method A1 (a), A5) - % PASSING SIEVES						
SIEVE ANALYSIS		**63.0 mm**				
		53.0 mm				
		37.5 mm				
		26.5 mm				
		19.0 mm				
		13.2 mm			100	
		4.75 mm			97	
		2.00 mm		100	95	
		0.425 mm		86	82	
		0.075 mm		59	60	
		*** 0.002 mm**		24	33	
SOIL MORTAR		**COARSE SAND**		14	14	
		FINE SAND		8 / 8 / 10	8 / 7 / 8	
		MATERIAL<0.075 mm		59	63	
GRADING MODULUS (GM)				0.56	0.64	
*** pH / CONDUCTIVITY Sm^{-1}**					7.60 / 0.3696	
ATTERBERG LIMITS ANALYSIS (TMH 1 :1986, Method A2, A3, & A4)						
ATTERBERG LIMITS PASSING SIEVE (mm) >0.425		**L.L**		39	52	
		P.I. / L.S.		20 / 9.0	24 / 10.9	
POTENTIAL EXPANSIVENESS (mm)			Low	Medium / 5.0mm	Medium / 21.0mm	
MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT, CALIFORNIA BEARING RATIO ANALYSIS (TMH 1 :1986, Method A7 & A8) UNCONFINED COMPRESSIVE STRENGTH & INDIRECT TENSILE STRENGTH OF STABILISED MATERIAL (TMH 1 :1986, Method A14 & A16T)						
CBR / * UCS / ITS DETERMINATION	MOD AASHTO	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		COMP MOISTURE (%)				
		DRY DENSITY (kg/m^3)				
		CBR (%) / * UCS / ITS (KPa)				
		SWELL (%)				
	NRB	**DRY DENSITY (kg/m^3)**				
		CBR (%)				
	PROCTOR	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		CBR (%)				
CBR / * UCS / ITS		**100%**				
		98%				
		95%				
		93%				
		90%				

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

MATERIAL ANALYSIS

HOLE No. / KM		**TP49**			
MATERIAL DEPTH (mm)		0-400	400-1000	1000-2600	+2600
SAMPLE / LAB. No.		**NS**	**NS**	**NS**	**NS**
MATERIAL DESCRIPTION *** IN SITU FIELD MOISTURE (%)**		Slightly moist brown medium dense clayey sand	Slightly moist brown stiff clay	Slightly moist olive stiff clay	Soft rock / Olive mudstone
AASHTO CLASSIFICATION					
UNIFIED SOIL CLASSIFICATION					
TRH14 / * COLTO CLASSIFICATION					
SIEVE ANALYSIS, PERCENTAGE OF MATERIAL PASSING 0.075 mm SIEVE (TMH 1 :1986, Method A1 (a), A5) - % PASSING SIEVES					
SIEVE ANALYSIS	**63.0 mm**				
	53.0 mm				
	37.5 mm				
	26.5 mm				
	19.0 mm				
	13.2 mm				
	4.75 mm				
	2.00 mm				
	0.425 mm				
	0.075 mm				
	*** 0.002 mm**				
SOIL MORTAR	**COARSE SAND**				
	FINE SAND				
	MATERIAL<0.075 mm				
GRADING MODULUS (GM)					
*** pH / CONDUCTIVITY Sm^{-1}**					
ATTERBERG LIMITS ANALYSIS (TMH 1 :1986, Method A2, A3, & A4)					
ATTERBERG LIMITS PASSING SIEVE (mm) >0.425	**L.L**				
	P.I. / L.S.				
POTENTIAL EXPANSIVENESS (mm)		Low	Medium / 8.52mm	Medium / 15.0mm	
MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT, CALIFORNIA BEARING RATIO ANALYSIS (TMH 1 :1986, Method A7 & A8)					
UNCONFINED COMPRESSIVE STRENGTH & INDIRECT TENSILE STRENGTH OF STABILISED MATERIAL (TMH 1 :1986, Method A14 & A16T)					
CBR / * UCS / ITS DETERMINATION	**MOD AASHTO**	**MAX DRY DENSITY (kg/m^3)**			
		OPT MOISTURE (%)			
		COMP MOISTURE (%)			
		DRY DENSITY (kg/m^3)			
		CBR (%) / * UCS / ITS (KPa)			
		SWELL (%)			
	NRB	**DRY DENSITY (kg/m^3)**			
		CBR (%)			
	PROCTOR	**MAX DRY DENSITY (kg/m^3)**			
		OPT MOISTURE (%)			
		CBR (%)			
CBR / * UCS / ITS	**100%**				
	98%				
	95%				
	93%				
	90%				

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

MATERIAL ANALYSIS

HOLE No. / KM			**TP50**			
MATERIAL DEPTH (mm)			0-300	300-700	700-1300	+1300
SAMPLE / LAB. No.			**NS**	**VD47 012/3618**	**VD48 012/3619**	**NS**
MATERIAL DESCRIPTION			Slightly moist brown medium dense sand	Slightly moist orange brown stiff clay	Slightly moist yellow orange stiff clay	Soft rock / Yellow sandstone
*** IN SITU FIELD MOISTURE (%)**				23.7	22.9	
AASHTO CLASSIFICATION						
UNIFIED SOIL CLASSIFICATION						
TRH14 / * COLTO CLASSIFICATION						
SIEVE ANALYSIS, PERCENTAGE OF MATERIAL PASSING 0.075 mm SIEVE (TMH 1 :1986, Method A1 (a), A5) - % PASSING SIEVES						
SIEVE ANALYSIS	**63.0 mm**					
	53.0 mm					
	37.5 mm					
	26.5 mm					
	19.0 mm					
	13.2 mm					
	4.75 mm			100	100	
	2.00 mm			99	97	
	0.425 mm			91	89	
	0.075 mm			68	61	
	*** 0.002 mm**			38	32	
SOIL MORTAR	**COARSE SAND**			8	8	
	FINE SAND			5 / 8 / 110	6 / 12 / 12	
	MATERIAL<0.075 mm			69	63	
GRADING MODULUS (GM)				0.41	0.54	
*** pH / CONDUCTIVITY Sm^{-1}**					7.01 / 0.1362	
ATTERBERG LIMITS ANALYSIS (TMH 1 :1986, Method A2, A3, & A4)						
ATTERBERG LIMITS PASSING SIEVE (mm) >0.425		**L.L**		51	47	
		P.I. / L.S.		25 / 11.8	23 / 9.9	
POTENTIAL EXPANSIVENESS (mm)			Low	High / 12.7mm	Medium / 7.6mm	
MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT, CALIFORNIA BEARING RATIO ANALYSIS (TMH 1 :1986, Method A7 & A8)						
UNCONFINED COMPRESSIVE STRENGTH & INDIRECT TENSILE STRENGTH OF STABILISED MATERIAL (TMH 1 :1986, Method A14 & A16T)						
CBR / * UCS / ITS DETERMINATION	MOD AASHTO	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		COMP MOISTURE (%)				
		DRY DENSITY (kg/m^3)				
		CBR (%) / * UCS / ITS (KPa)				
		SWELL (%)				
	NRB	**DRY DENSITY (kg/m^3)**				
		CBR (%)				
	PROCTOR	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		CBR (%)				
CBR / * UCS / ITS	**100%**					
	98%					
	95%					
	93%					
	90%					

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

MATERIAL ANALYSIS

HOLE No. / KM			**TP51**			
MATERIAL DEPTH (mm)			0-500	500-1300	+1300	
SAMPLE / LAB. No.			**NS**	**VD49 012/3620**	**NS**	
MATERIAL DESCRIPTION			Slightly moist brown medium dense clayey sand	Slightly moist orange dense ferricrete	Soft rock / Yellow sandstone	
*** IN SITU FIELD MOISTURE (%)**				20.8		
AASHTO CLASSIFICATION						
UNIFIED SOIL CLASSIFICATION						
TRH14 / * COLTO CLASSIFICATION						
SIEVE ANALYSIS, PERCENTAGE OF MATERIAL PASSING 0.075 mm SIEVE (TMH 1 :1986, Method A1 (a), A5) - % PASSING SIEVES						
SIEVE ANALYSIS	**63.0 mm**					
	53.0 mm					
	37.5 mm					
	26.5 mm					
	19.0 mm					
	13.2 mm			100		
	4.75 mm			99		
	2.00 mm			94		
	0.425 mm			83		
	0.075 mm			59		
	*** 0.002 mm**			30		
SOIL MORTAR	**COARSE SAND**			12		
	FINE SAND			7 / 10 / 9		
	MATERIAL<0.075 mm			62		
GRADING MODULUS (GM)				0.64		
*** pH / CONDUCTIVITY Sm^{-1}**						
ATTERBERG LIMITS ANALYSIS (TMH 1 :1986, Method A2, A3, & A4)						
ATTERBERG LIMITS PASSING SIEVE (mm) >0.425	**L.L**			42		
	P.I. / L.S.			19 / 10.3		
POTENTIAL EXPANSIVENESS (mm)			Low	Medium / 9.8mm		
MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT, CALIFORNIA BEARING RATIO ANALYSIS (TMH 1 :1986, Method A7 & A8)						
UNCONFINED COMPRESSIVE STRENGTH & INDIRECT TENSILE STRENGTH OF STABILISED MATERIAL (TMH 1 :1986, Method A14 & A16T)						
CBR / * UCS / ITS DETERMINATION	MOD AASHTO	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		COMP MOISTURE (%)				
		DRY DENSITY (kg/m^3)				
		CBR (%) / * UCS / ITS (KPa)				
		SWELL (%)				
	NRB	**DRY DENSITY (kg/m^3)**				
		CBR (%)				
	PROCTOR	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		CBR (%)				
CBR / * UCS / ITS	**100%**					
	98%					
	95%					
	93%					
	90%					

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

MATERIAL ANALYSIS

HOLE No. / KM			**TP52**			
MATERIAL DEPTH (mm)			0-400	400-1500	+1500	
SAMPLE / LAB. No.			**VD50 012/ 3621**	**VD51 012/3622**	**NS**	
MATERIAL DESCRIPTION			Slightly moist brown stiff sandy clay	Slightly moist orange grey stiff clay	Soft rock / Yellow sandstone	
*** IN SITU FIELD MOISTURE (%)**			9.6	21.1		
AASHTO CLASSIFICATION						
UNIFIED SOIL CLASSIFICATION						
TRH14 / * COLTO CLASSIFICATION						
SIEVE ANALYSIS, PERCENTAGE OF MATERIAL PASSING 0.075 mm SIEVE (TMH 1 :1986, Method A1 (a), A5) - % PASSING SIEVES						
SIEVE ANALYSIS	**63.0 mm**					
	53.0 mm					
	37.5 mm					
	26.5 mm					
	19.0 mm					
	13.2 mm			100		
	4.75 mm		100	99		
	2.00 mm		99	97		
	0.425 mm		86	89		
	0.075 mm		49	68		
	*** 0.002 mm**			39		
SOIL MORTAR	**COARSE SAND**		14	8		
	FINE SAND		10 / 13 / 15	5 / 8 / 10		
	MATERIAL<0.075 mm		49	70		
GRADING MODULUS (GM)			0.66	0.47		
*** pH / CONDUCTIVITY Sm^{-1}**				7.92 / 0.3015		
ATTERBERG LIMITS ANALYSIS (TMH 1 :1986, Method A2, A3, & A4)						
ATTERBERG LIMITS PASSING SIEVE (mm) >0.425		**L.L**	24	50		
		P.I. / L.S.	13 / 5.1	25 / 11.4		
POTENTIAL EXPANSIVENESS (mm)			Low	Medium / 13.5mm		
MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT, CALIFORNIA BEARING RATIO ANALYSIS (TMH 1 :1986, Method A7 & A8) UNCONFINED COMPRESSIVE STRENGTH & INDIRECT TENSILE STRENGTH OF STABILISED MATERIAL (TMH 1 :1986, Method A14 & A16T)						
CBR / * UCS / ITS DETERMINATION	MOD AASHTO	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		COMP MOISTURE (%)				
		DRY DENSITY (kg/m^3)				
		CBR (%) / * UCS / ITS (KPa)				
		SWELL (%)				
	NRB	**DRY DENSITY (kg/m^3)**				
		CBR (%)				
	PROCTOR	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		CBR (%)				
CBR / * UCS / ITS	**100%**					
	98%					
	95%					
	93%					
	90%					

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

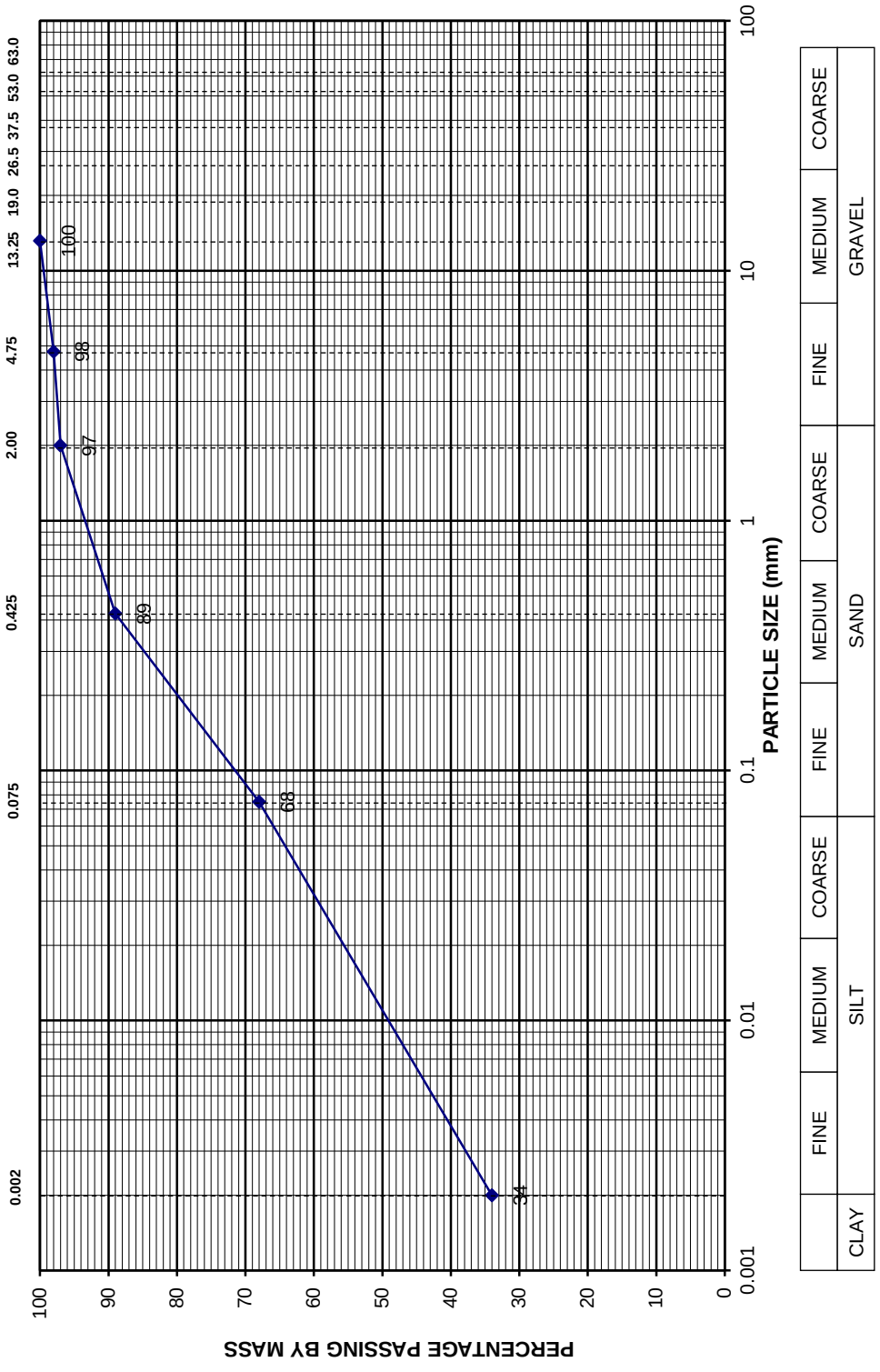
MATERIAL ANALYSIS

HOLE No. / KM			**TP53**			
MATERIAL DEPTH (mm)			0-300	300-900	900-1600	+1600
SAMPLE / LAB. No.			**NS**	**VD52 012/3623**	**VD53 012/3624**	**NS**
MATERIAL DESCRIPTION			Slightly moist brown medium dense clayey sand	Slightly moist brown stiff clay	Slightly moist grey stiff clay	Soft rock / Olive mudstone
*** IN SITU FIELD MOISTURE (%)**				18.7	23.6	
AASHTO CLASSIFICATION						
UNIFIED SOIL CLASSIFICATION						
TRH14 / * COLTO CLASSIFICATION						
SIEVE ANALYSIS, PERCENTAGE OF MATERIAL PASSING 0.075 mm SIEVE (TMH 1 :1986, Method A1 (a), A5) - % PASSING SIEVES						
SIEVE ANALYSIS	**63.0 mm**					
	53.0 mm					
	37.5 mm					
	26.5 mm					
	19.0 mm					
	13.2 mm					
	4.75 mm				100	
	2.00 mm			100	97	
	0.425 mm			90	89	
	0.075 mm			63	69	
	*** 0.002 mm**			31	37	
SOIL MORTAR	**COARSE SAND**			10	8	
	FINE SAND			7 / 9 / 10	5 / 7 / 8	
	MATERIAL<0.075 mm			63	72	
GRADING MODULUS (GM)				0.47	0.45	
*** pH / CONDUCTIVITY Sm^{-1}**					6.23 / 0.3598	
ATTERBERG LIMITS ANALYSIS (TMH 1 :1986, Method A2, A3, & A4)						
ATTERBERG LIMITS PASSING SIEVE (mm) >0.425		**L.L**		40	51	
		P.I. / L.S.		23 / 9.6	22 / 10.7	
POTENTIAL EXPANSIVENESS (mm)			Low	Medium / 8.7mm	Medium / 8.0mm	
MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT, CALIFORNIA BEARING RATIO ANALYSIS (TMH 1 :1986, Method A7 & A8)						
UNCONFINED COMPRESSIVE STRENGTH & INDIRECT TENSILE STRENGTH OF STABILISED MATERIAL (TMH 1 :1986, Method A14 & A16T)						
CBR / * UCS / ITS DETERMINATION	MOD AASHTO	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		COMP MOISTURE (%)				
		DRY DENSITY (kg/m^3)				
		CBR (%) / * UCS / ITS (KPa)				
		SWELL (%)				
	NRB	**DRY DENSITY (kg/m^3)**				
		CBR (%)				
	PROCTOR	**MAX DRY DENSITY (kg/m^3)**				
		OPT MOISTURE (%)				
		CBR (%)				
CBR / * UCS / ITS	**100%**					
	98%					
	95%					
	93%					
	90%					

APPENDIX D
PARTICLE SIZE DISTRIBUTION

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447 0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

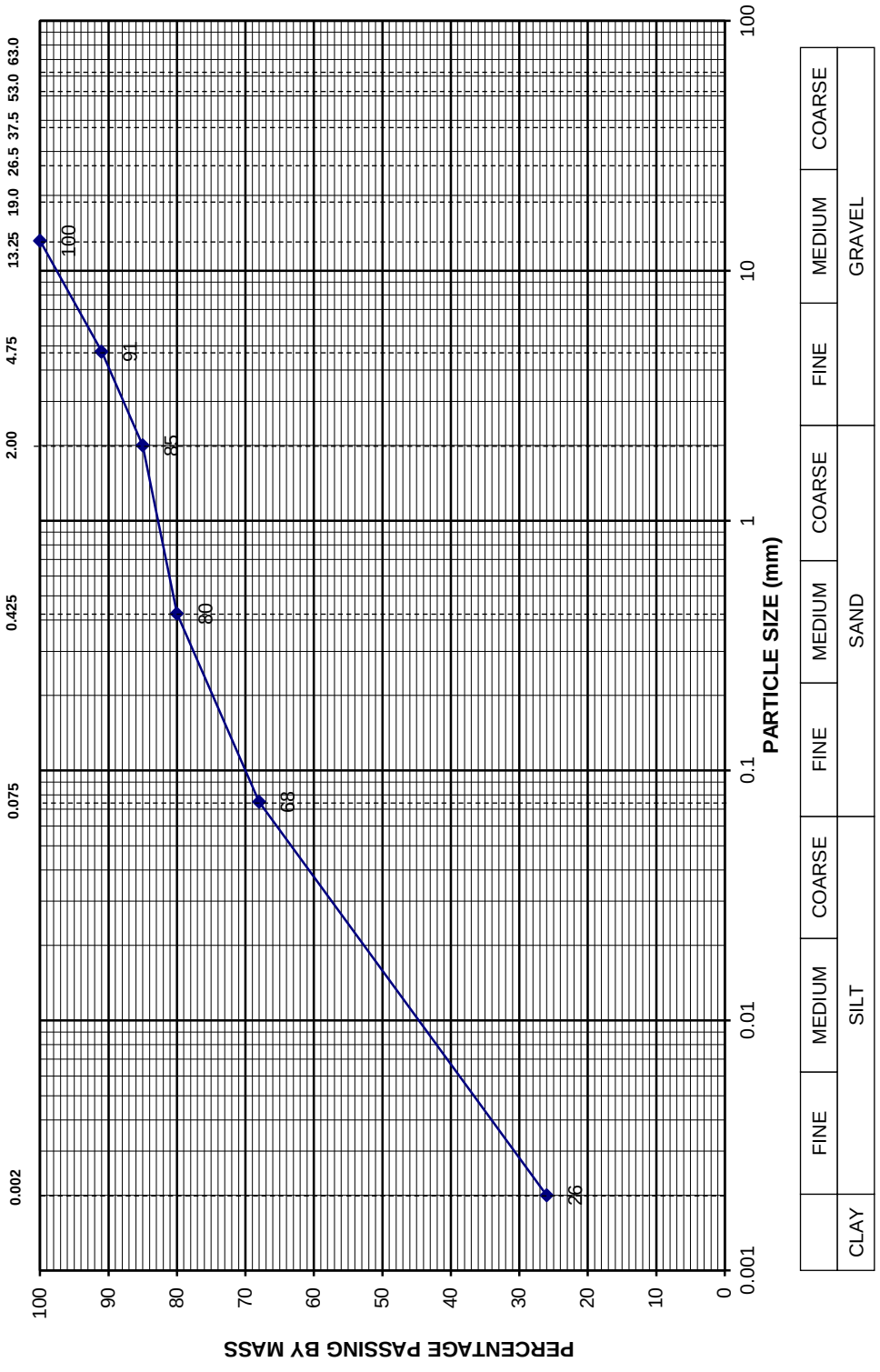
* PARTICLE SIZE DISTRIBUTION



HOLE No.	: TP 1
DEPTH	: 0 - 700mm
POTENTIAL EXPANSIVENESS :	Medium / 11.0mm
SAMPLE No.	: VD01, 012/3572
DESCRIPTION :	N/A
PAGE No.	: 1 of 53

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447 0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

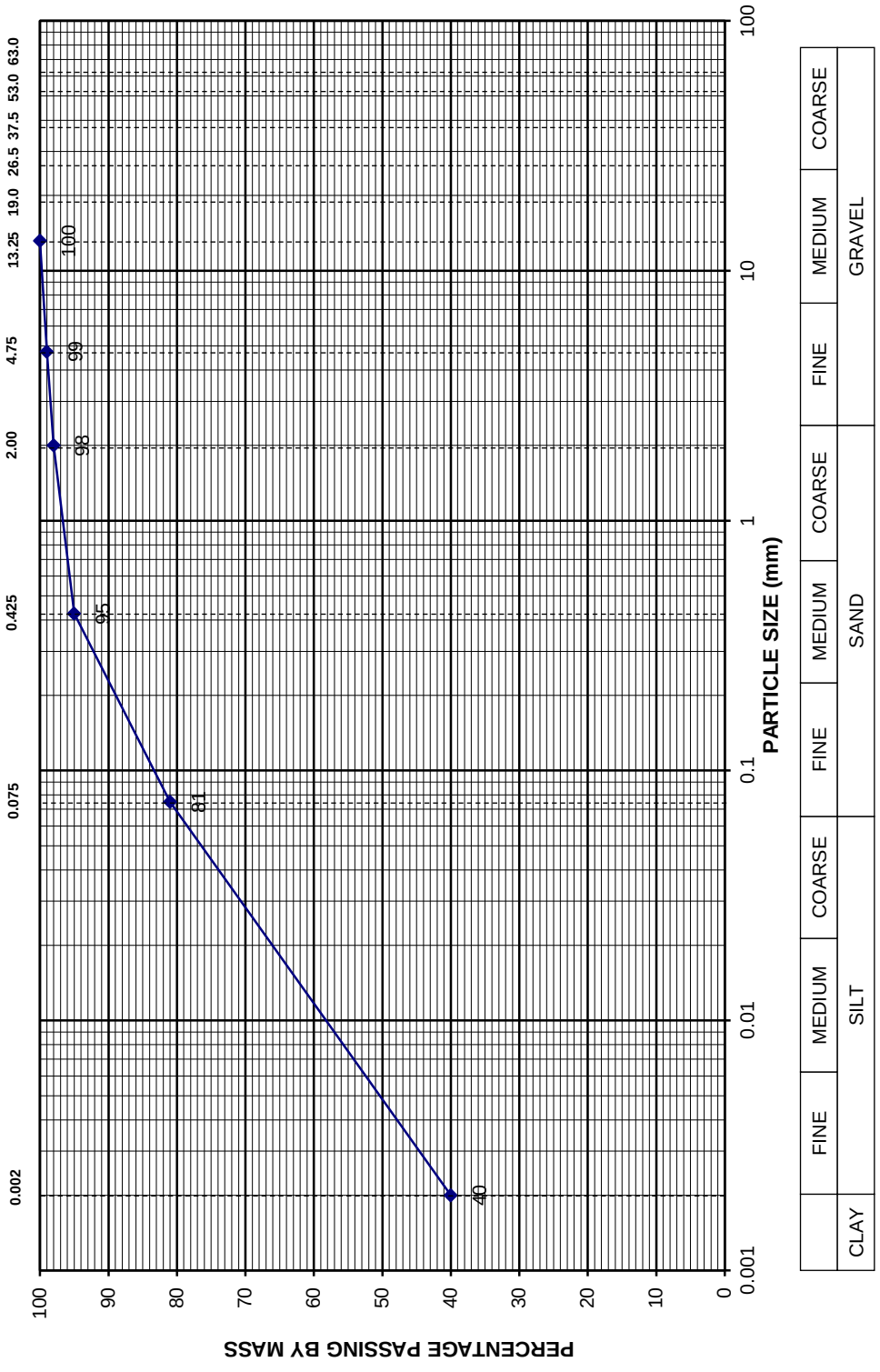
* PARTICLE SIZE DISTRIBUTION



SAMPLE No. :	VD02, 012/3573
DESCRIPTION :	N/A
PAGE No. :	2 of 53
HOLE No. :	TP 1
DEPTH :	700 - 1500mm
POTENTIAL EXPANSIVENESS :	Medium / 9.4mm

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447 0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

* PARTICLE SIZE DISTRIBUTION

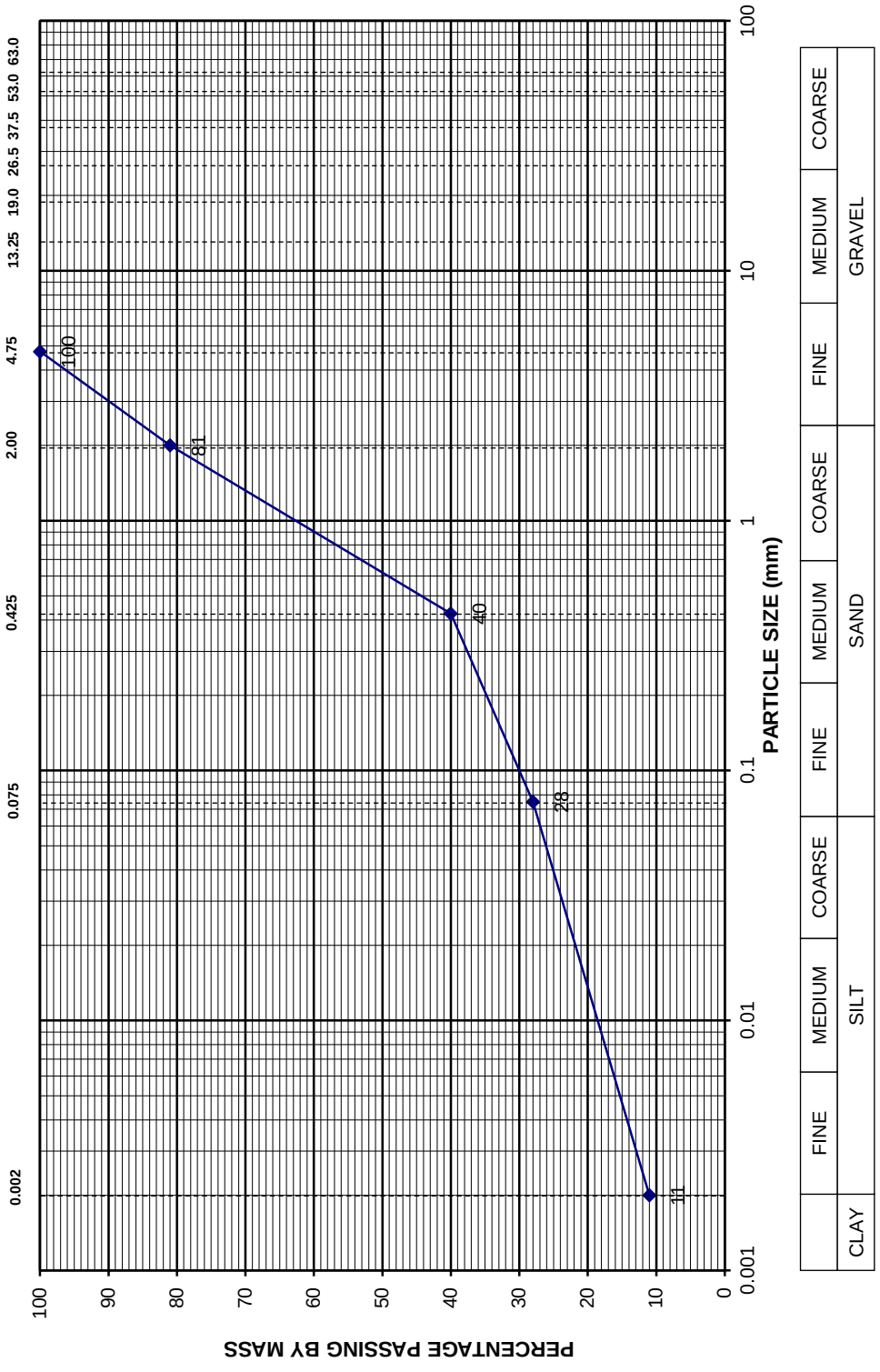


HOLE No. : TP 2
DEPTH : 900 - 1500mm
POTENTIAL EXPANSIVENESS : High / 14.5mm

SAMPLE No. : VD03, 012/3574
DESCRIPTION : N/A
PAGE No. : 3 of 53

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447 0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

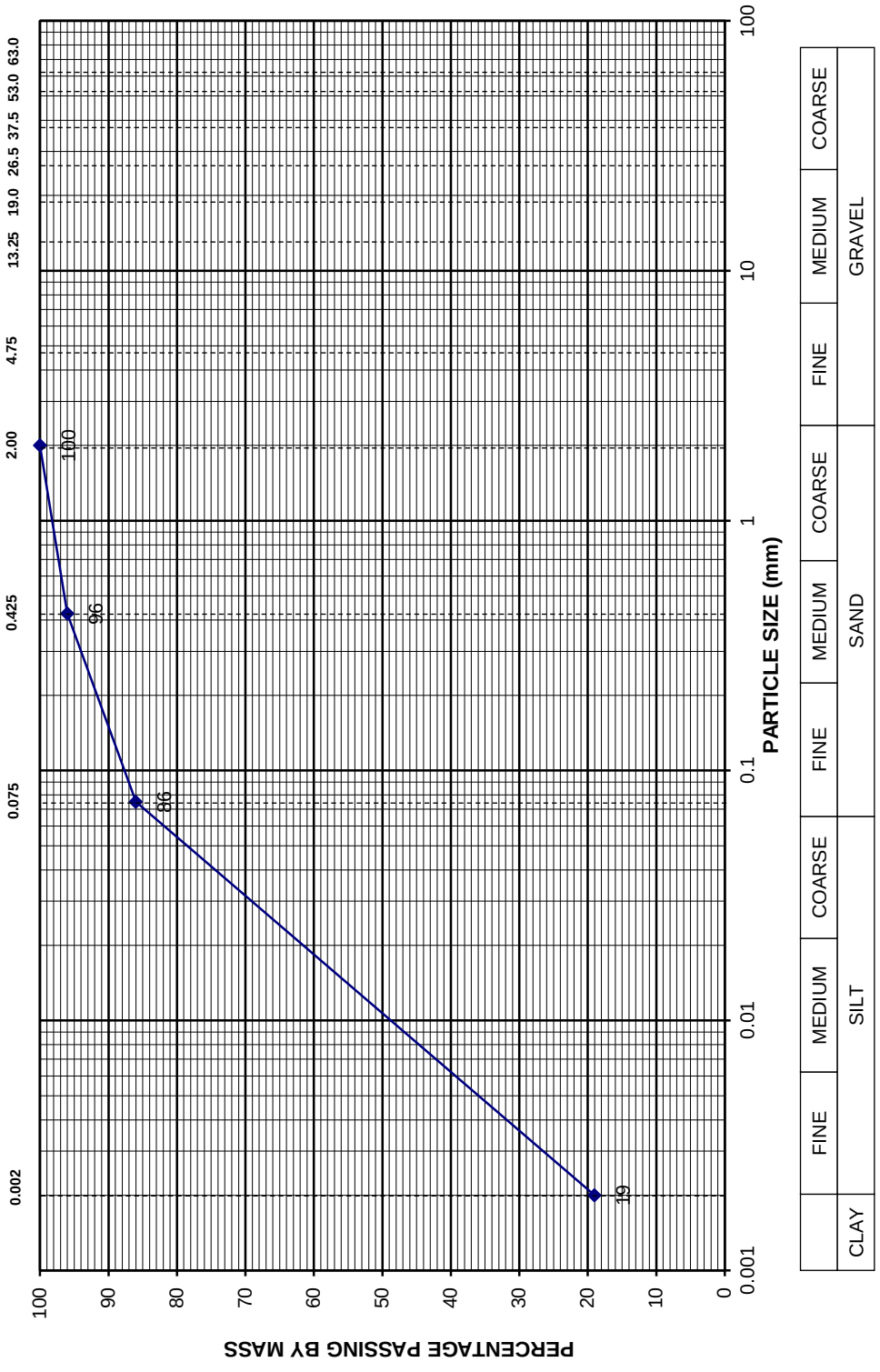
* PARTICLE SIZE DISTRIBUTION



HOLE No.	: TP 5
DEPTH	: 600 - 1000mm
POTENTIAL EXPANSIVENESS :	Low
SAMPLE No.	: VD04, 012/3575
DESCRIPTION :	N/A
PAGE No.	: 4 of 53

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447 0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

* PARTICLE SIZE DISTRIBUTION

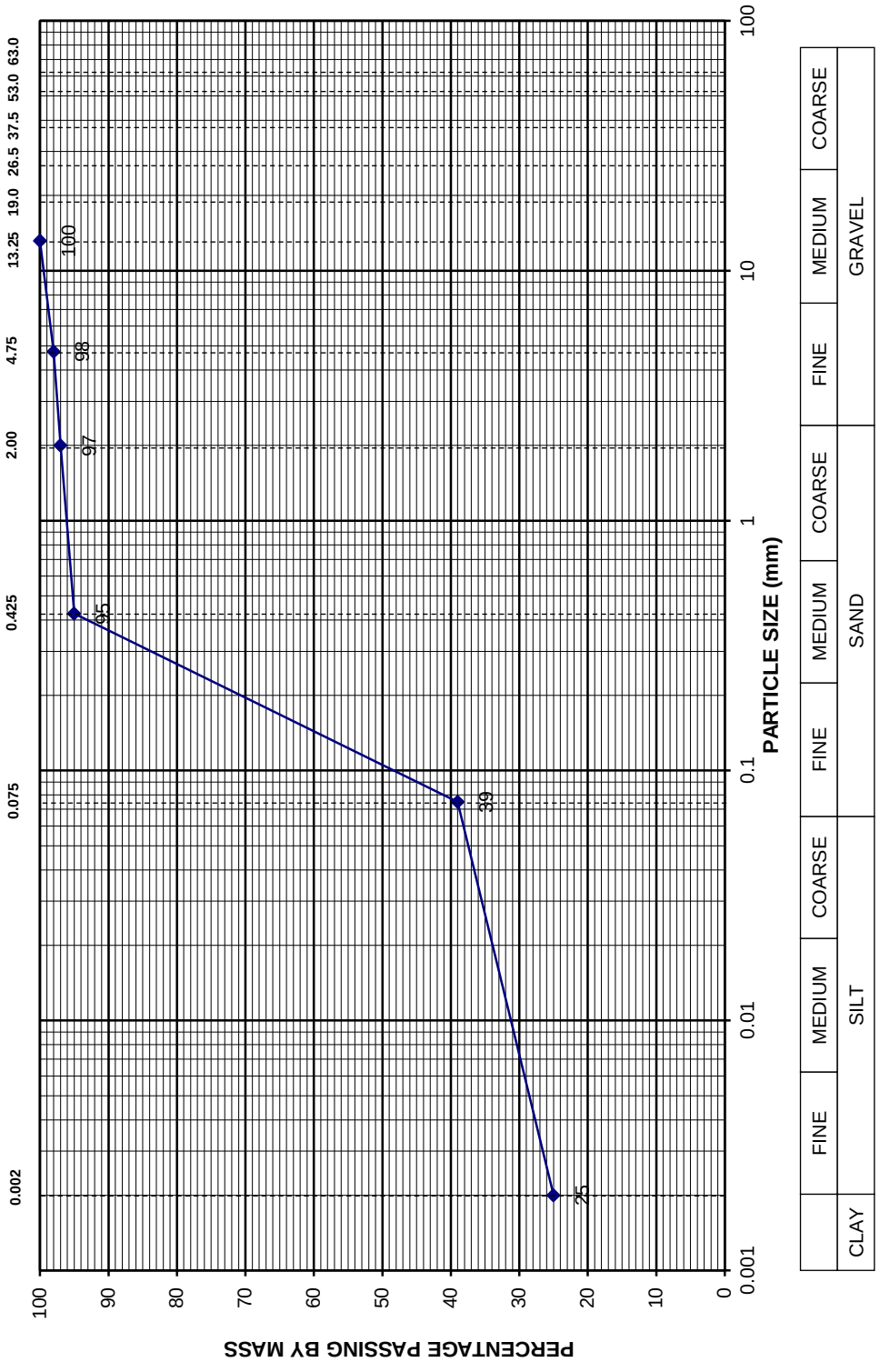


SAMPLE No. : VD05, 012/3576
DESCRIPTION : N/A
PAGE No. : 5 of 53

HOLE No. : TP 7
DEPTH : 0 - 600mm
POTENTIAL EXPANSIVENESS : High / 20.0mm

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447 0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

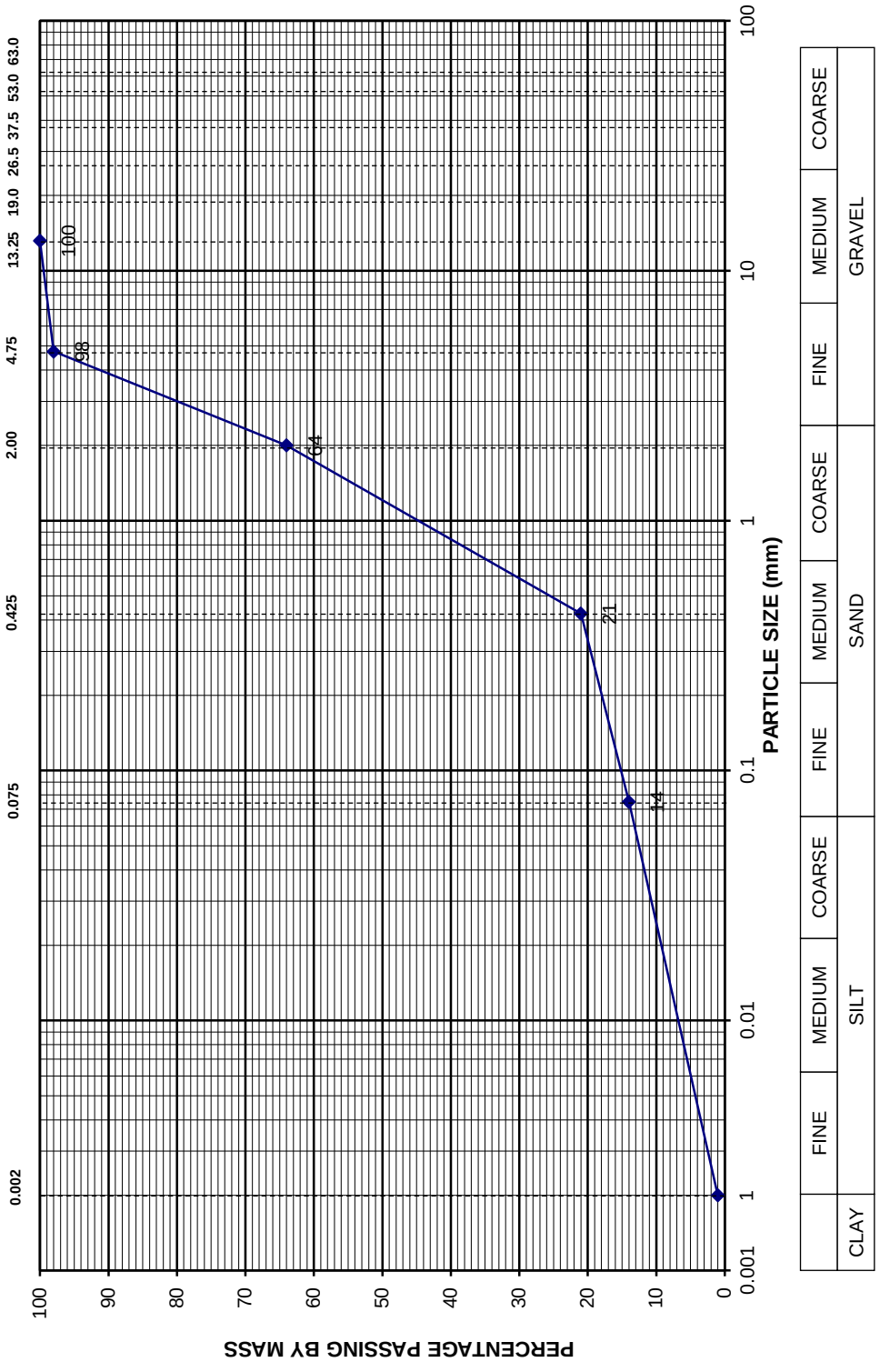
* PARTICLE SIZE DISTRIBUTION



SAMPLE No.	: VD06, 012/3577
DESCRIPTION	: N/A
PAGE No.	: 6 of 53
HOLE No.	: TP 7
DEPTH	: 600 - 1200mm
POTENTIAL EXPANSIVENESS	: High / 15.8mm

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447 0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

* PARTICLE SIZE DISTRIBUTION

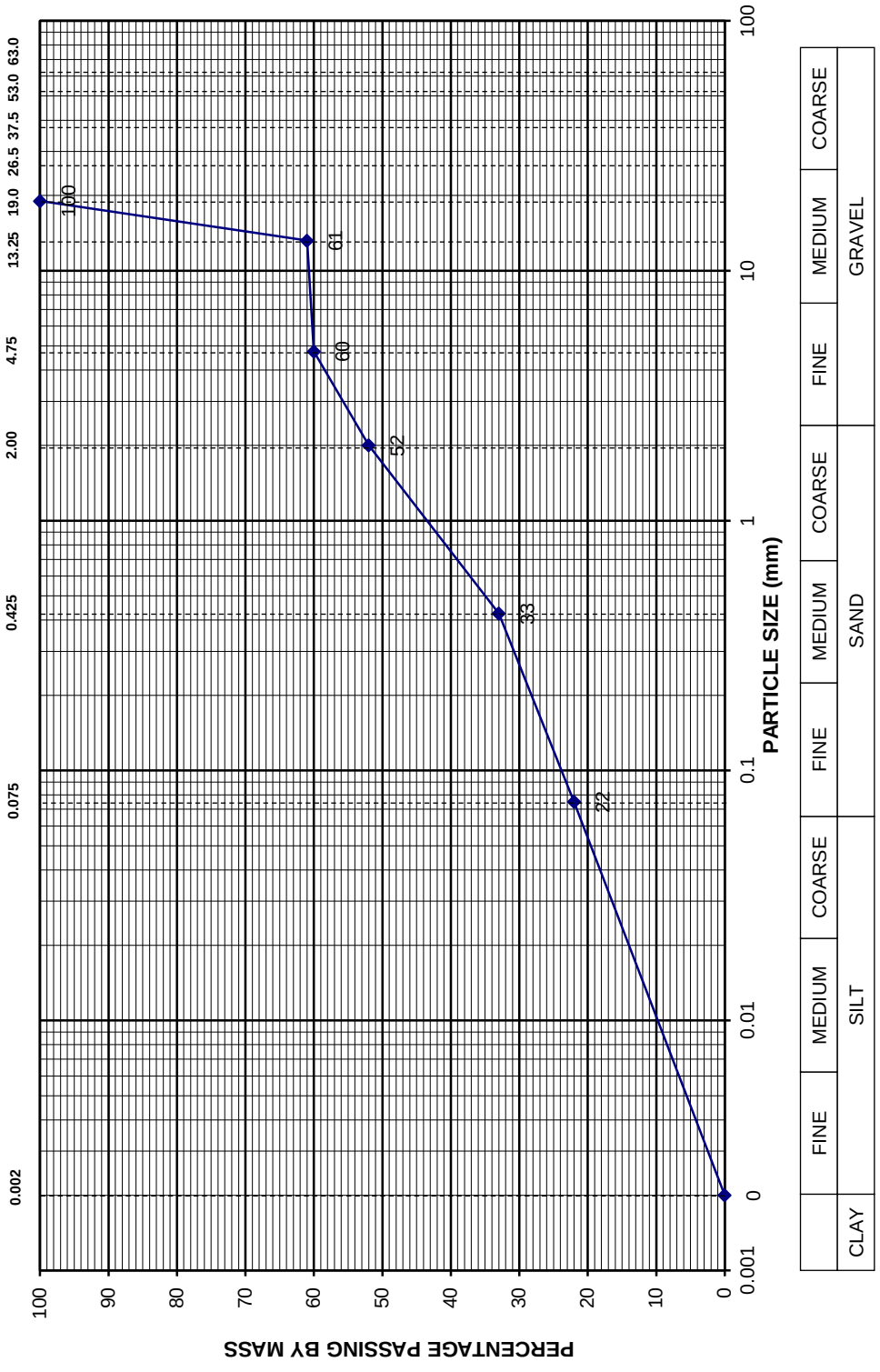


SAMPLE No. : VD07, 012/3578
DESCRIPTION : N/A
PAGE No. : 7 of 53

HOLE No. : TP 8
DEPTH : 0 - 600mm
POTENTIAL EXPANSIVENESS : Low

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447 0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

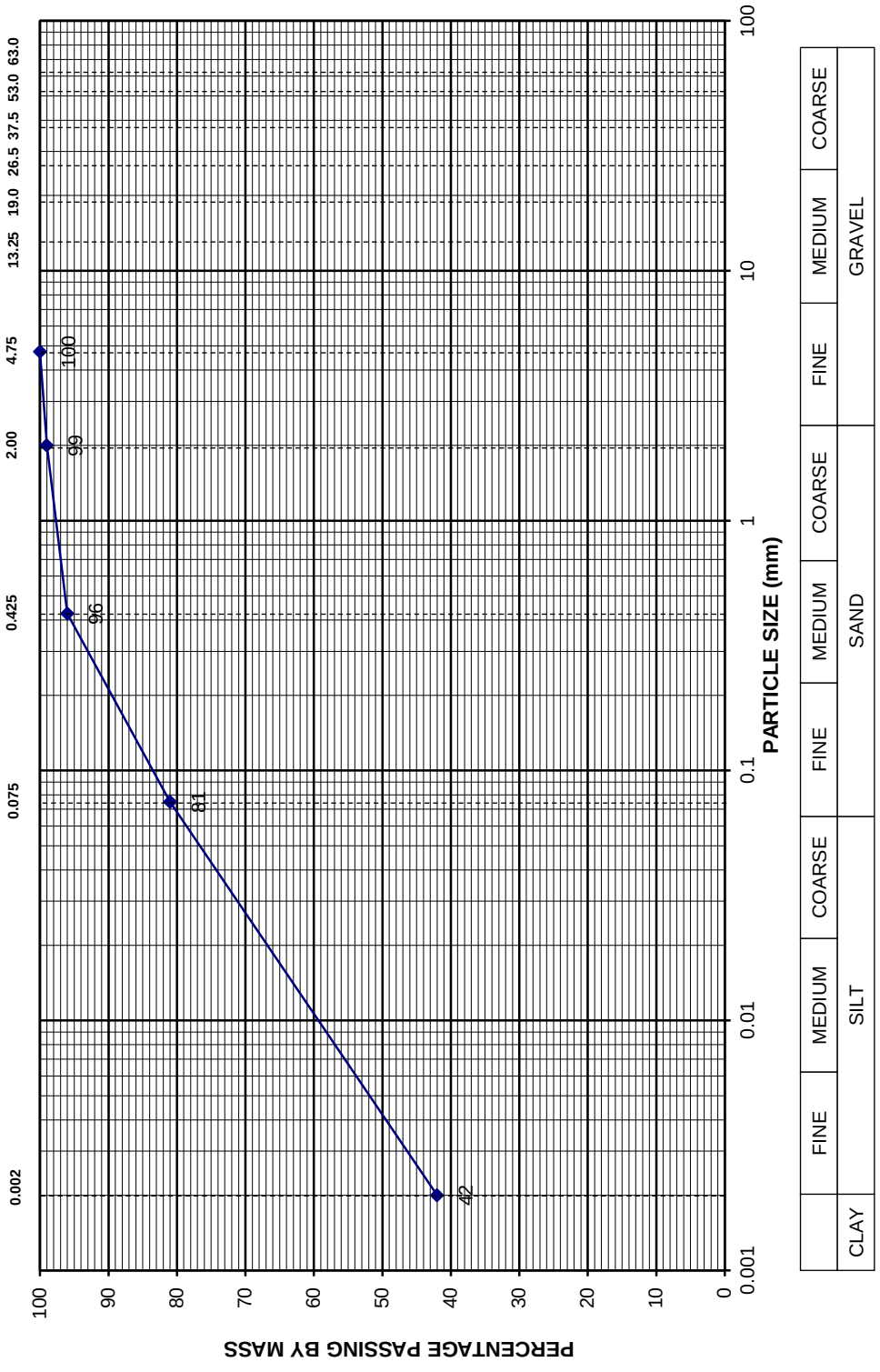
* PARTICLE SIZE DISTRIBUTION



HOLE No.	: TP 8
DEPTH	: 600 - 1400mm
POTENTIAL EXPANSIVENESS :	Low
SAMPLE No.	: VD08, 012/3579
DESCRIPTION :	N/A
PAGE No.	: 8 of 53

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447 0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

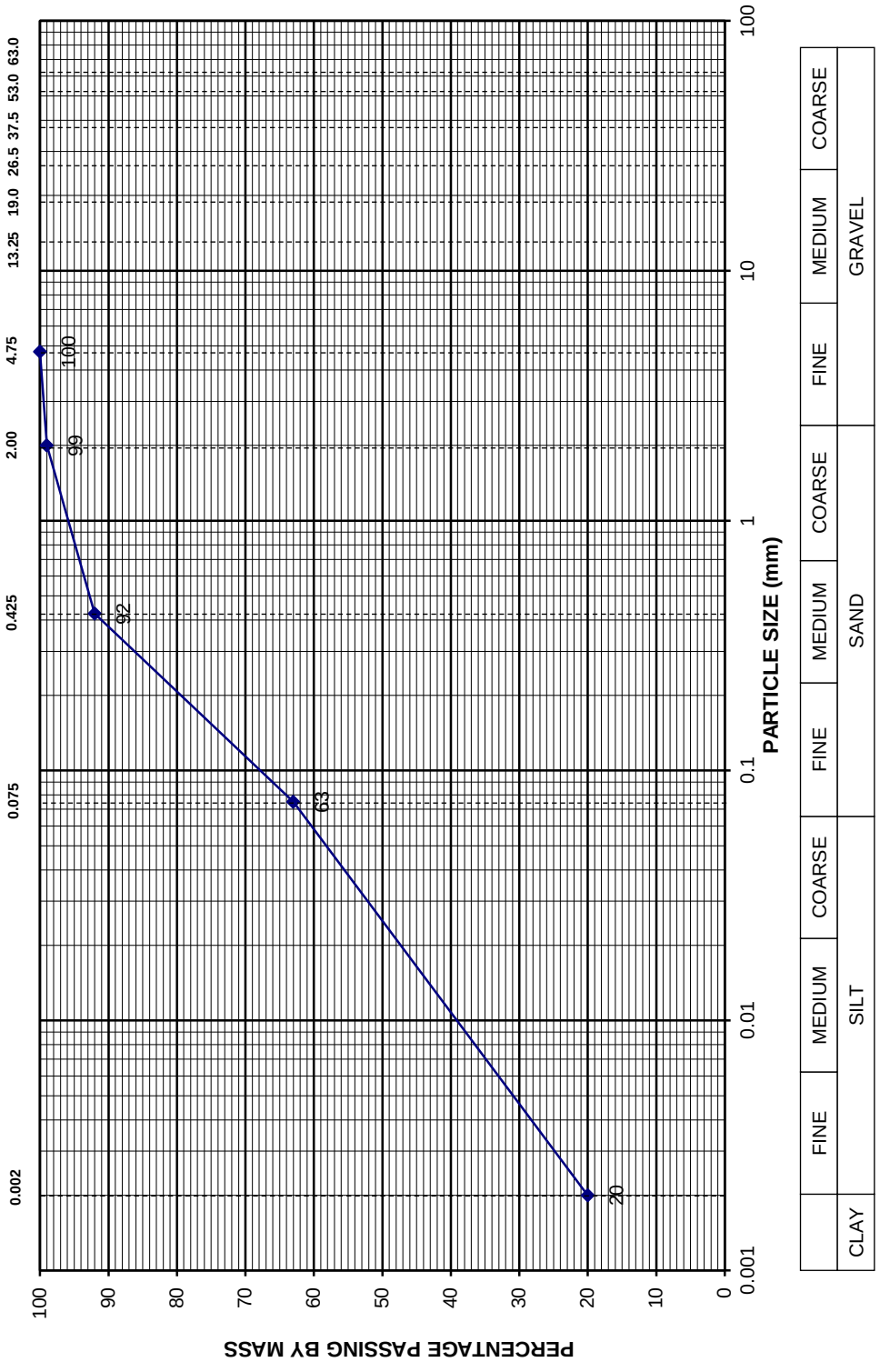
* PARTICLE SIZE DISTRIBUTION



HOLE No.	: TP 10
DEPTH	: 0 - 1000mm
POTENTIAL EXPANSIVENESS :	Medium / 14.5mm
SAMPLE No.	: VD09, 012/3580
DESCRIPTION :	N/A
PAGE No.	: 9 of 53

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447 0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

* PARTICLE SIZE DISTRIBUTION



SAMPLE No. : VD10, 012/3581

DESCRIPTION : N/A

PAGE No. : 10 of 53

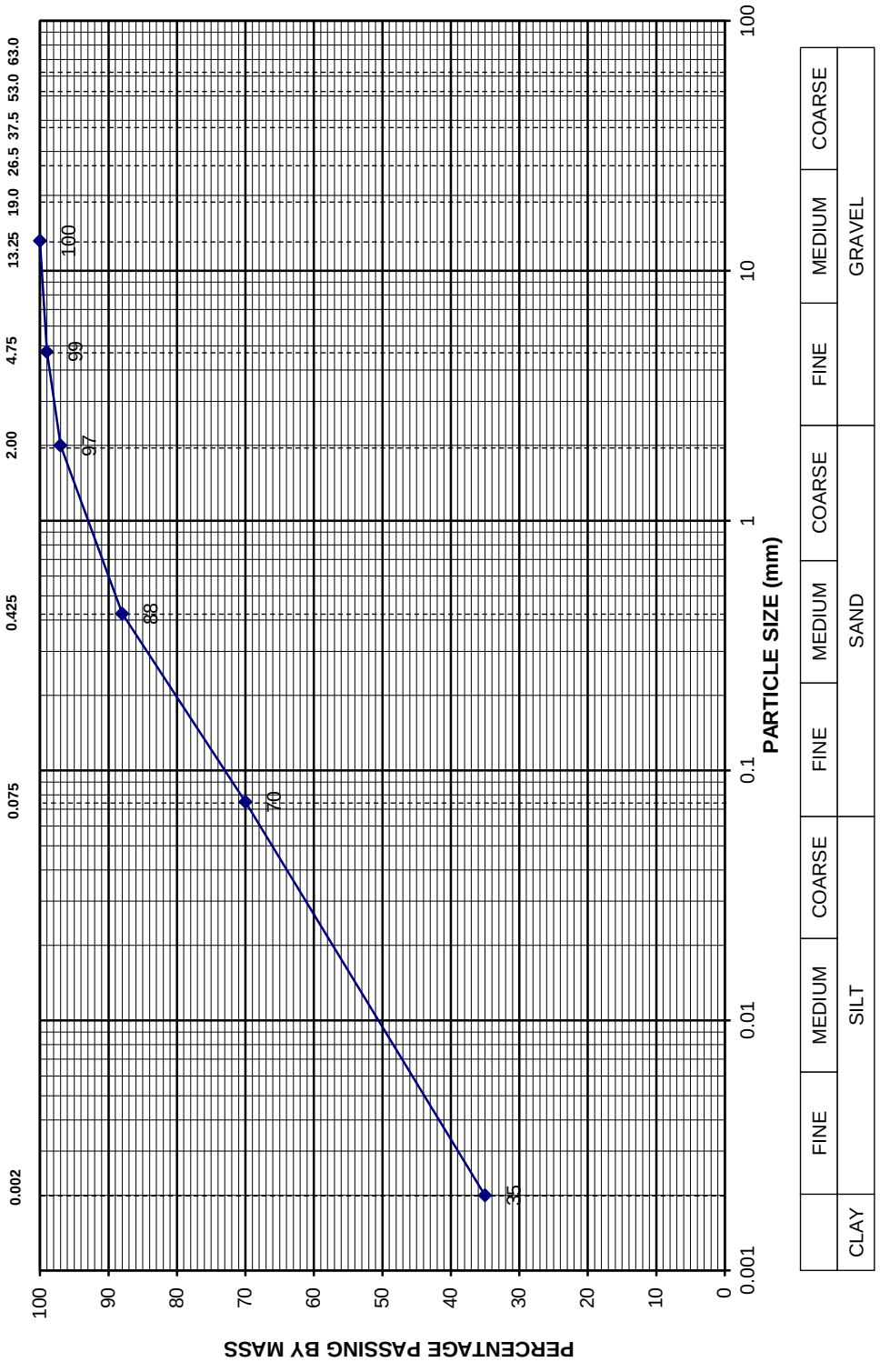
HOLE No. : TP 12

DEPTH : 0 - 400mm

POTENTIAL EXPANSIVENESS : Medium / 7.2mm

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447 0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

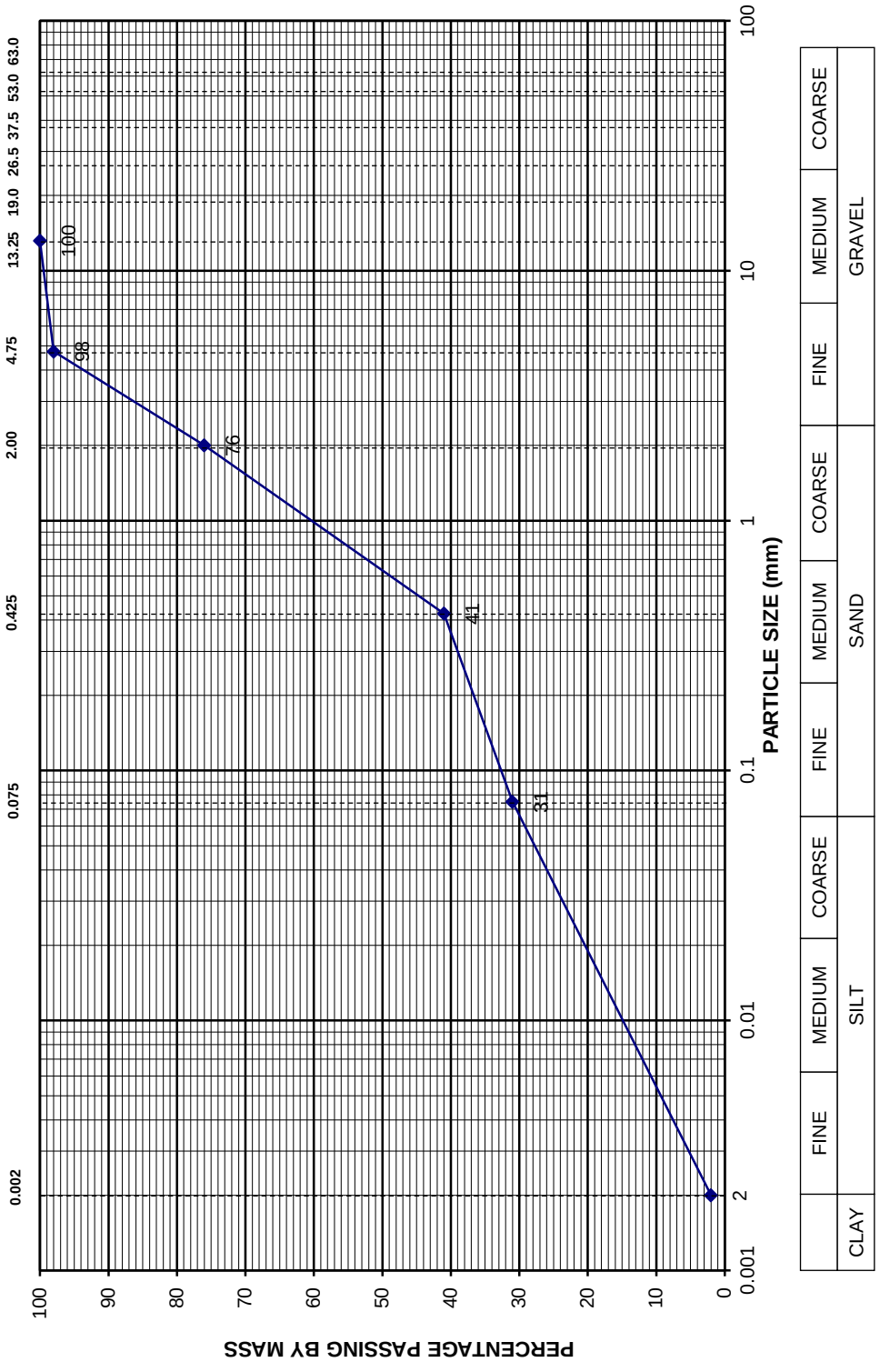
* PARTICLE SIZE DISTRIBUTION



SAMPLE No. :	VD11, 012/3582
DESCRIPTION :	N/A
PAGE No. :	11 of 53
HOLE No. :	TP 12
DEPTH :	400 - 800mm
POTENTIAL EXPANSIVENESS :	Medium / 6.0mm

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447 0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

* PARTICLE SIZE DISTRIBUTION

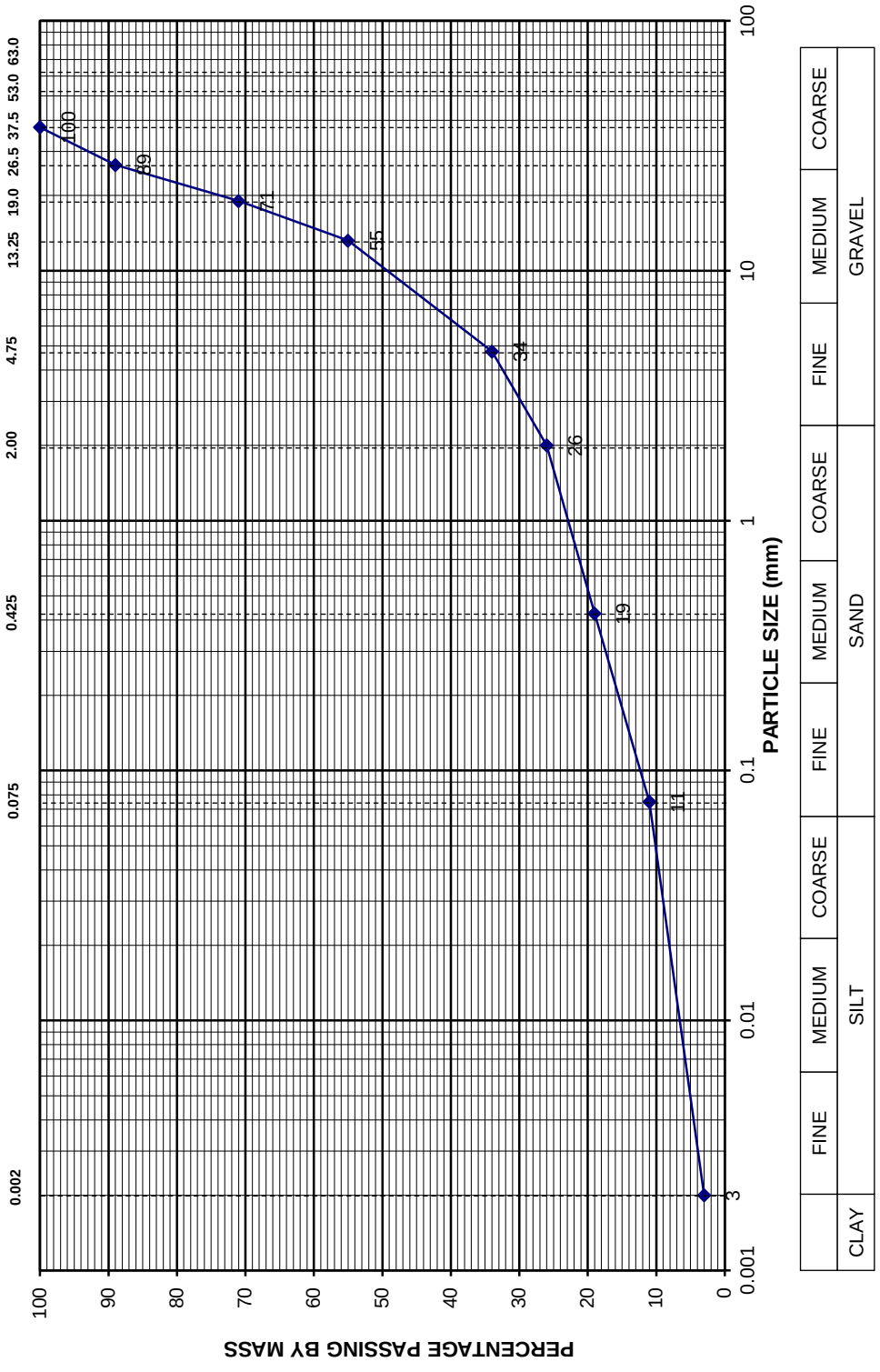


HOLE No. : TP 12
DEPTH : 800 - 1400mm
POTENTIAL EXPANSIVENESS : Low

SAMPLE No. : VD12, 012/3583
DESCRIPTION : N/A
PAGE No. : 12 of 53

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447 0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

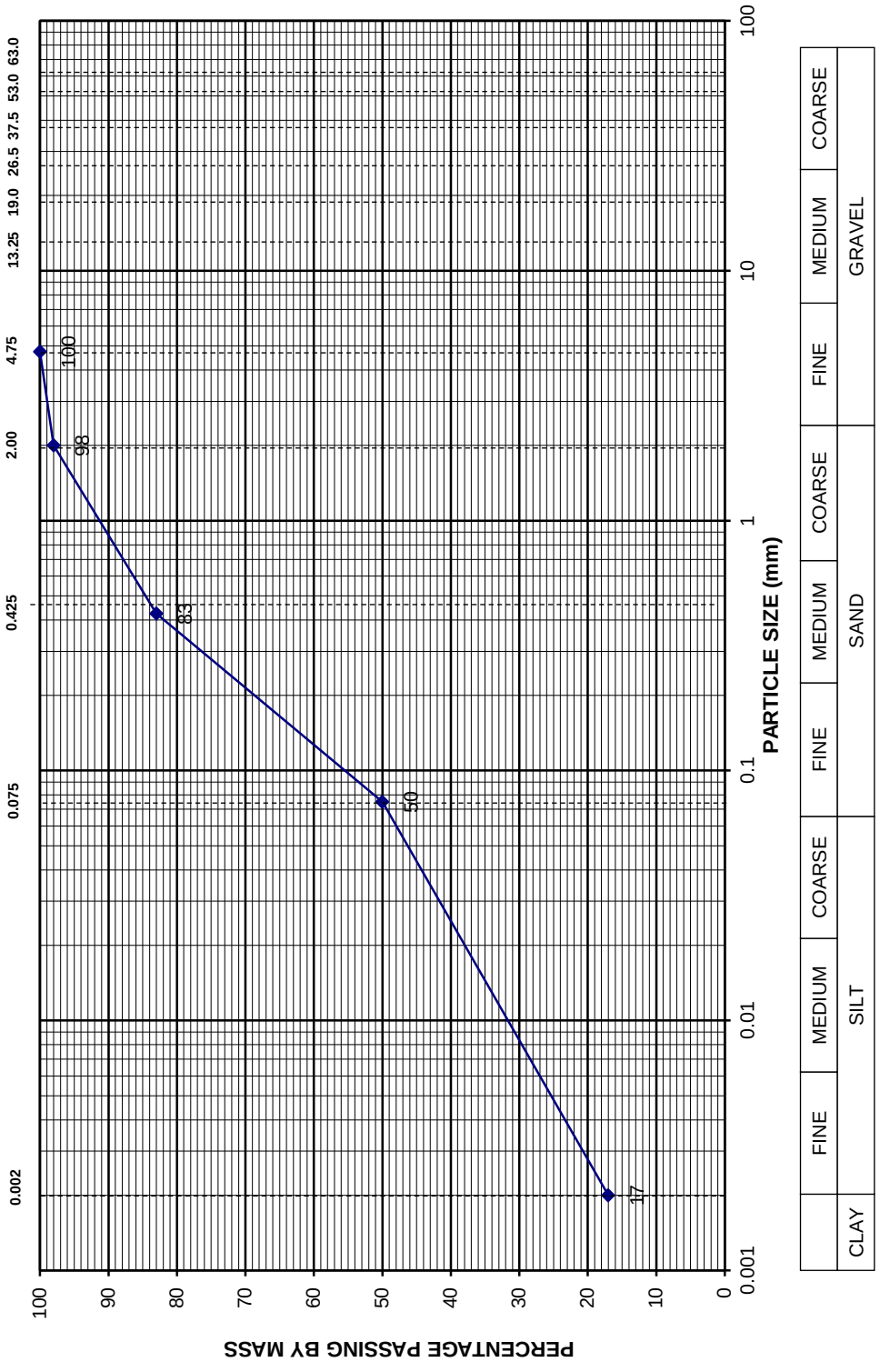
* PARTICLE SIZE DISTRIBUTION



SAMPLE No. :	VD13, 012/3584
DESCRIPTION :	N/A
PAGE No. :	13 of 53
HOLE No. :	TP 16
DEPTH :	0 - 700mm
POTENTIAL EXPANSIVENESS :	Low

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447 0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

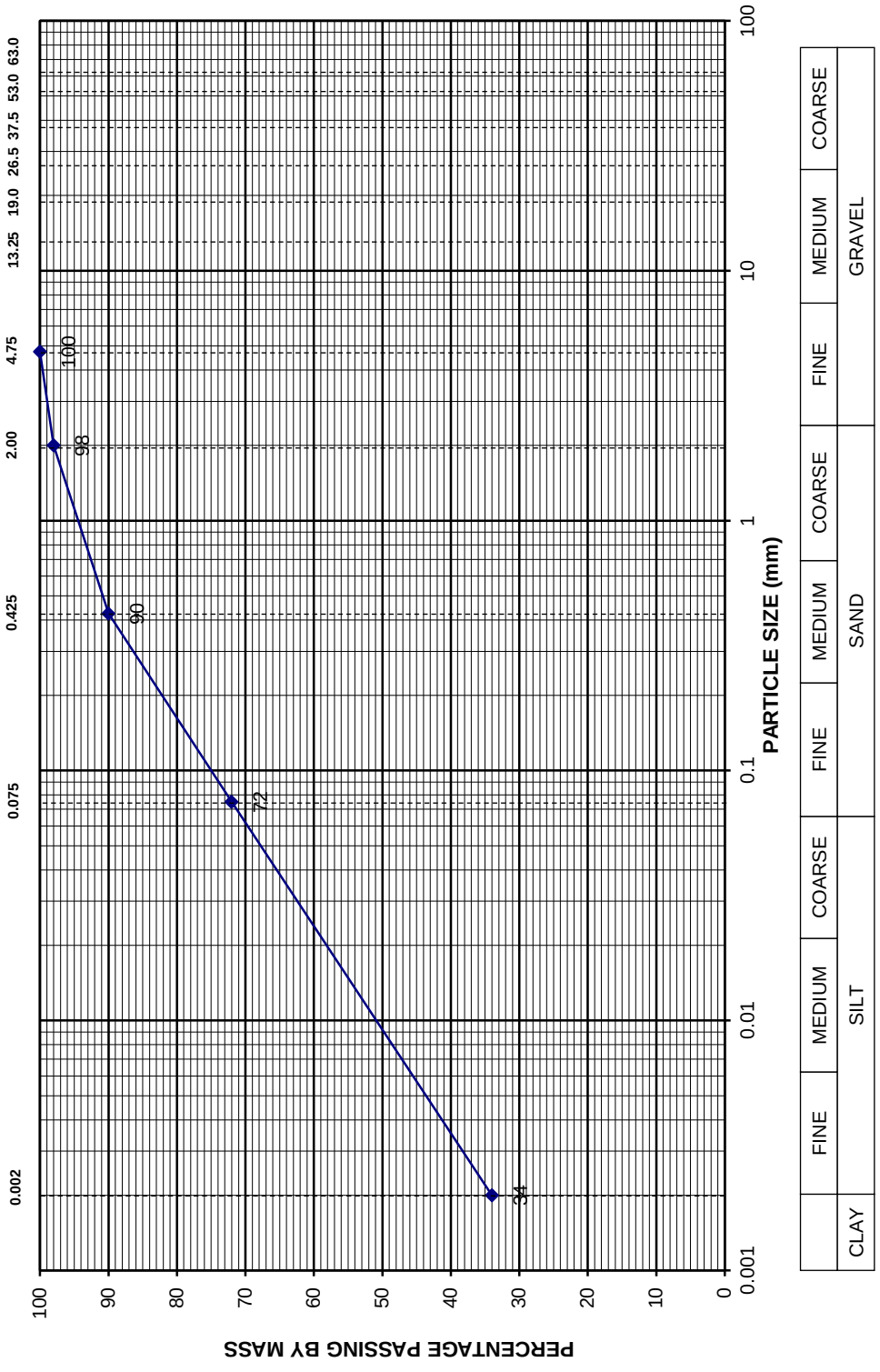
* PARTICLE SIZE DISTRIBUTION



HOLE No.	: TP 18
DEPTH	: 400 - 900mm
POTENTIAL EXPANSIVENESS :	Low
SAMPLE No.	: VD14, 012/3585
DESCRIPTION :	N/A
PAGE No.	: 14 of 53

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447 0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

* PARTICLE SIZE DISTRIBUTION

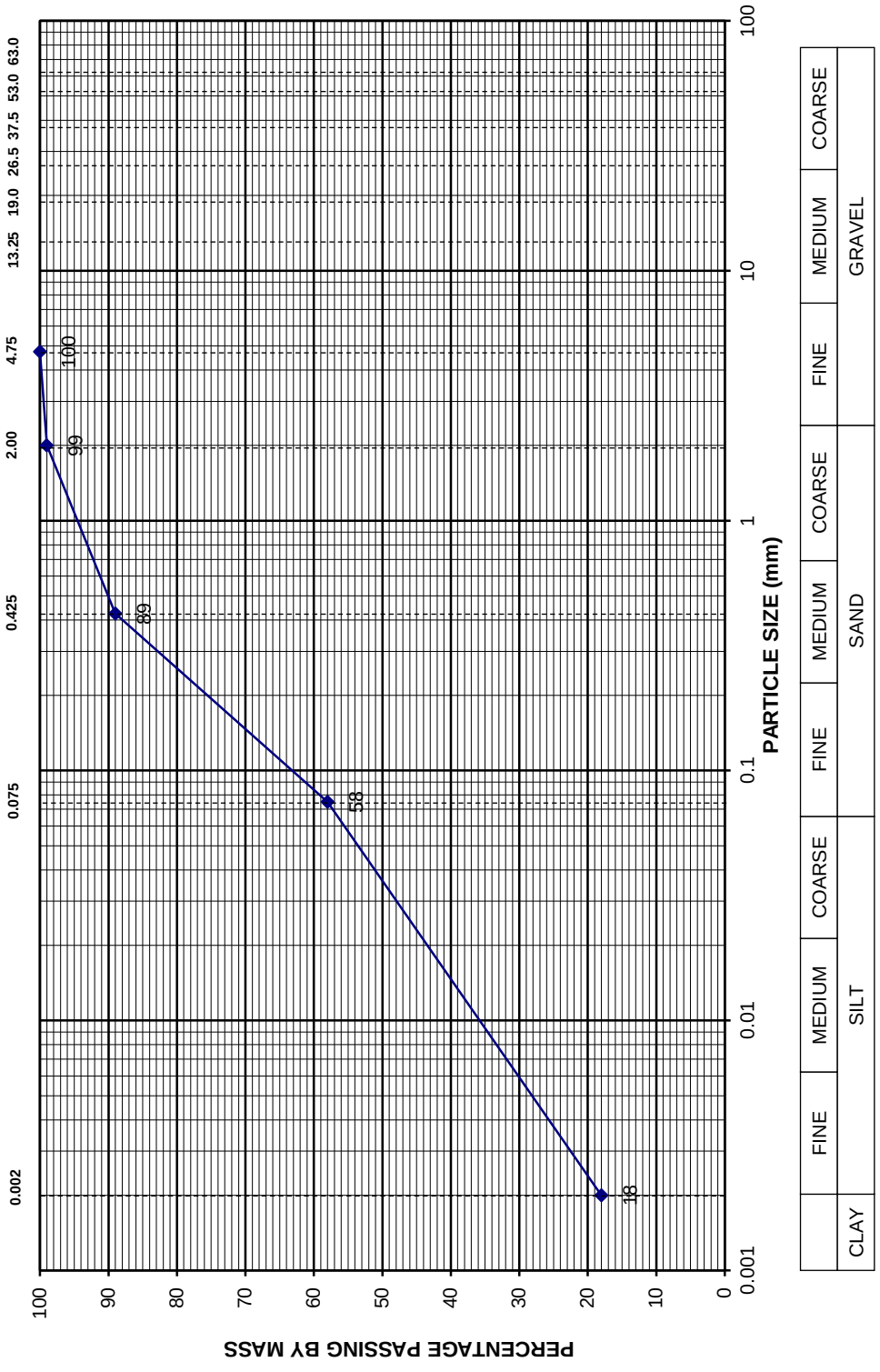


SAMPLE No. : VD15, 012/3586
DESCRIPTION : N/A
PAGE No. : 15 of 53

HOLE No. : TP 18
DEPTH : 900 - 11500mm
POTENTIAL EXPANSIVENESS : Medium / 4.7mm

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447 0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

* PARTICLE SIZE DISTRIBUTION

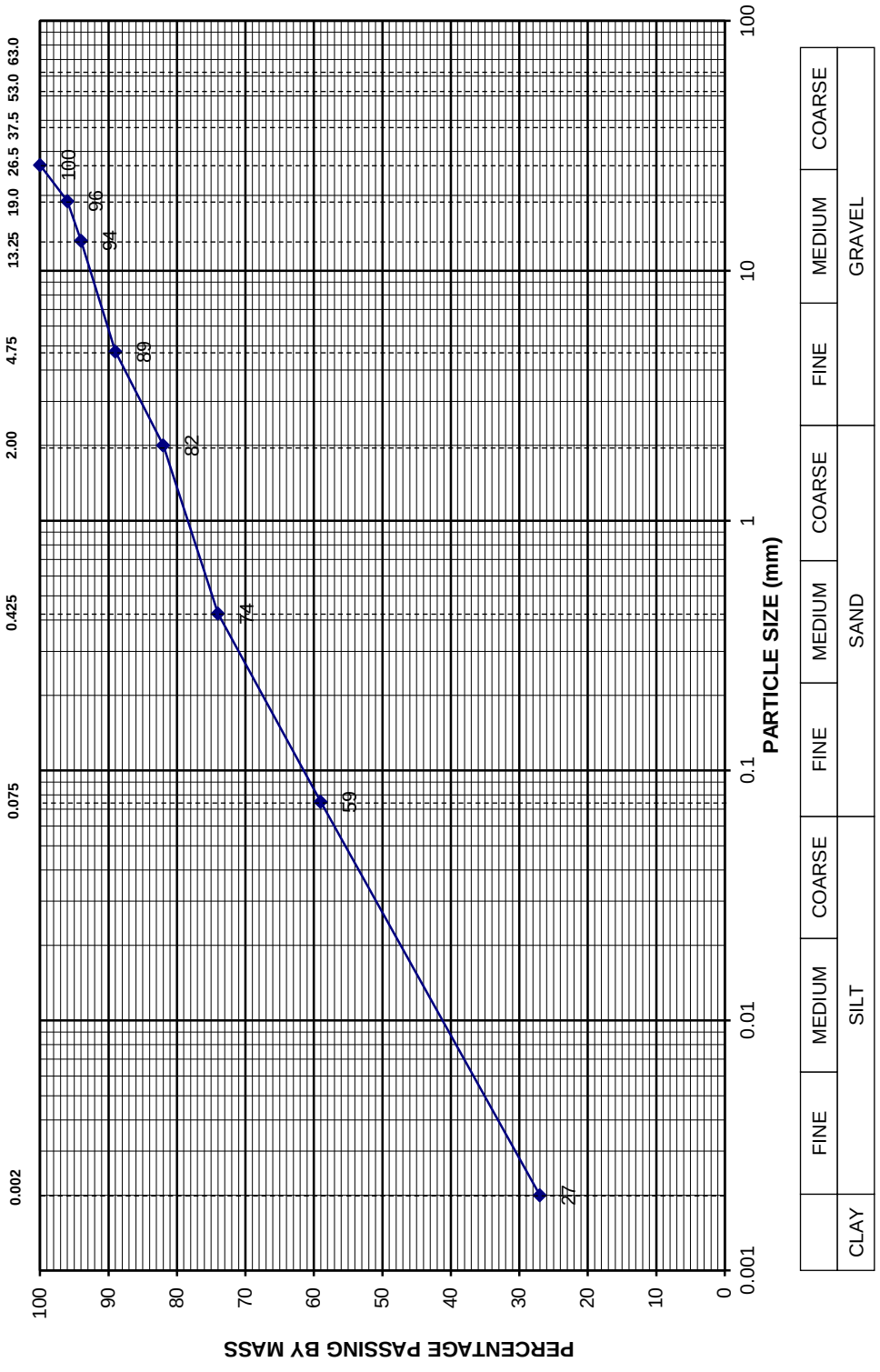


SAMPLE No. : VD16, 012/3587
DESCRIPTION : N/A
PAGE No. : 16 of 53

HOLE No. : TP 22
DEPTH : 0 - 600mm
POTENTIAL EXPANSIVENESS : Low

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447 0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

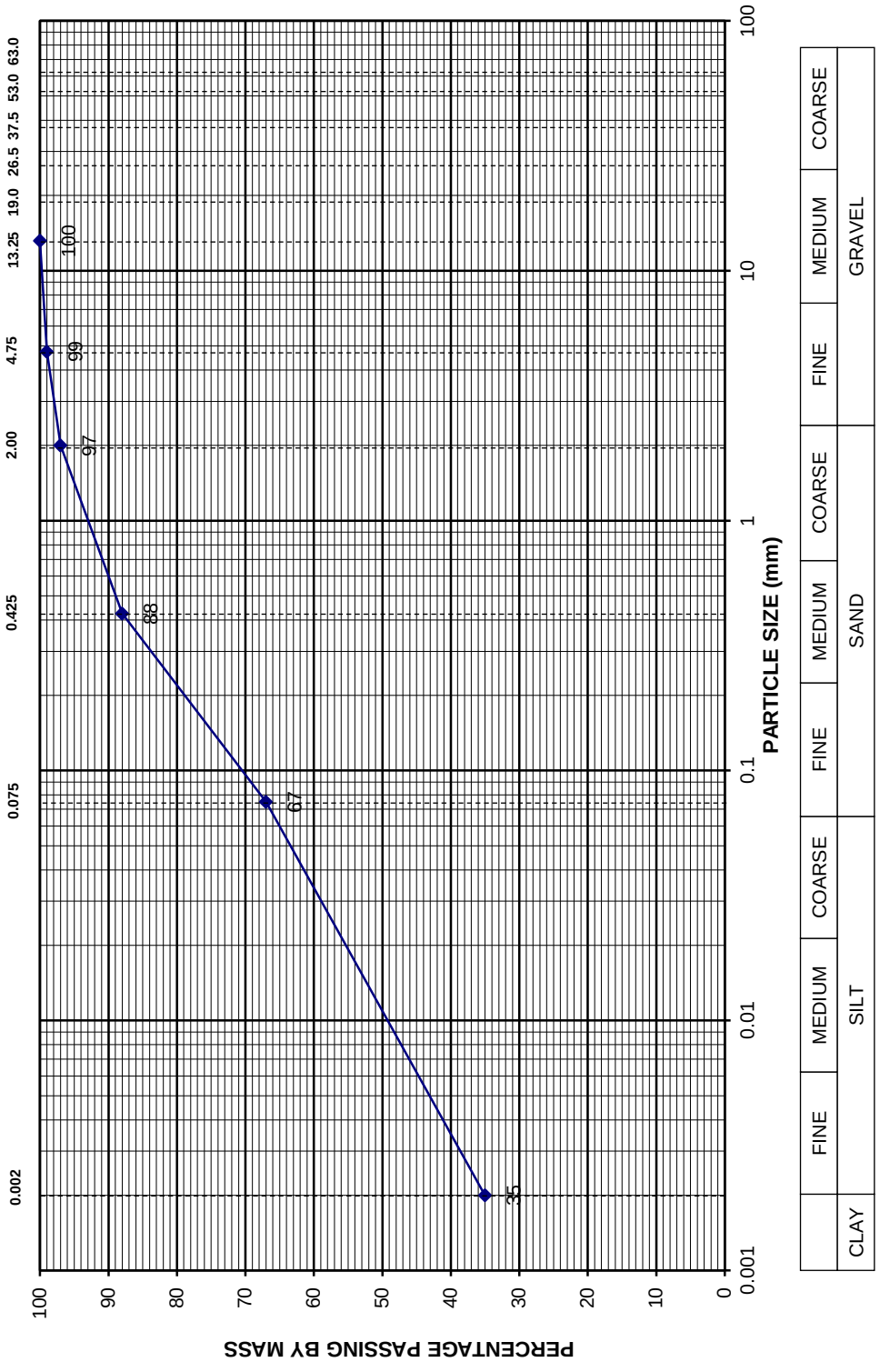
* PARTICLE SIZE DISTRIBUTION



HOLE No.	: TP 22
DEPTH	: 600 - 1100mm
POTENTIAL EXPANSIVENESS :	Medium / 6.9mm
SAMPLE No.	: VD17, 012/3588
DESCRIPTION :	N/A
PAGE No.	: 17 of 53

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447 0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

* PARTICLE SIZE DISTRIBUTION

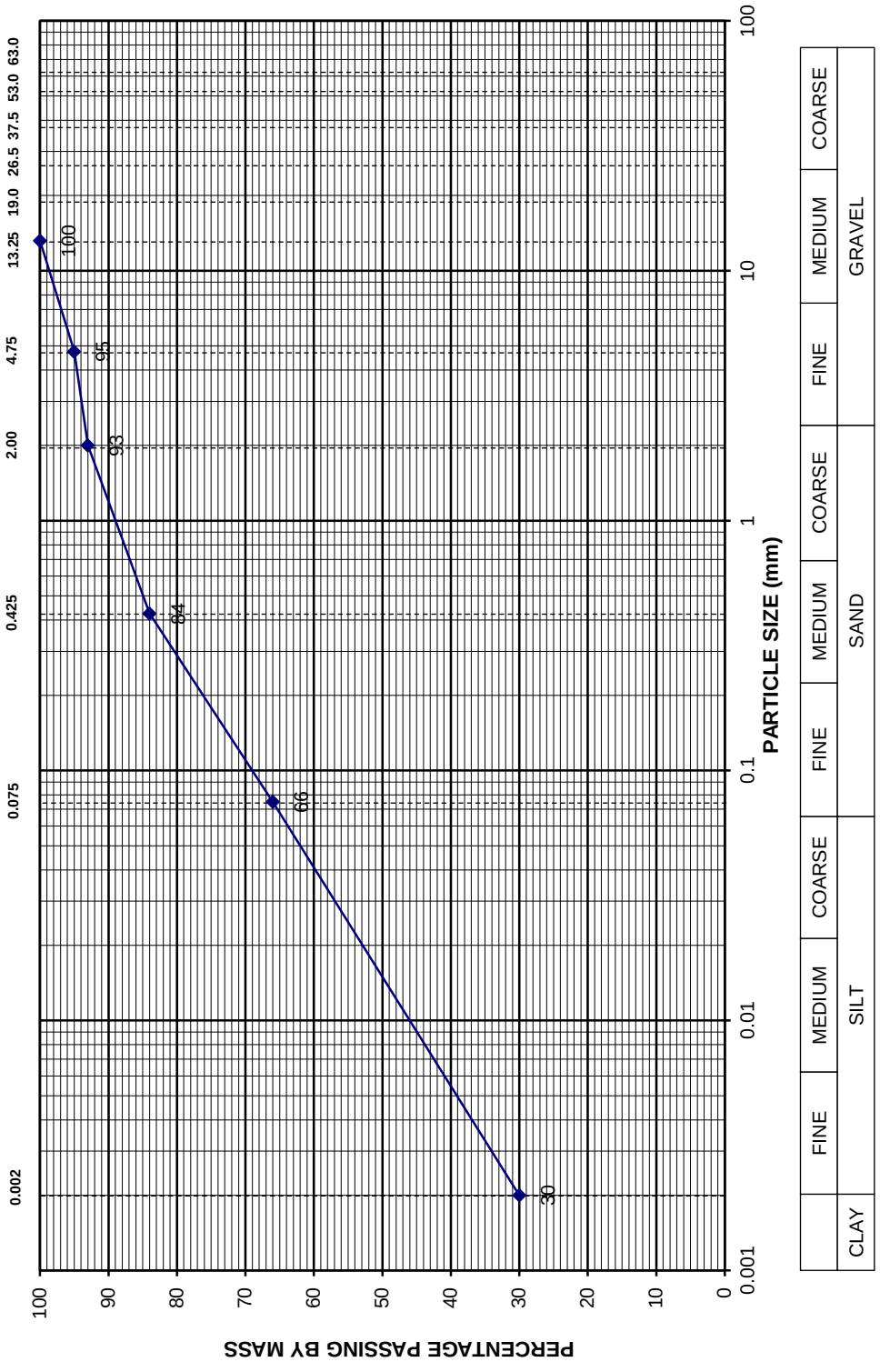


HOLE No. : TP24
DEPTH : 400 -2100mm
POTENTIAL EXPANSIVENESS : Medium / 21.0mm

SAMPLE No. : VD18, 012/3589
DESCRIPTION : N/A
PAGE No. : 18 of 53

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447 0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

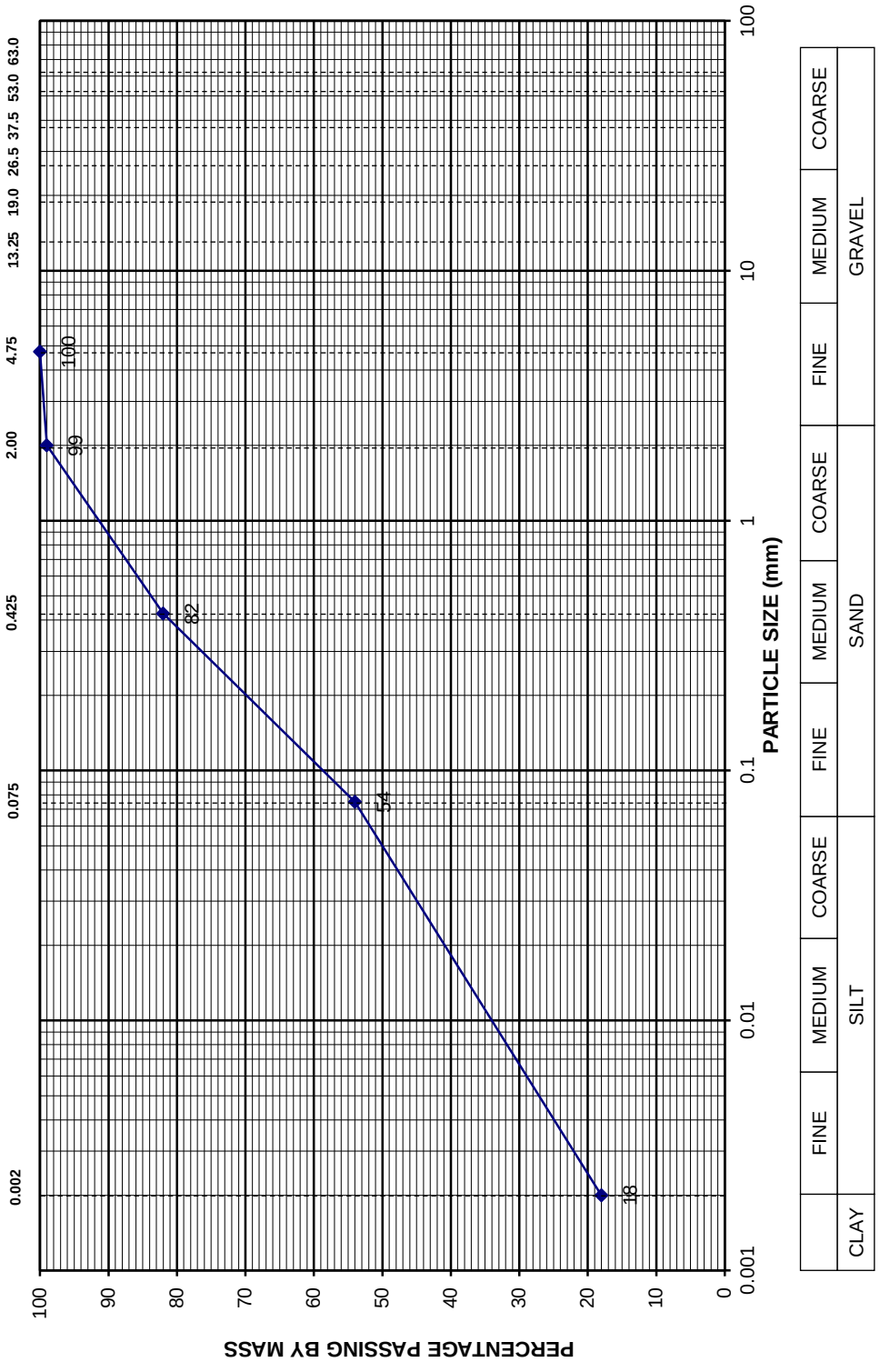
* PARTICLE SIZE DISTRIBUTION



SAMPLE No. :	VD19, 012/3590
DESCRIPTION :	N/A
PAGE No. :	19 of 53
HOLE No. :	TP 24
DEPTH :	2100 - 3000mm
POTENTIAL EXPANSIVENESS :	Low

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447 0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

* PARTICLE SIZE DISTRIBUTION

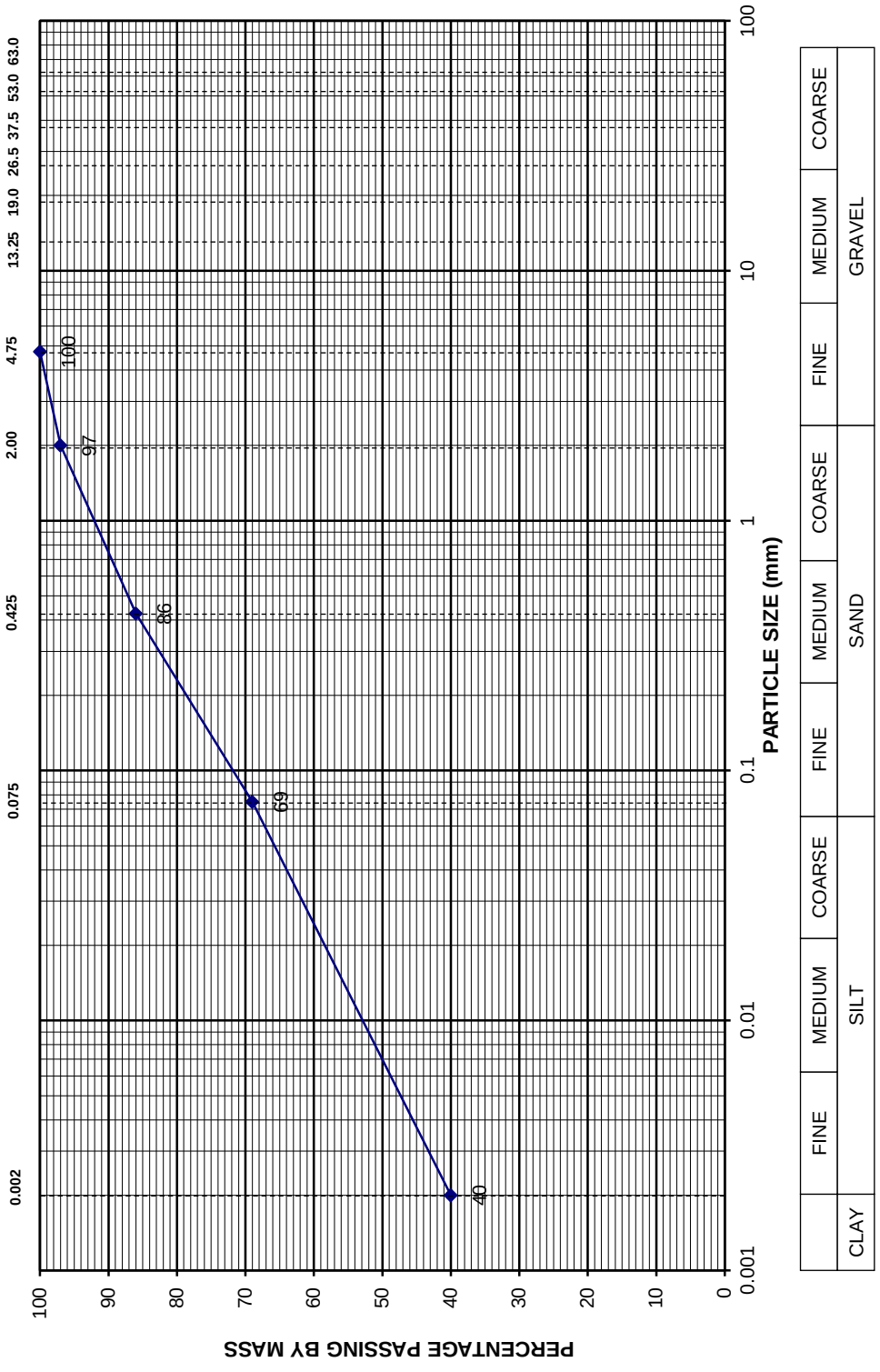


SAMPLE No. : VD20, 012/3591
DESCRIPTION : N/A
PAGE No. : 20 of 53

HOLE No. : TP 28
DEPTH : 0 - 600mm
POTENTIAL EXPANSIVENESS : Low

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447 0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

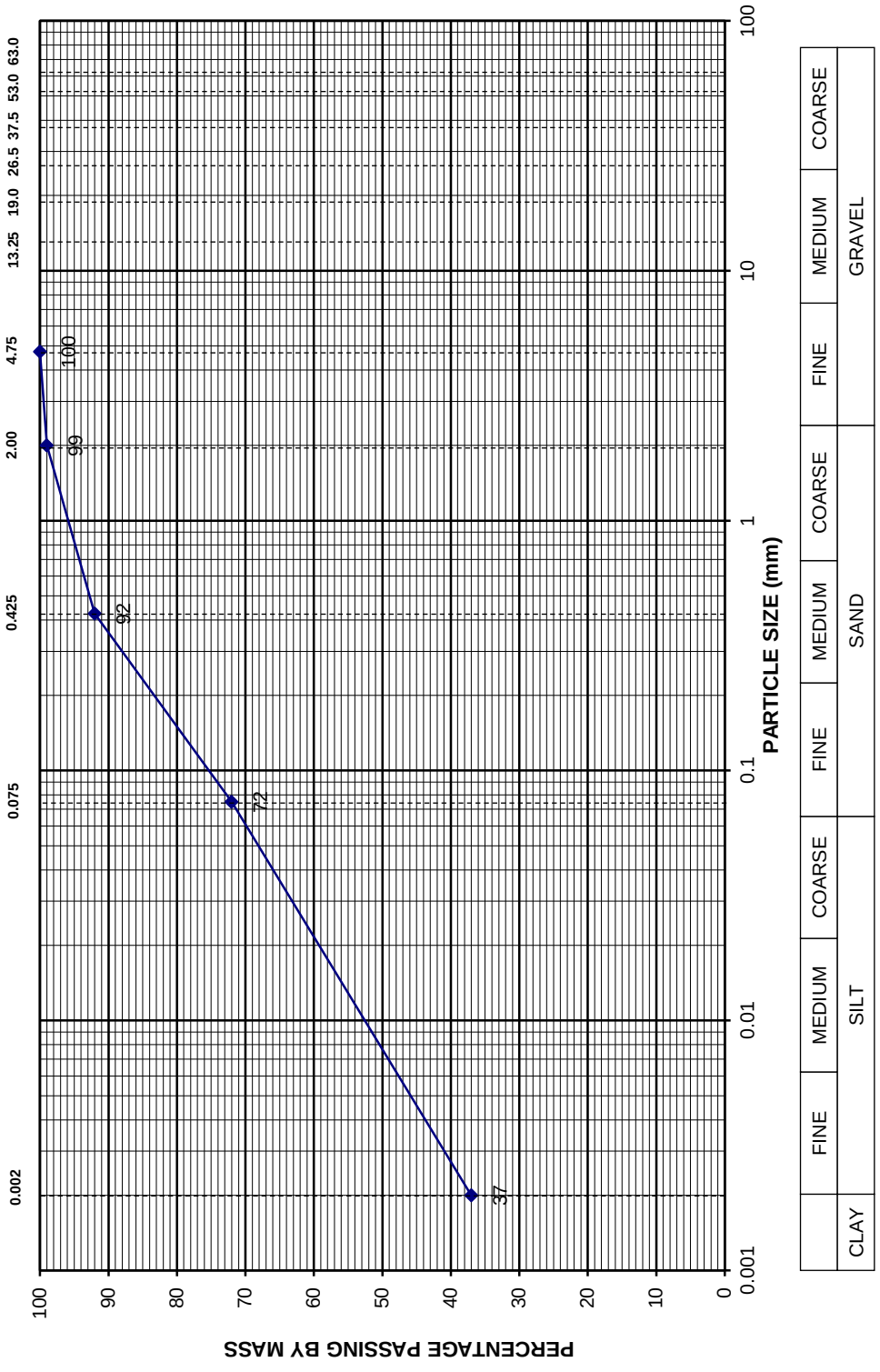
* PARTICLE SIZE DISTRIBUTION



HOLE No.	: TP 28
DEPTH	: 600 - 1200mm
POTENTIAL EXPANSIVENESS :	High / 16.0mm
SAMPLE No.	: VD21, 012/3592
DESCRIPTION :	N/A
PAGE No.	: 21 of 53

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447 0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

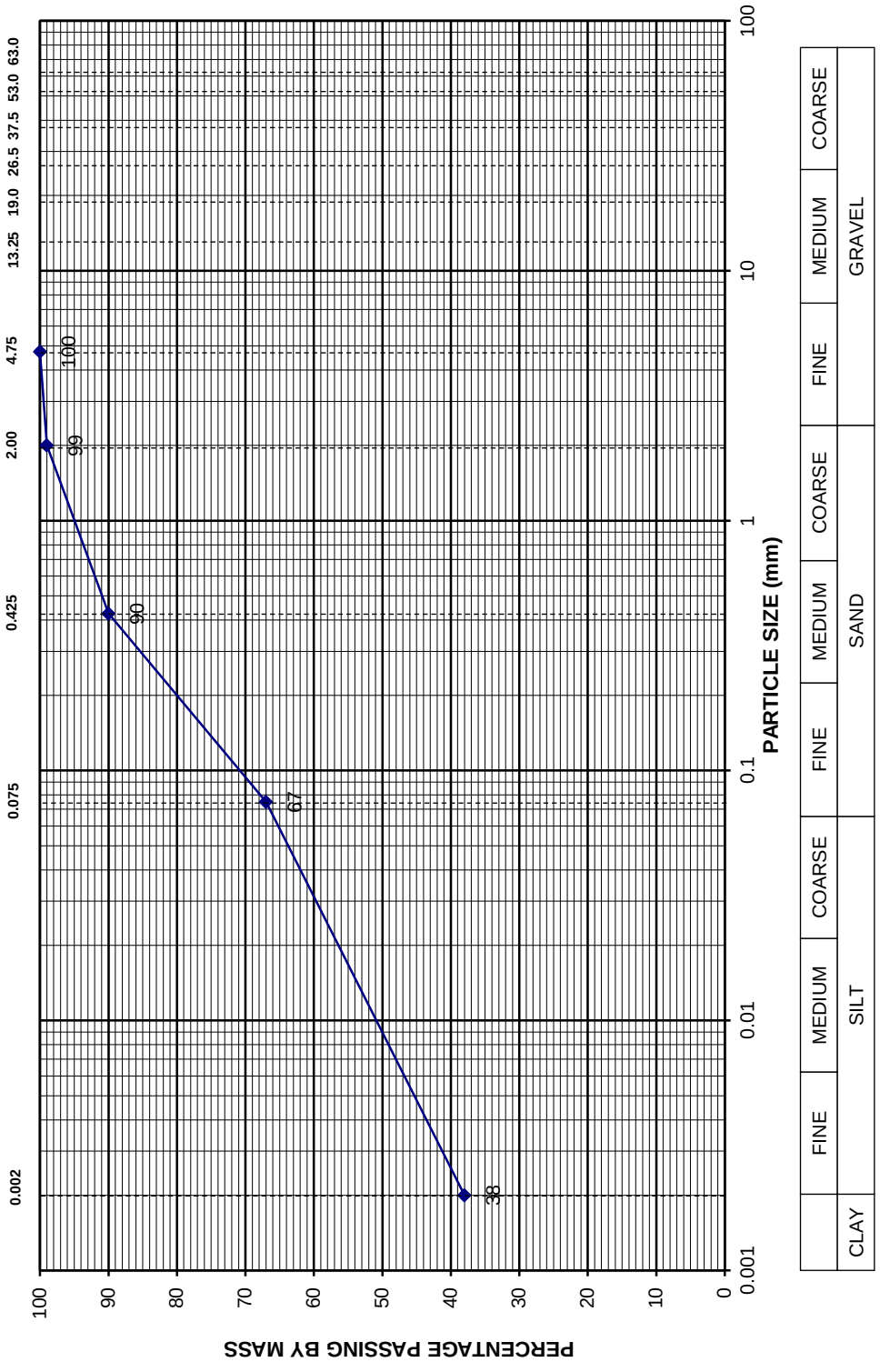
* PARTICLE SIZE DISTRIBUTION



SAMPLE No. :	VD22, 012/3593
DESCRIPTION :	N/A
PAGE No. :	22 of 53
HOLE No. :	TP 28
DEPTH :	1200 - 28500mm
POTENTIAL EXPANSIVENESS :	Medium / 15.mm

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447 0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

* PARTICLE SIZE DISTRIBUTION

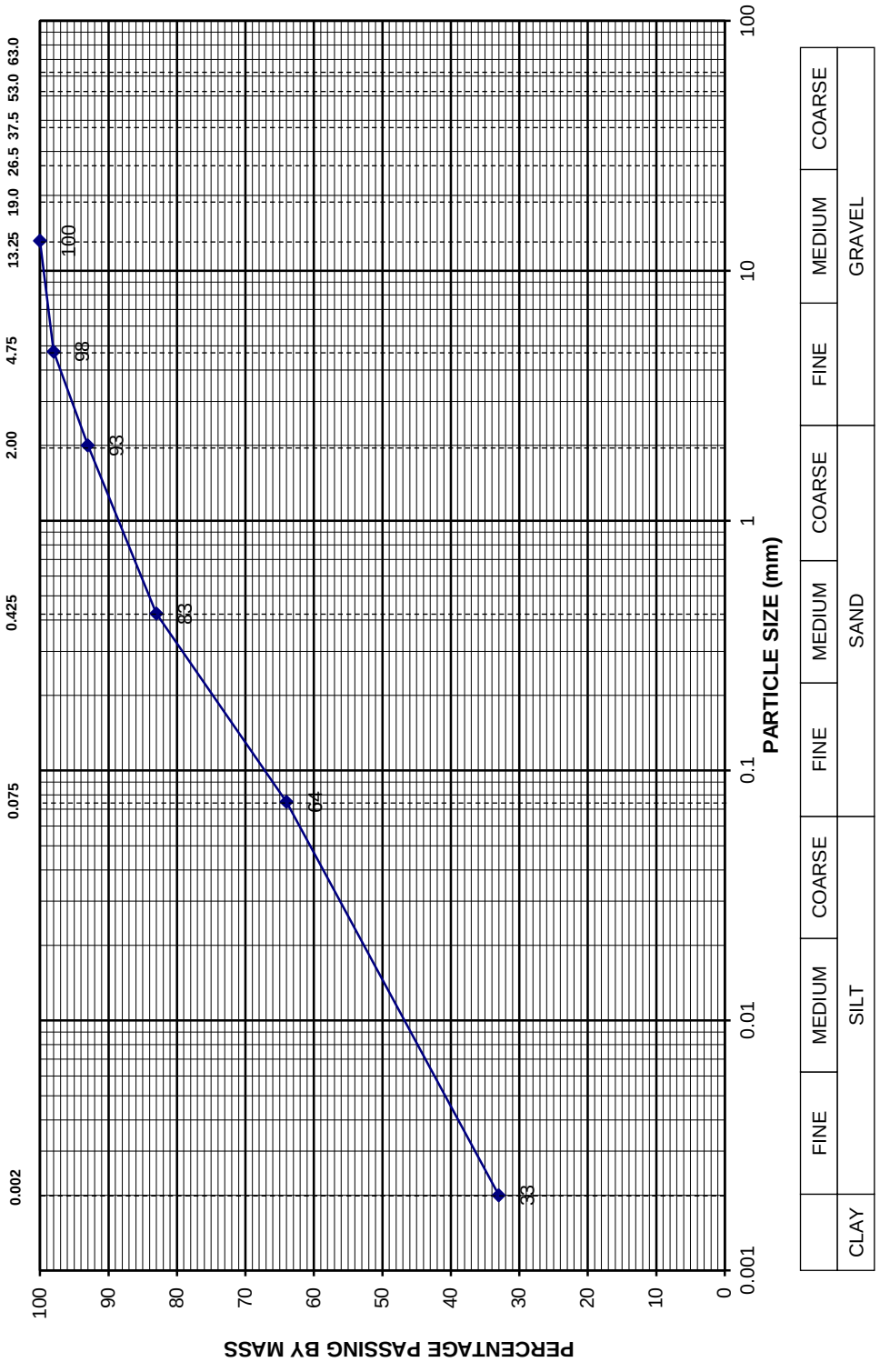


HOLE No. : TP 30
DEPTH : 300 - 600mm
POTENTIAL EXPANSIVENESS : High / 10.0mm

SAMPLE No. : VD23, 012/3594
DESCRIPTION : N/A
PAGE No. : 23 of 53

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447 0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

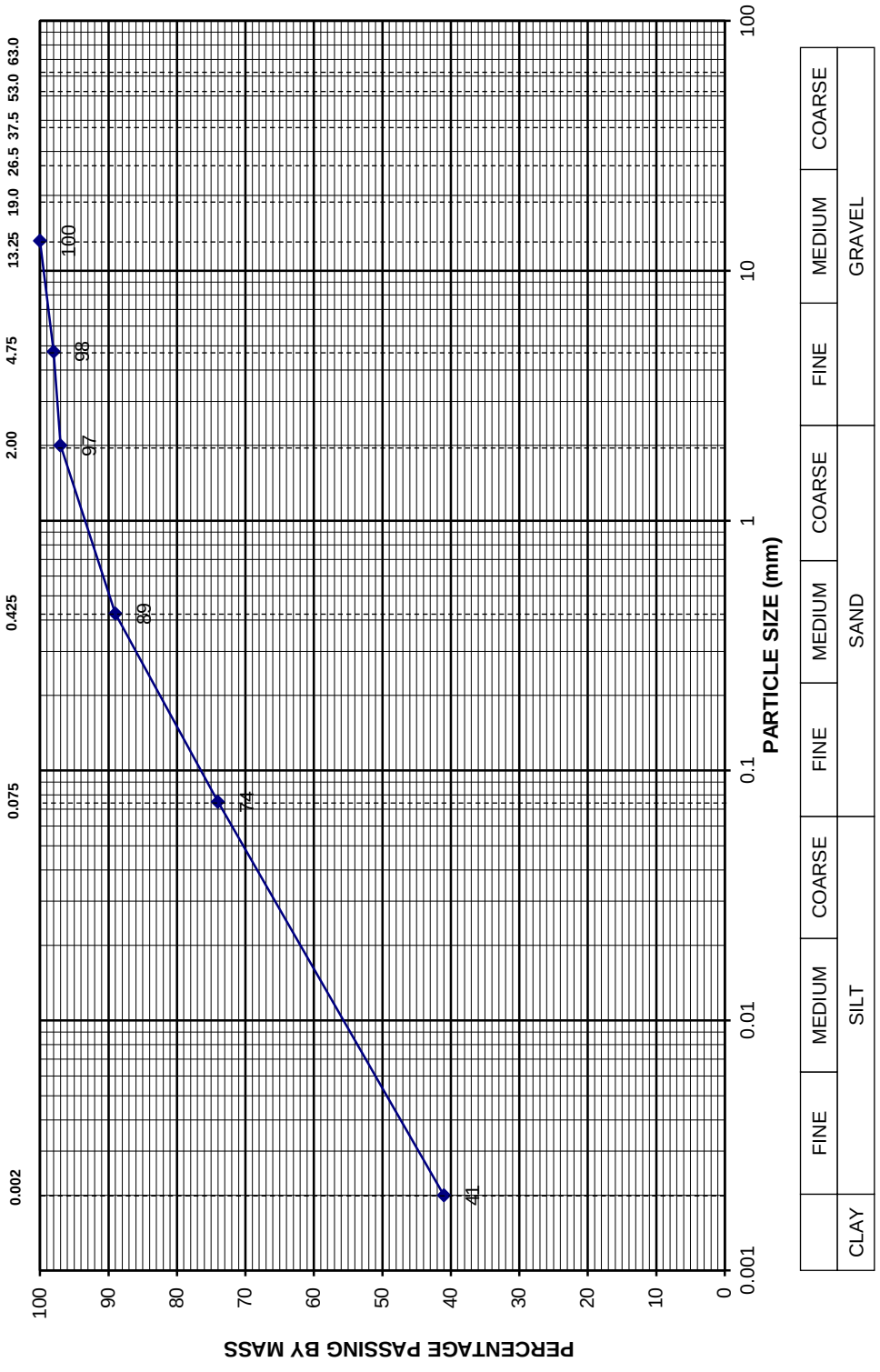
* PARTICLE SIZE DISTRIBUTION



HOLE No.	: TP 30
DEPTH	: 600 - 1400mm
POTENTIAL EXPANSIVENESS :	Low
SAMPLE No.	: VD24, 012/3595
DESCRIPTION :	N/A
PAGE No.	: 24 of 53

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447 0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

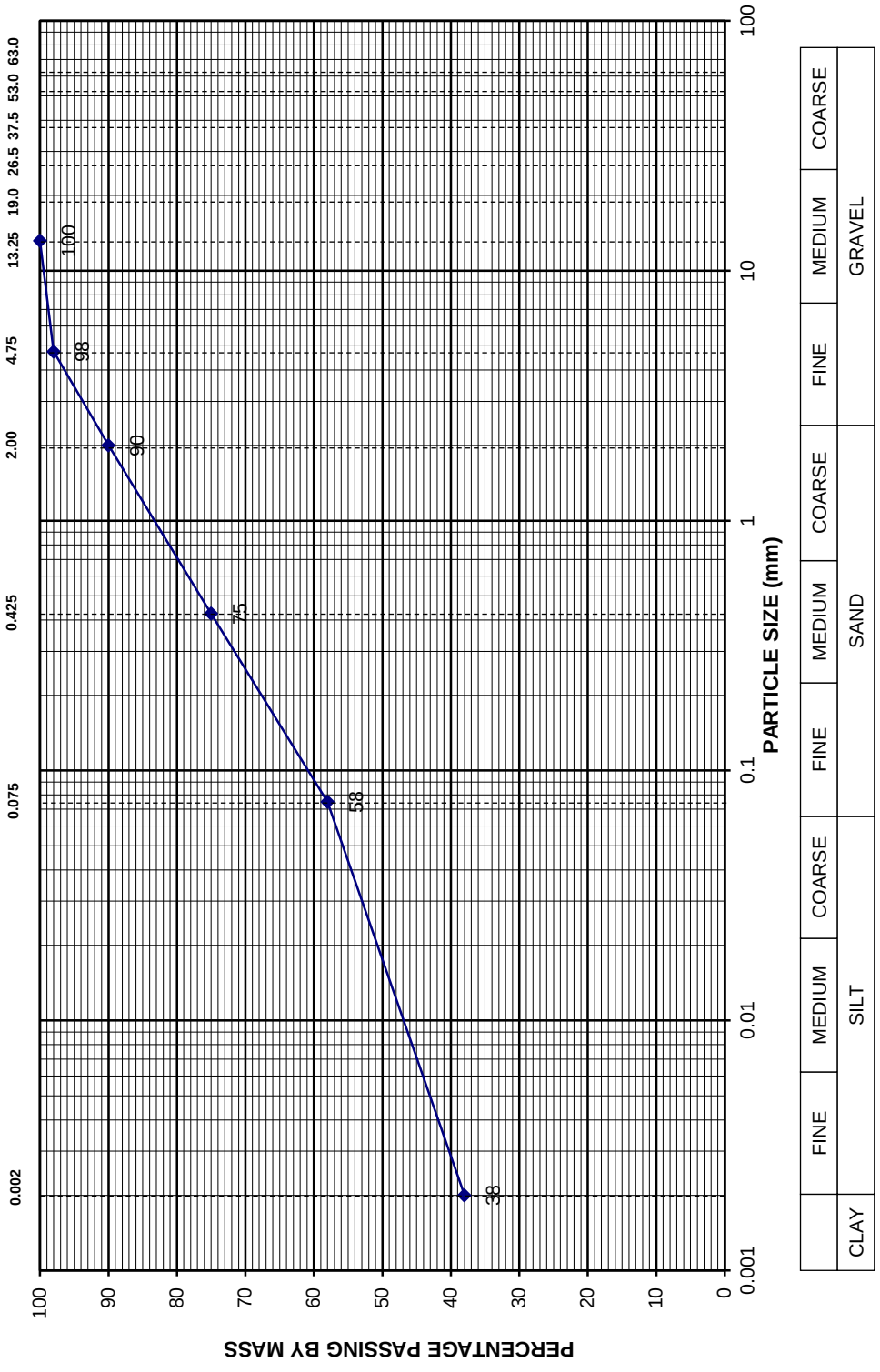
* PARTICLE SIZE DISTRIBUTION



HOLE No. :	TP 32
DEPTH :	300 - 1000mm
POTENTIAL EXPANSIVENESS :	Low
SAMPLE No. :	VD25, 012/3596
DESCRIPTION :	N/A
PAGE No. :	25 of 53

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447 0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

* PARTICLE SIZE DISTRIBUTION

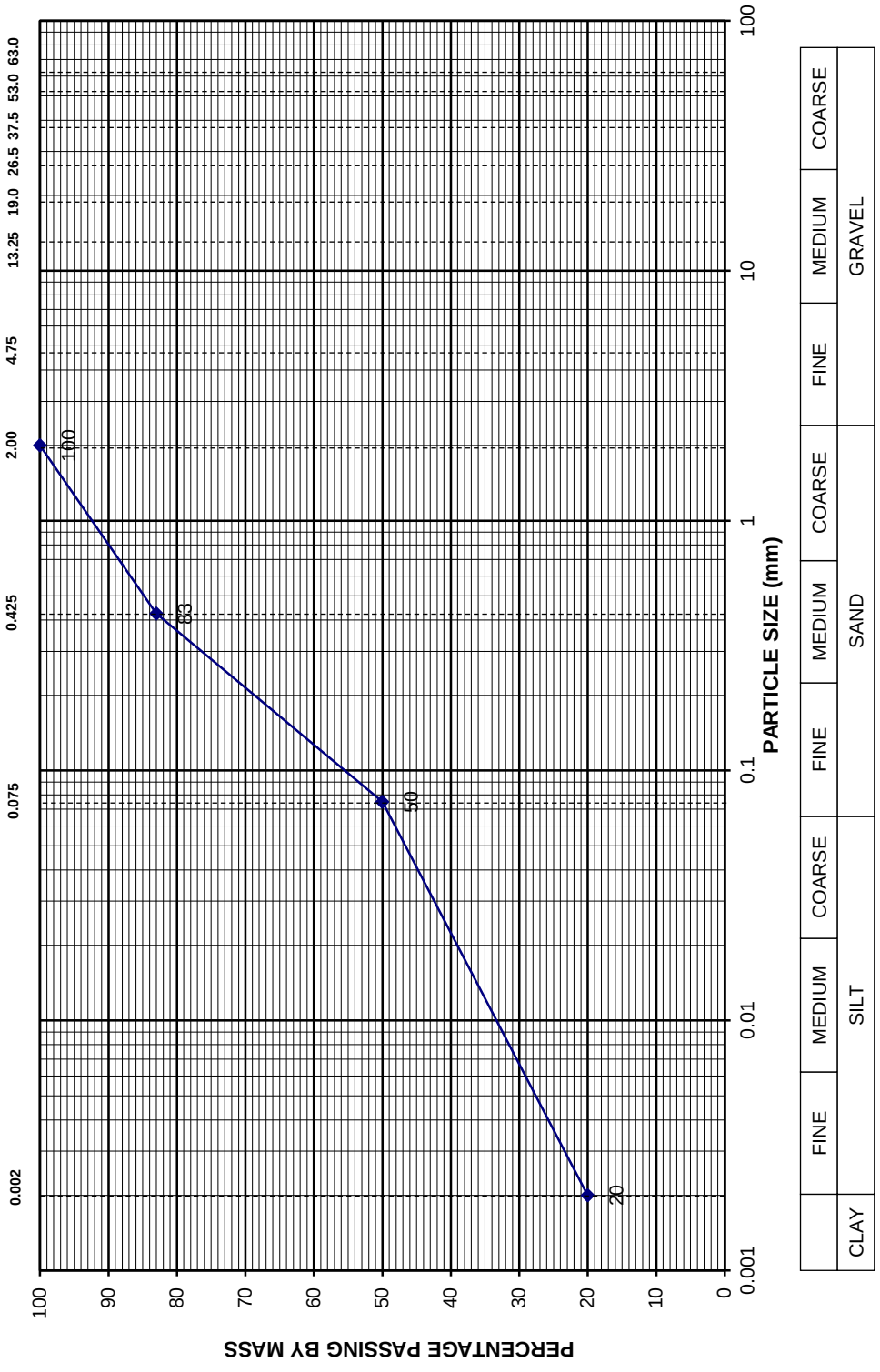


HOLE No. : TP 32
DEPTH : 1000 - 1900mm
POTENTIAL EXPANSIVENESS : Medium / 9.5mm

SAMPLE No. : VD26, 012/3597
DESCRIPTION : N/A
PAGE No. : 26 of 53

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447 0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

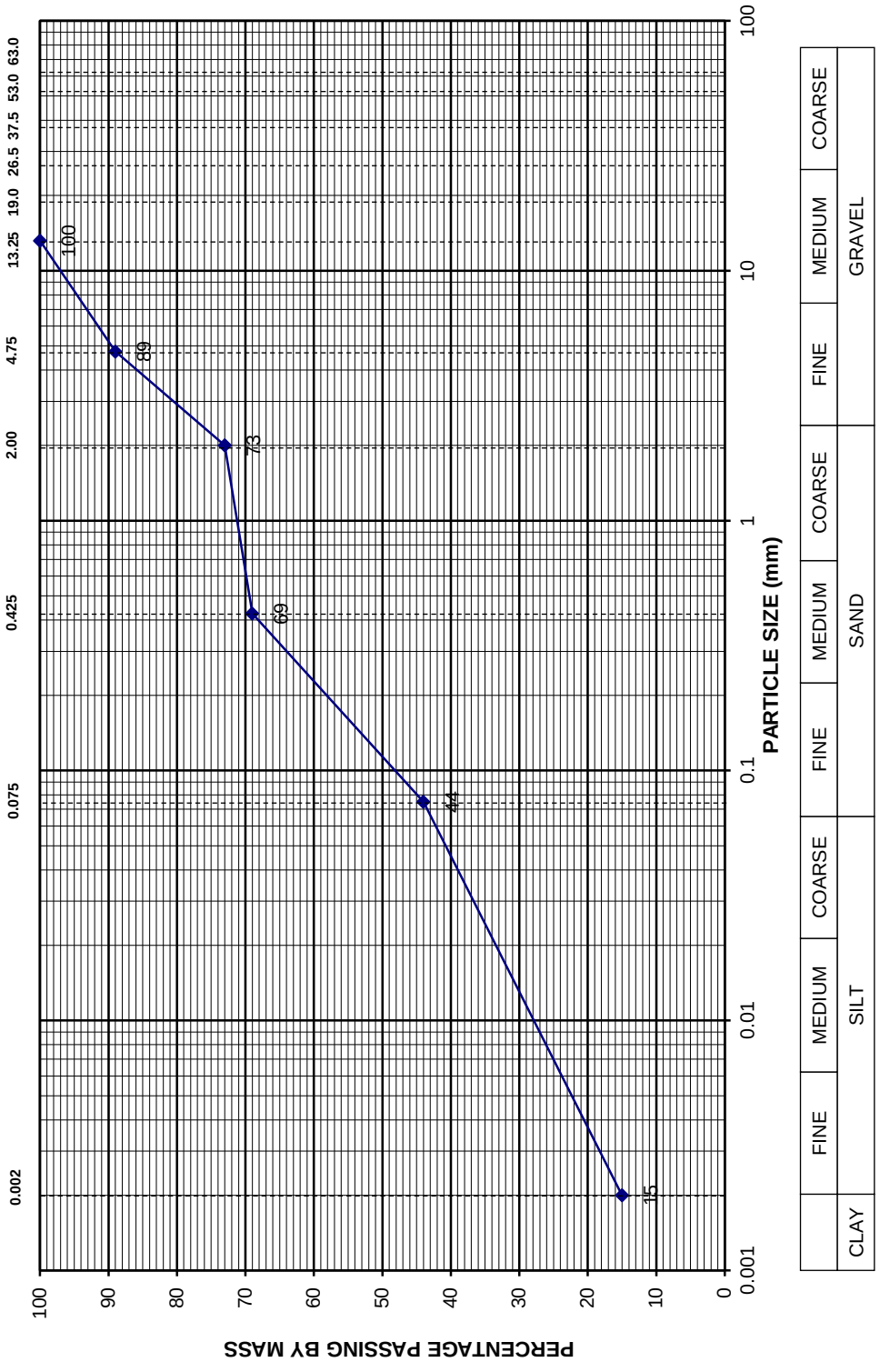
* PARTICLE SIZE DISTRIBUTION



HOLE No.	: TP 33
DEPTH	: 0 - 600mm
POTENTIAL EXPANSIVENESS :	Low
SAMPLE No.	: VD27, 012/3598
DESCRIPTION :	N/A
PAGE No.	: 27 of 53

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447 0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

* PARTICLE SIZE DISTRIBUTION



SAMPLE No. : VD28, 012/3599

DESCRIPTION : N/A

PAGE No. : 28 of 53

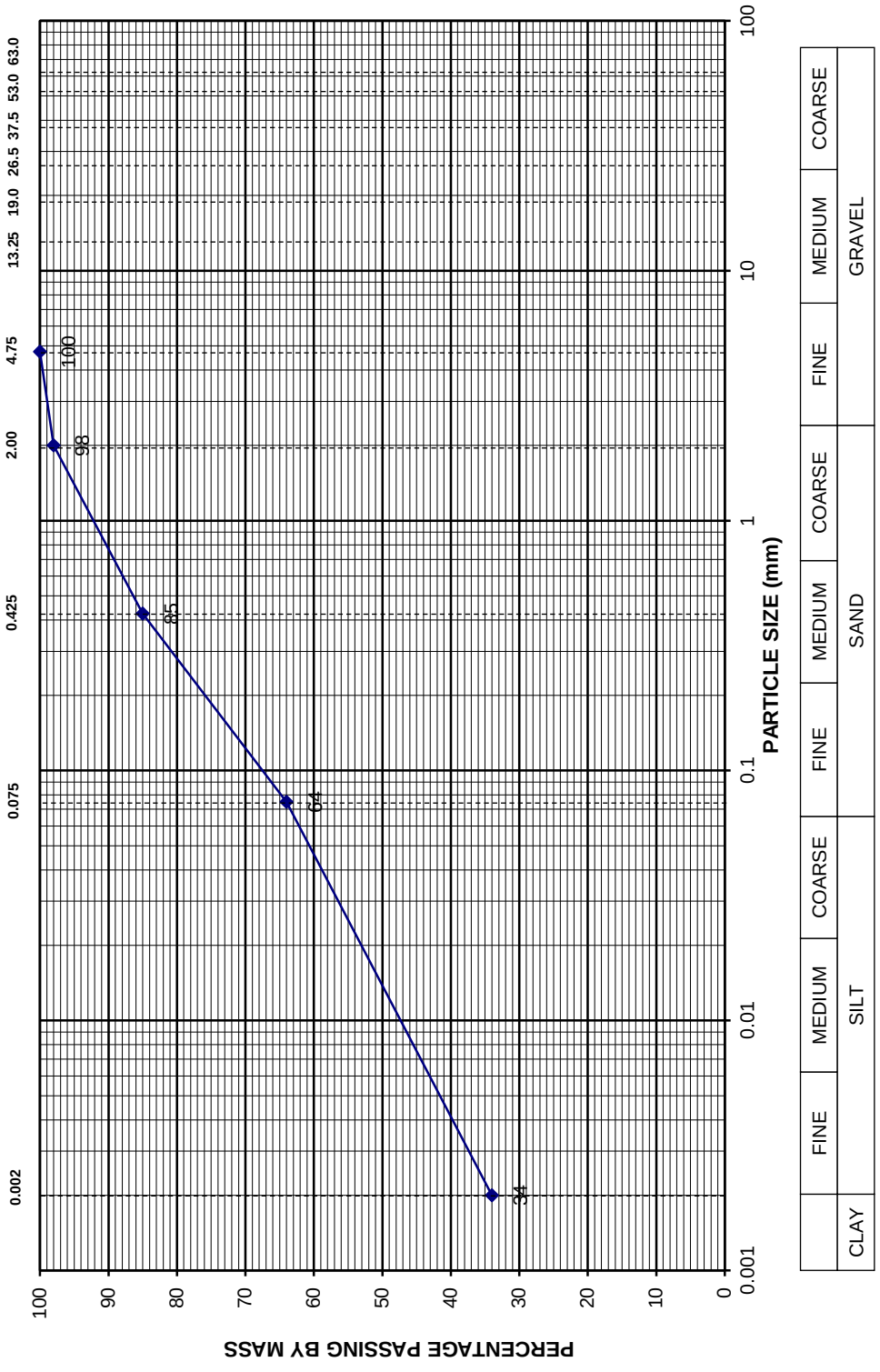
HOLE No. : TP 33

DEPTH : 600 - 1300mm

POTENTIAL EXPANSIVENESS : Medium / 8.7mm

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447 0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

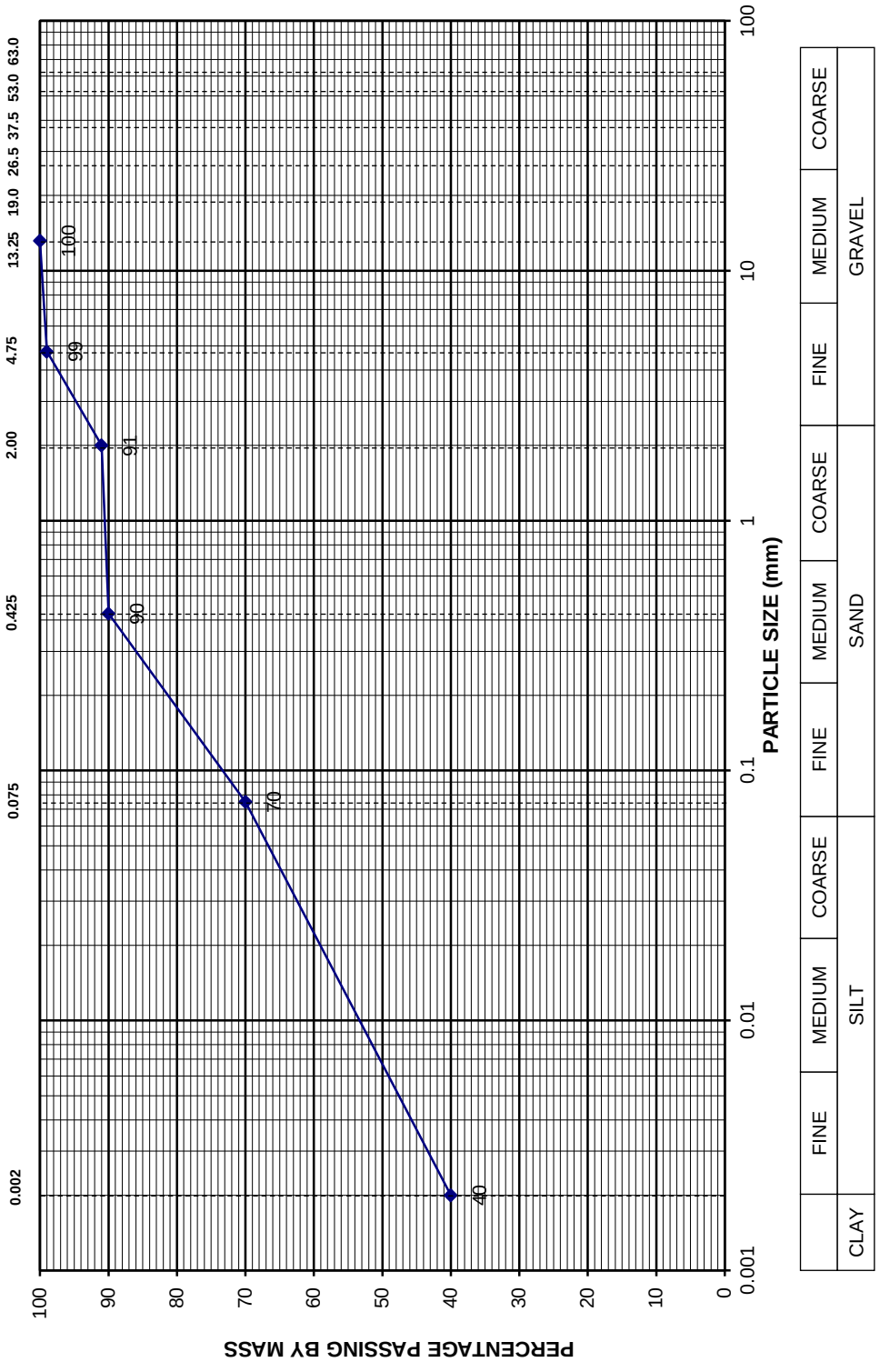
* PARTICLE SIZE DISTRIBUTION



HOLE No.	: TP 35
DEPTH	: 400 - 1000mm
POTENTIAL EXPANSIVENESS :	Low
SAMPLE No.	: VD29, 012/3600
DESCRIPTION :	N/A
PAGE No.	: 29 of 53

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447 0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

* PARTICLE SIZE DISTRIBUTION

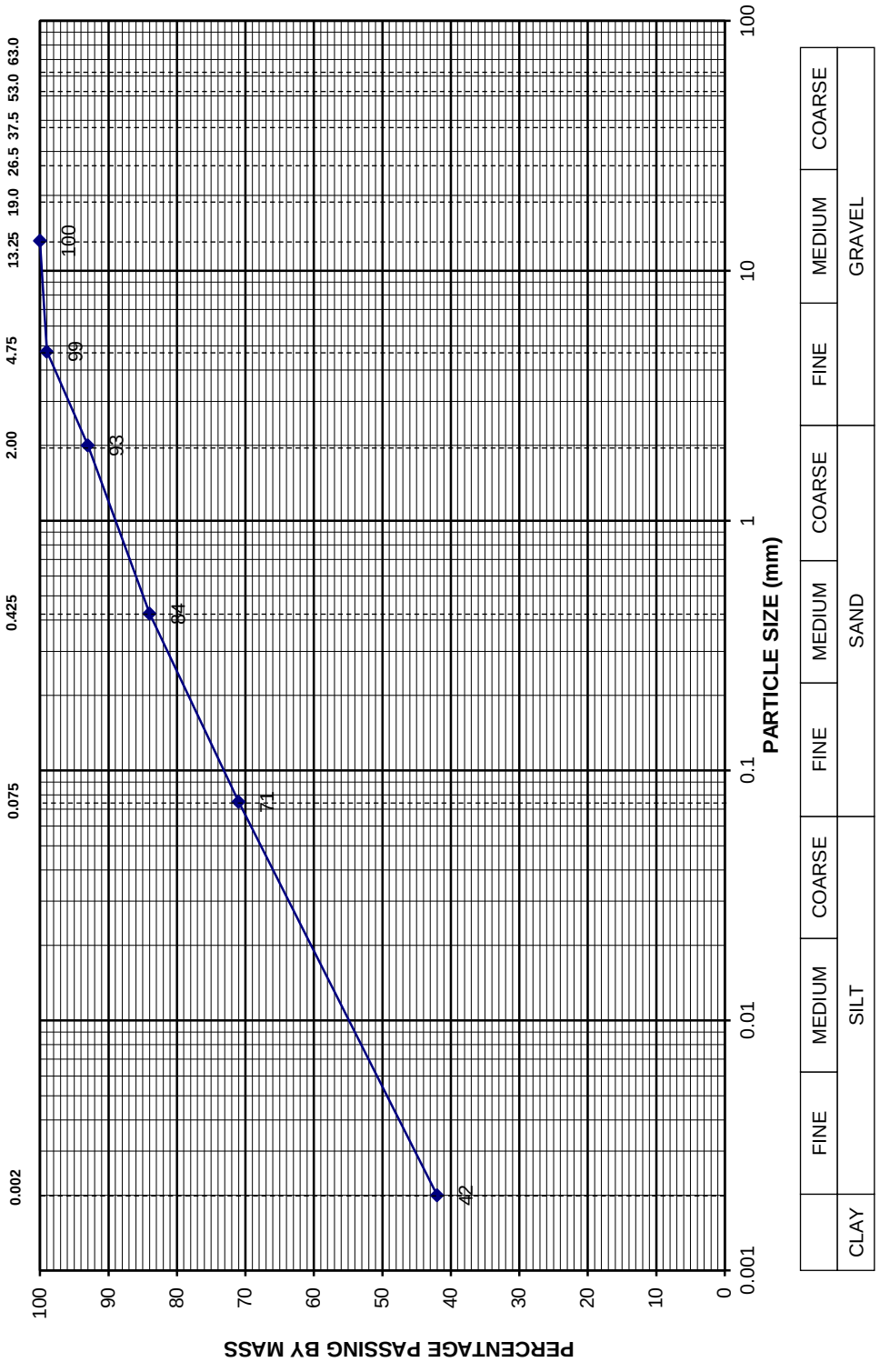


HOLE No. : TP 36
DEPTH : 300 - 700mm
POTENTIAL EXPANSIVENESS : Medium / 6.4mm

SAMPLE No. : VD30, 012/3601
DESCRIPTION : N/A
PAGE No. : 30 of 53

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447 0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

* PARTICLE SIZE DISTRIBUTION

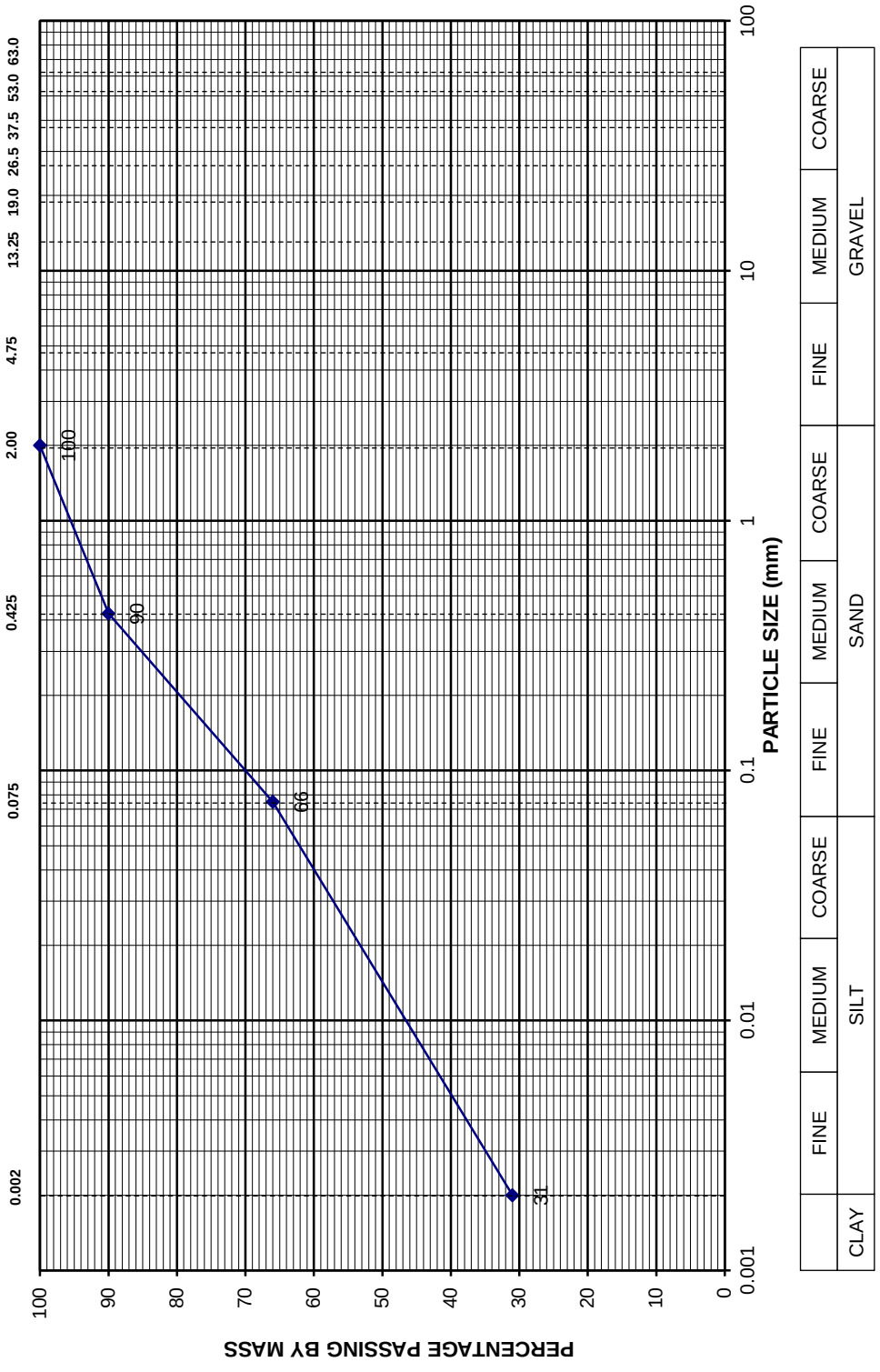


HOLE No. : TP 36
DEPTH : 700 -1000mm
POTENTIAL EXPANSIVENESS : Low

SAMPLE No. : VD31, 012/3602
DESCRIPTION : N/A
PAGE No. : 31 of 53

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447 0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

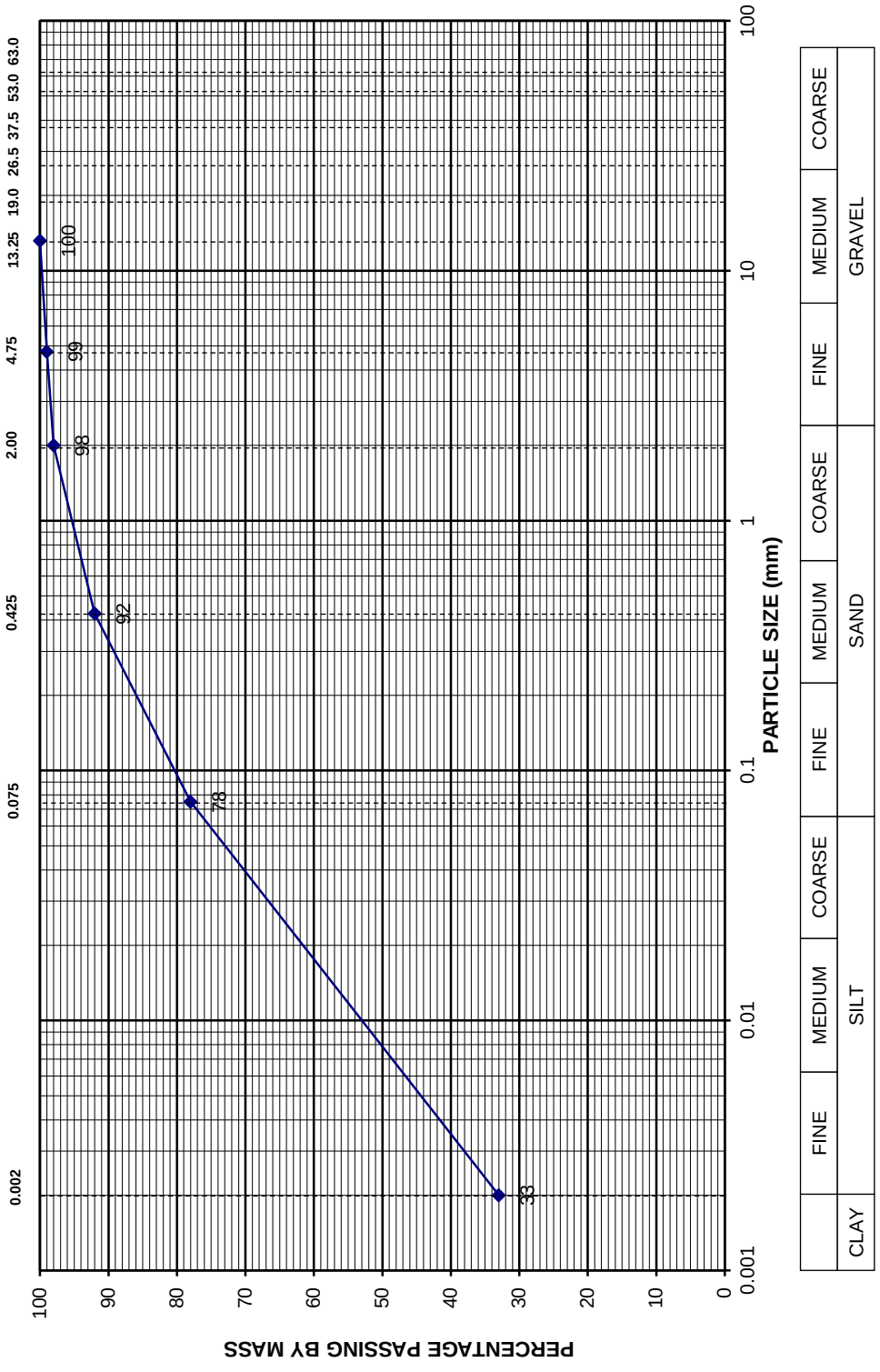
* PARTICLE SIZE DISTRIBUTION



HOLE No. :	TP 37
DEPTH :	400 - 900mm
POTENTIAL EXPANSIVENESS :	Medium / 7.3mm
SAMPLE No. :	VD32, 012/3603
DESCRIPTION :	N/A
PAGE No. :	32 of 53

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447 0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

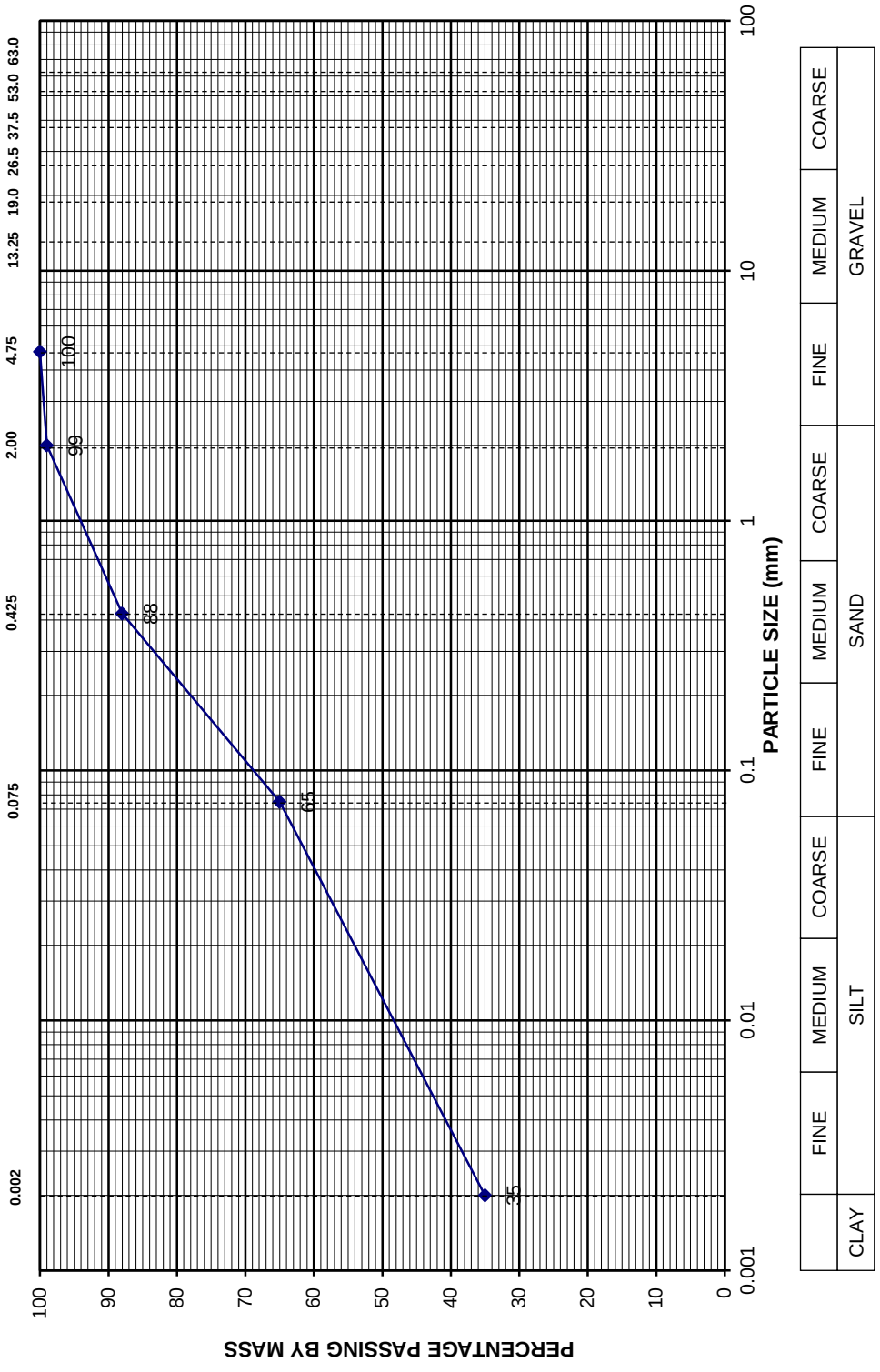
* PARTICLE SIZE DISTRIBUTION



SAMPLE No. :	VD33, 012/3604
DESCRIPTION :	N/A
PAGE No. :	33 of 53
HOLE No. :	TP 37
DEPTH :	900 -2300mm
POTENTIAL EXPANSIVENESS :	Low

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447 0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

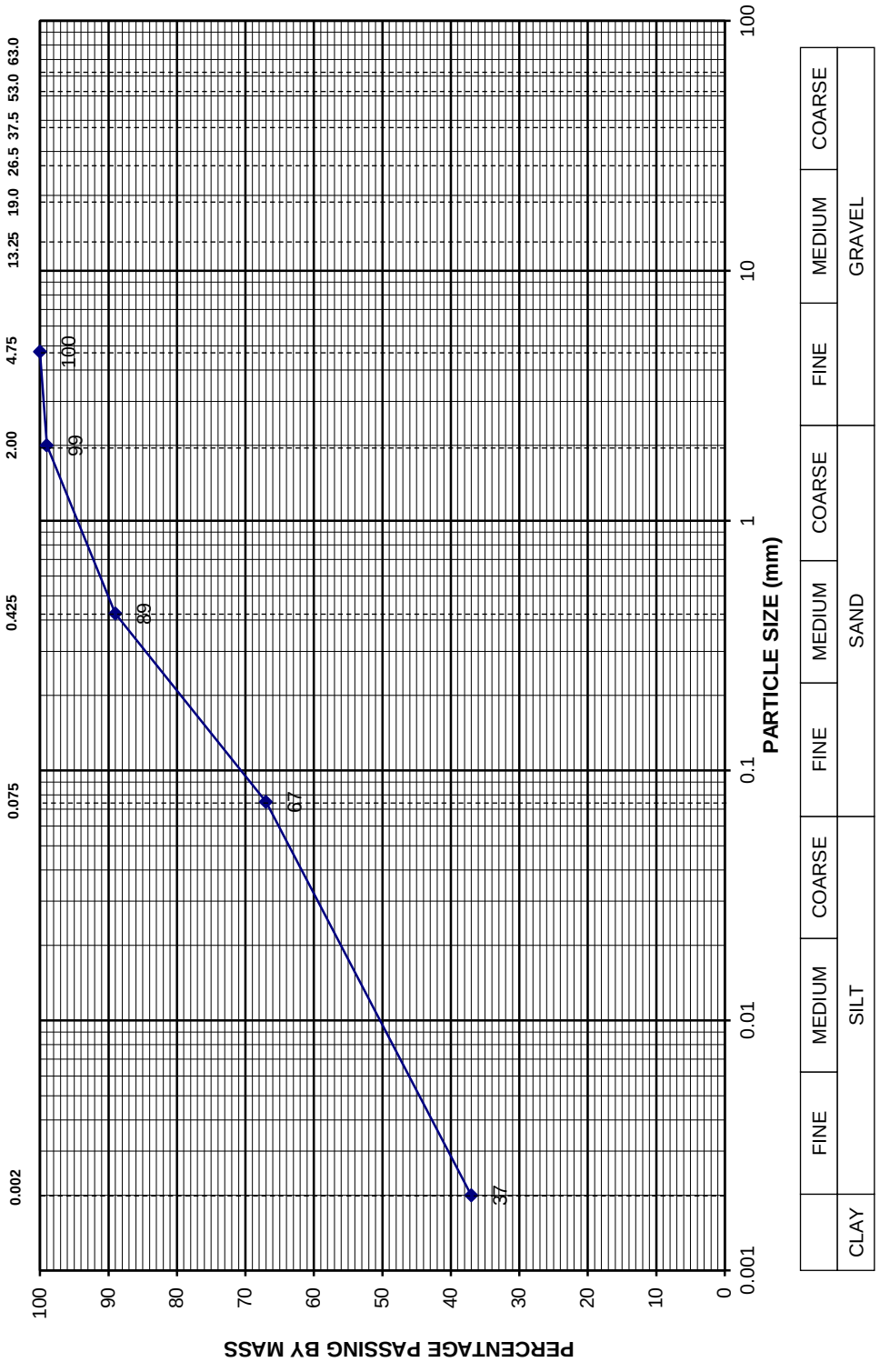
* PARTICLE SIZE DISTRIBUTION



HOLE No. :	TP 39
DEPTH :	500 - 1000mm
POTENTIAL EXPANSIVENESS :	Low
SAMPLE No. :	VD34, 012/3605
DESCRIPTION :	N/A
PAGE No. :	34 of 53

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447 0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

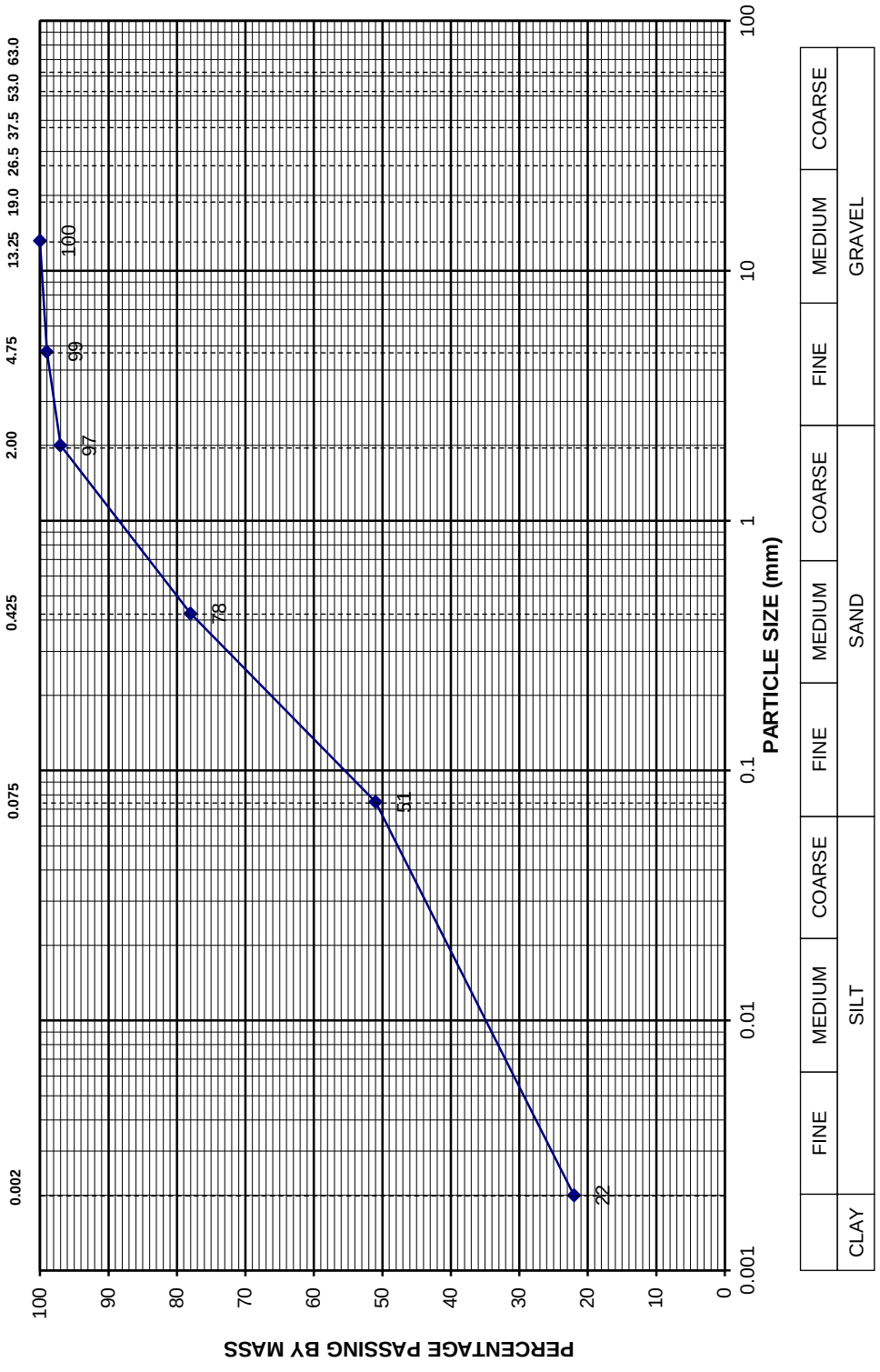
* PARTICLE SIZE DISTRIBUTION



HOLE No.	: TP 39
DEPTH	: 1000 - 2000mm
POTENTIAL EXPANSIVENESS :	Medium / 10.4mm
SAMPLE No.	: VD35, 012/3606
DESCRIPTION :	N/A
PAGE No.	: 35 of 53

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447 0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

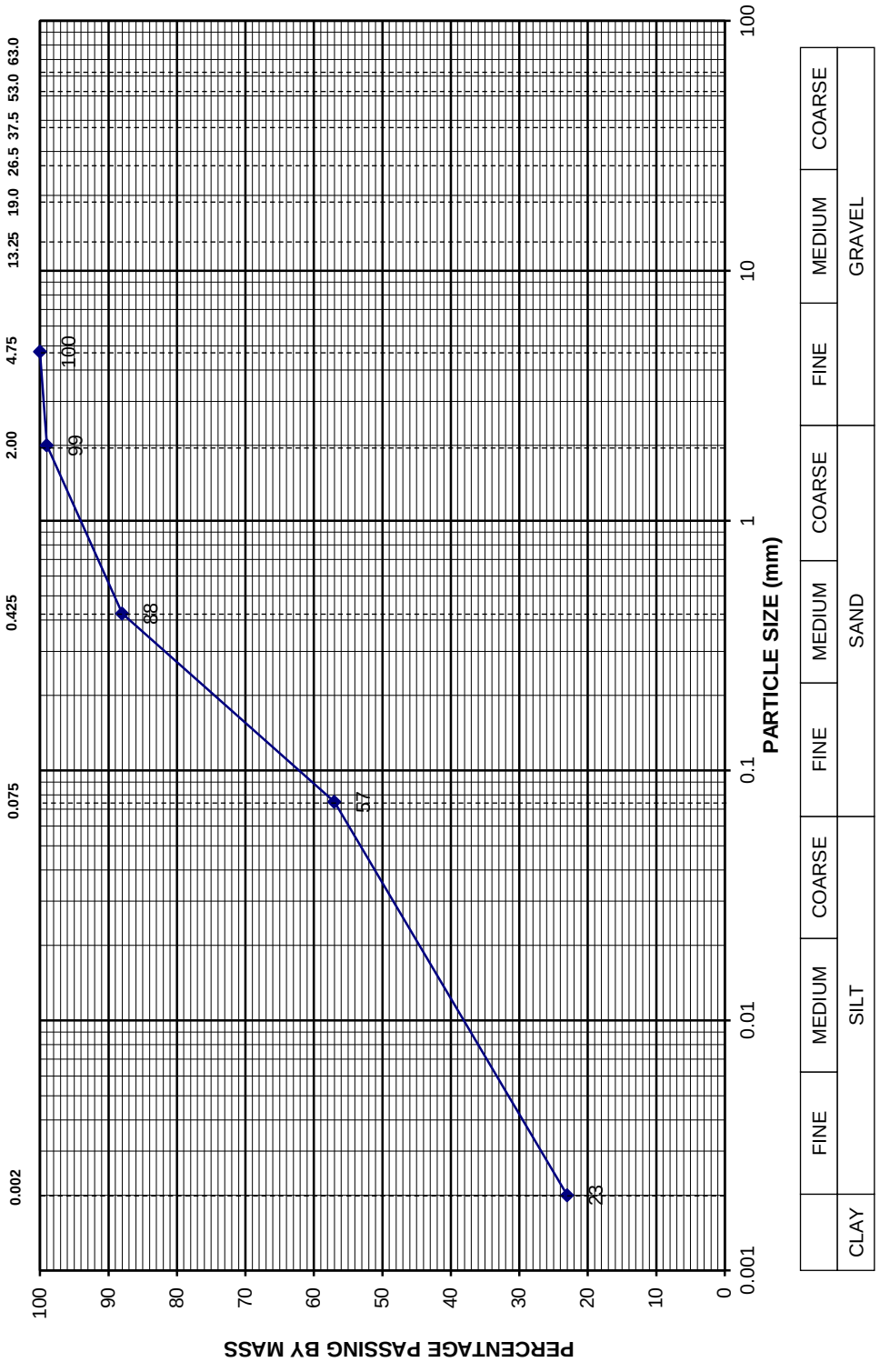
* PARTICLE SIZE DISTRIBUTION



SAMPLE No. :	VD36, 012/3607
DESCRIPTION :	N/A
PAGE No. :	36 of 53
HOLE No. :	TP 40
DEPTH :	400 - 1000mm
POTENTIAL EXPANSIVENESS :	Low

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447 0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

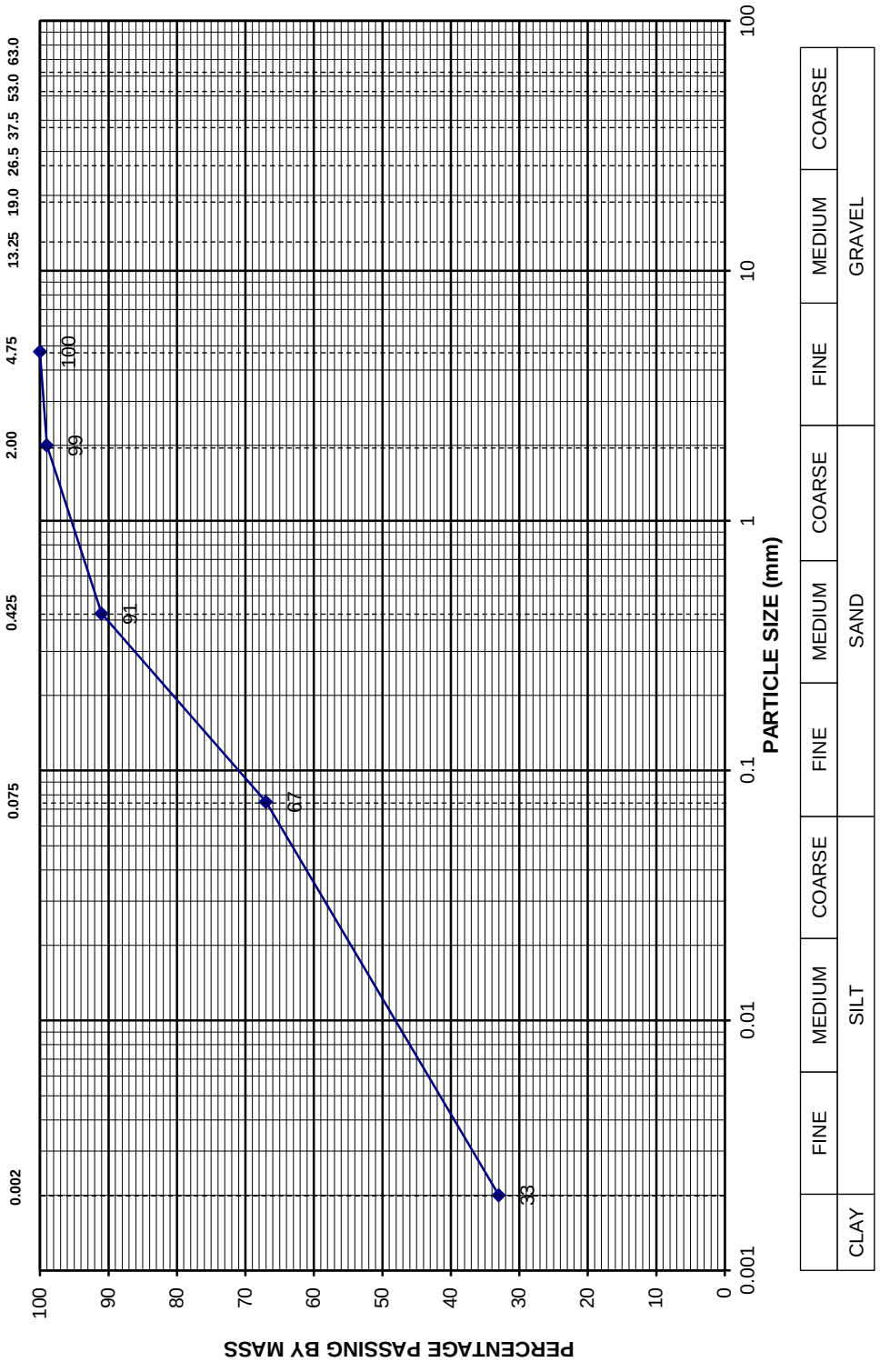
* PARTICLE SIZE DISTRIBUTION



HOLE No.	: TP 41
DEPTH	: 0 - 600mm
POTENTIAL EXPANSIVENESS :	Medium / 9.5mm
SAMPLE No.	: VD37, 012/3608
DESCRIPTION :	N/A
PAGE No.	: 37 of 53

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447 0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

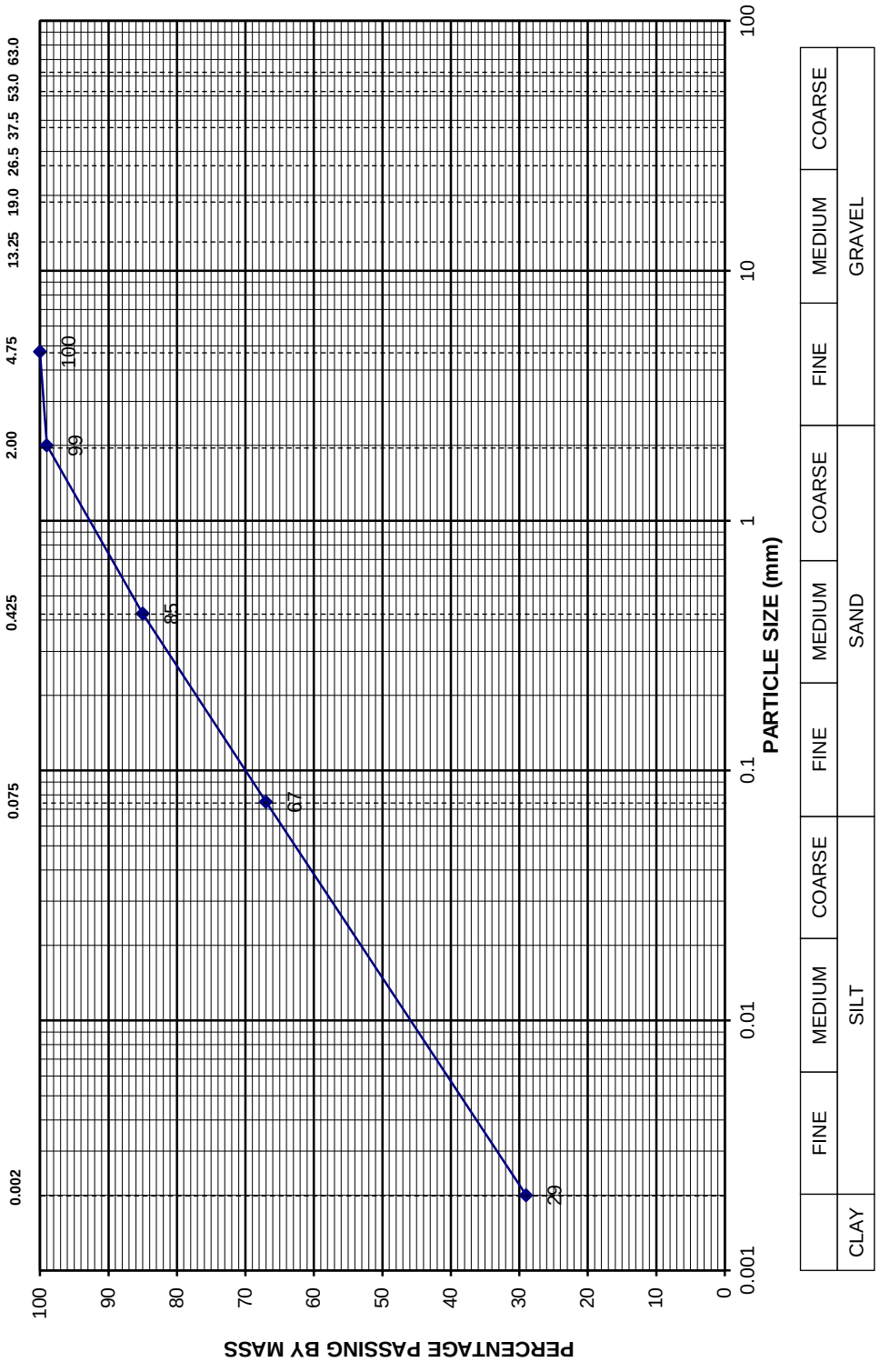
* PARTICLE SIZE DISTRIBUTION



HOLE No.	: TP41
DEPTH	: 600 -1200mm
POTENTIAL EXPANSIVENESS :	Medium / 7.8mm
SAMPLE No.	: VD38, 012/3609
DESCRIPTION :	N/A
PAGE No.	: 38 of 53

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447 0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

* PARTICLE SIZE DISTRIBUTION

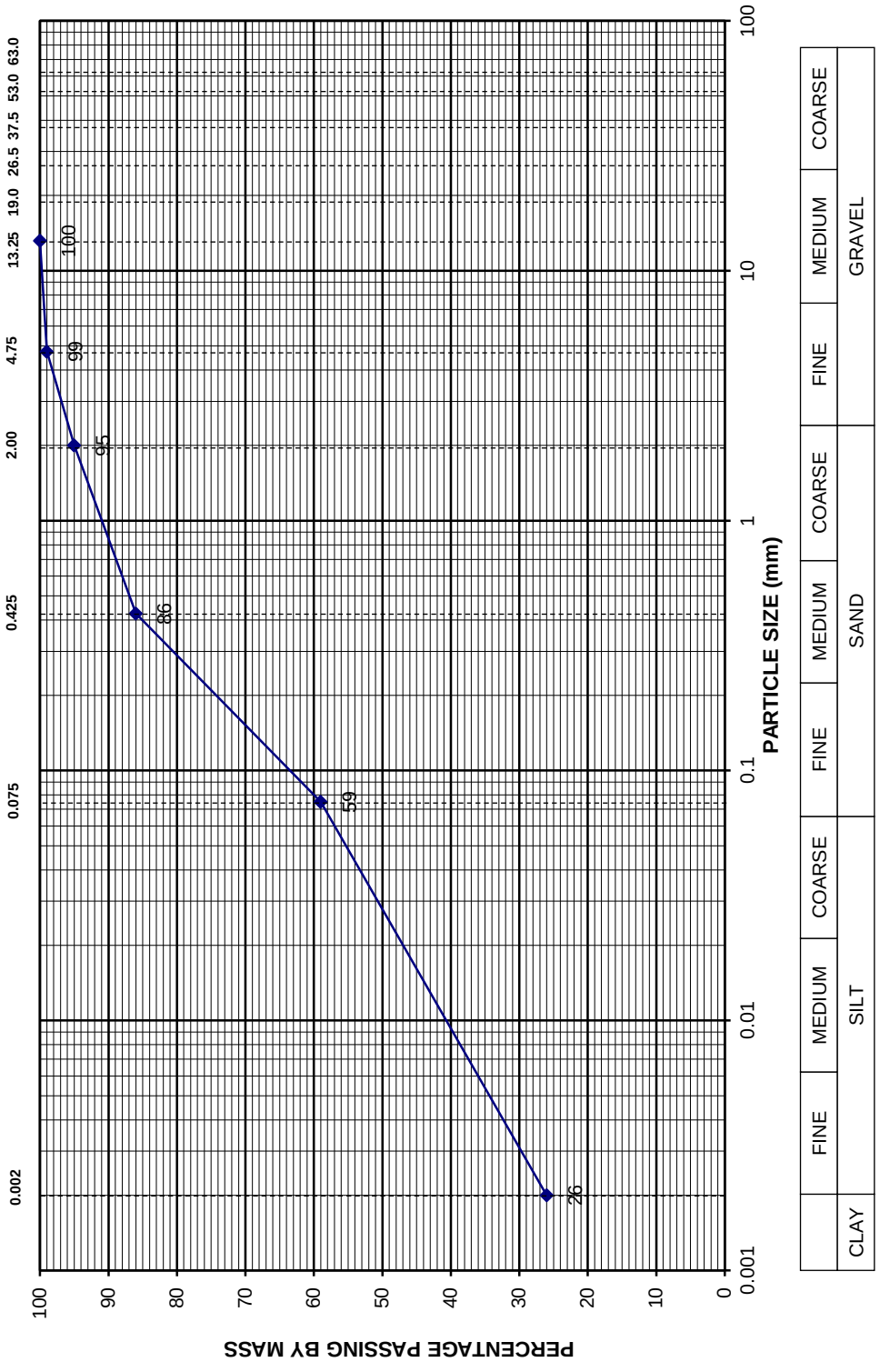


HOLE No. : TP 42
DEPTH : 400 - 1000mm
POTENTIAL EXPANSIVENESS : Medium / 8.3mm

SAMPLE No. : VD39, 012/3610
DESCRIPTION : N/A
PAGE No. : 39 of 53

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447 0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

* PARTICLE SIZE DISTRIBUTION

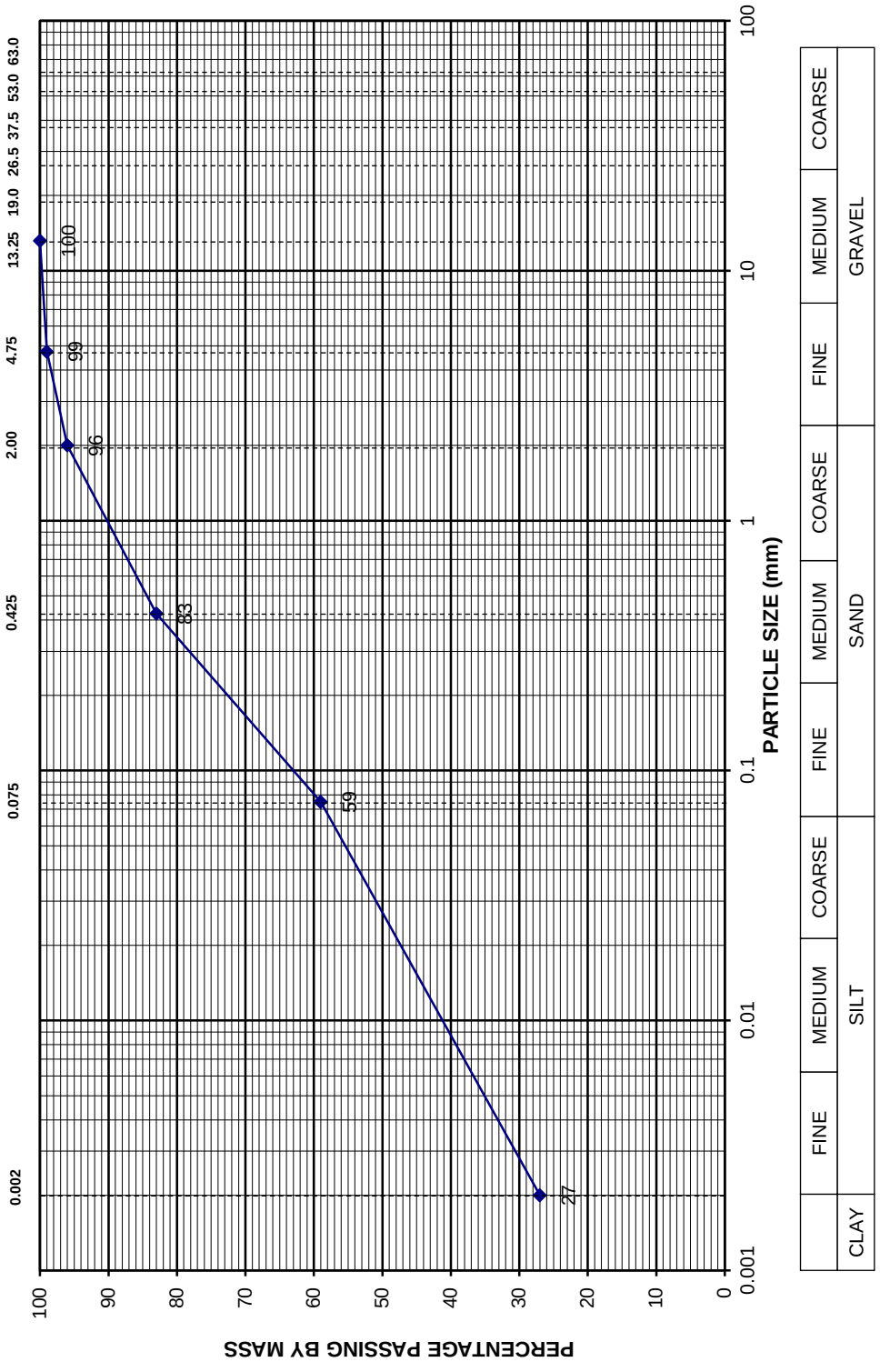


HOLE No. : TP 42
DEPTH : 1000 - 3000mm
POTENTIAL EXPANSIVENESS : Medium / 19.0

SAMPLE No. : VD40, 012/3611
DESCRIPTION : N/A
PAGE No. : 40 of 53

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447 0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

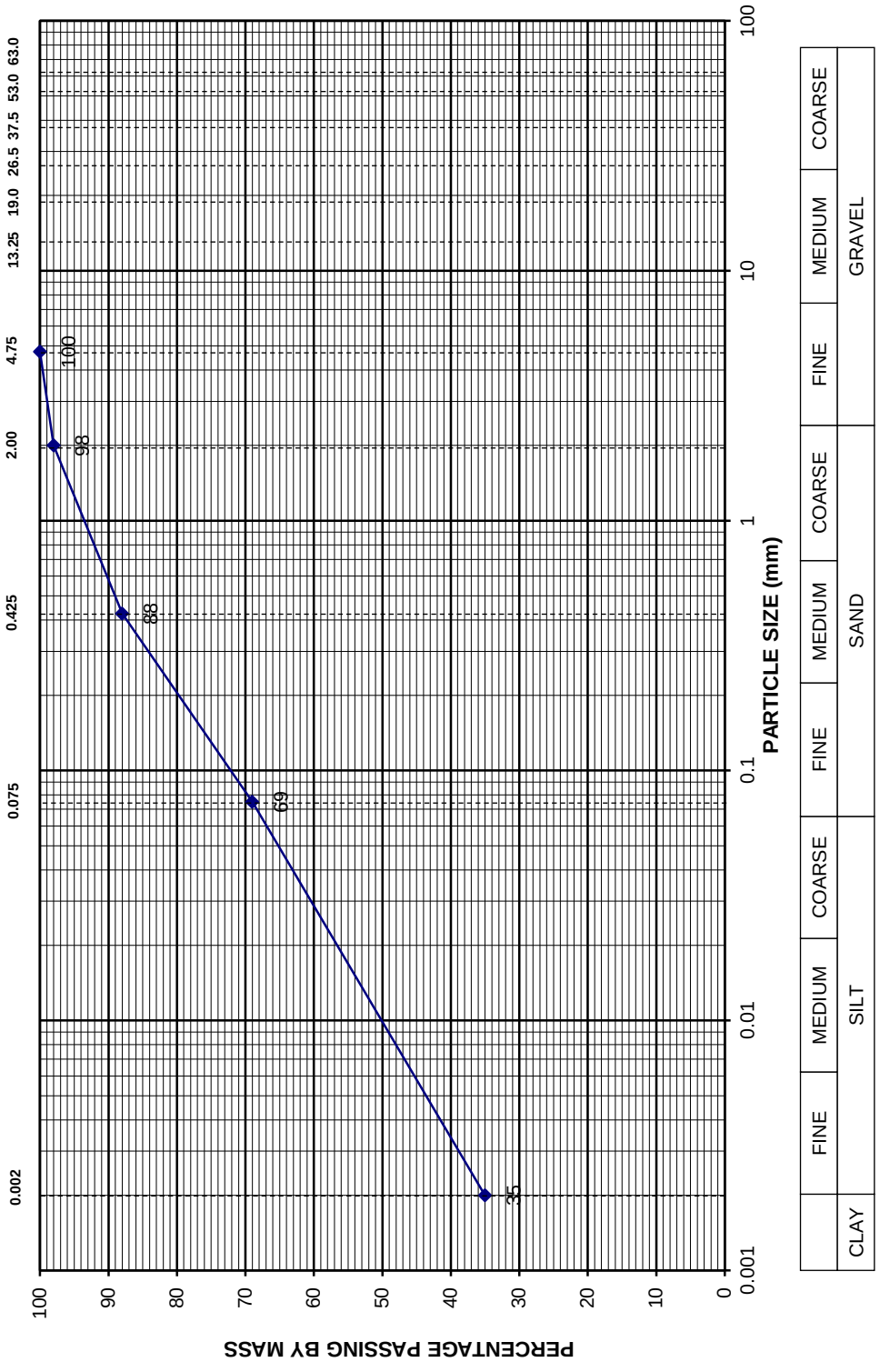
* PARTICLE SIZE DISTRIBUTION



HOLE No.	: TP 46
DEPTH	: 0 - 600mm
POTENTIAL EXPANSIVENESS :	Medium / 9.5mm
SAMPLE No.	: VD41, 012/3612
DESCRIPTION :	N/A
PAGE No.	: 41 of 53

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447 0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

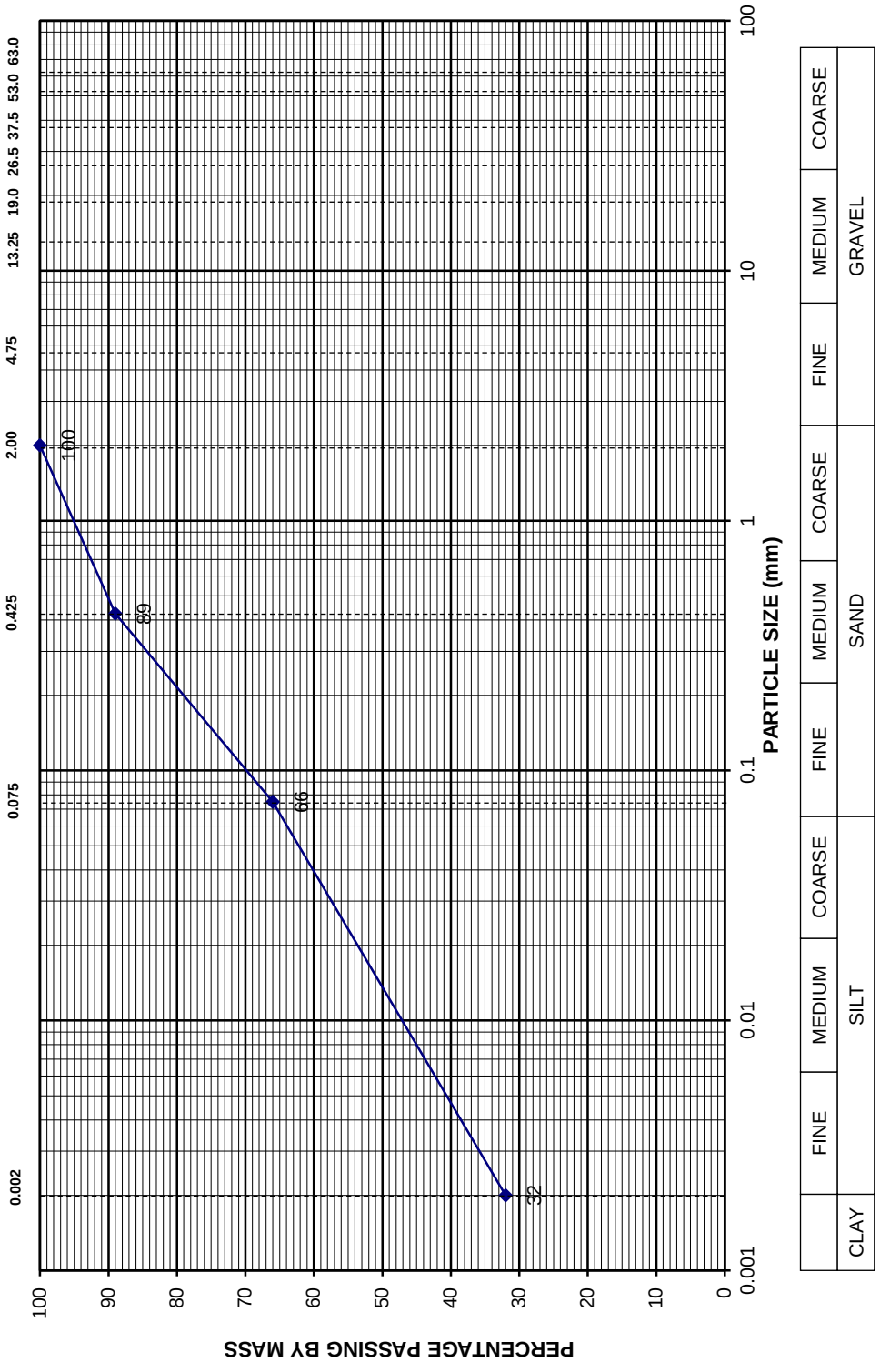
* PARTICLE SIZE DISTRIBUTION



HOLE No.	: TP 46
DEPTH	: 600 - 1500mm
POTENTIAL EXPANSIVENESS :	Medium / 11.1mm
SAMPLE No.	: VD42, 012/3613
DESCRIPTION :	N/A
PAGE No.	: 42 of 53

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447 0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

* PARTICLE SIZE DISTRIBUTION



SAMPLE No. : VD43, 012/3614

DESCRIPTION : N/A

PAGE No. : 43 of 53

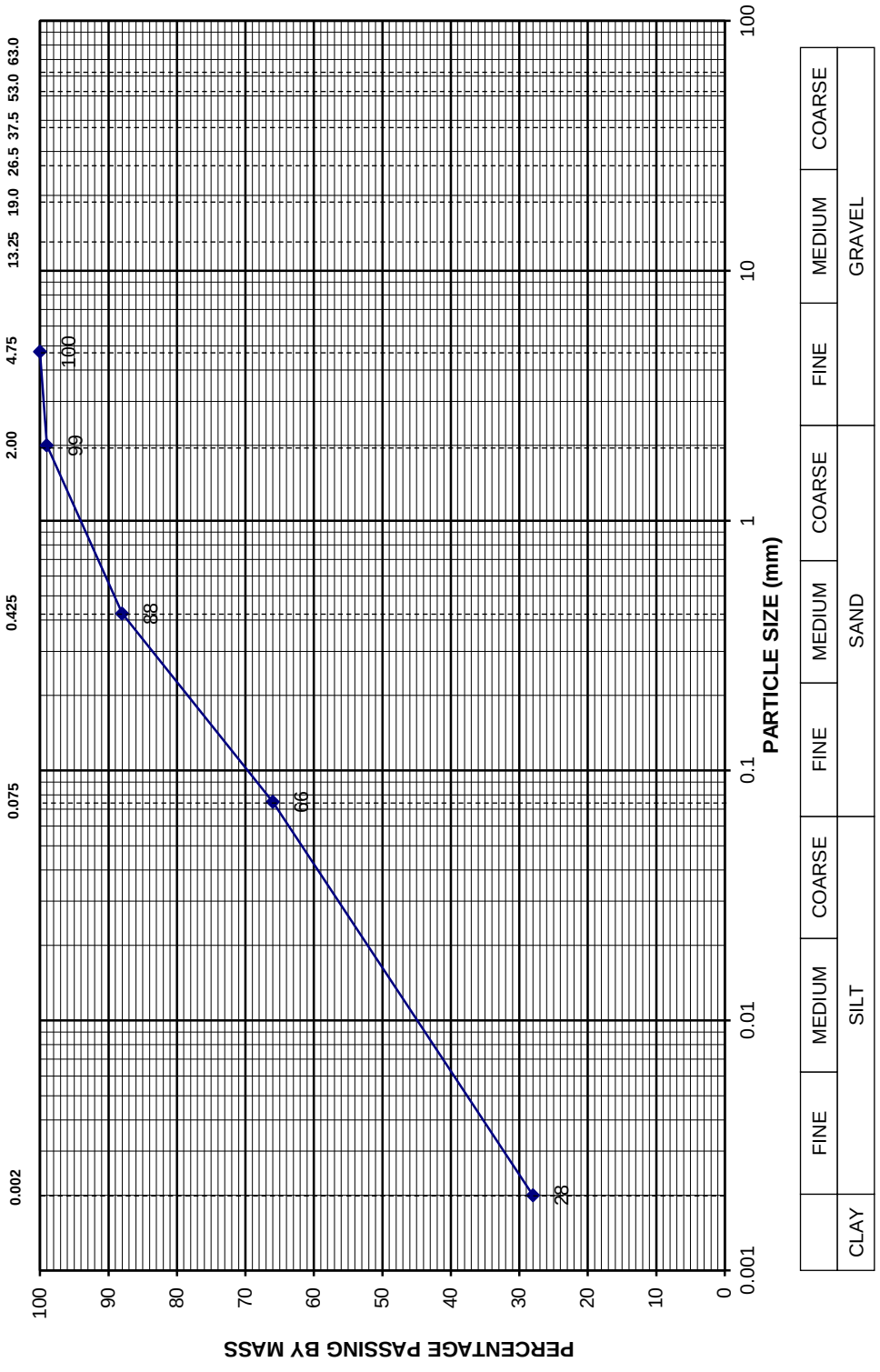
HOLE No. : TP 47

DEPTH : 400 - 1000mm

POTENTIAL EXPANSIVENESS : Medium / 8.3mm

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447 0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

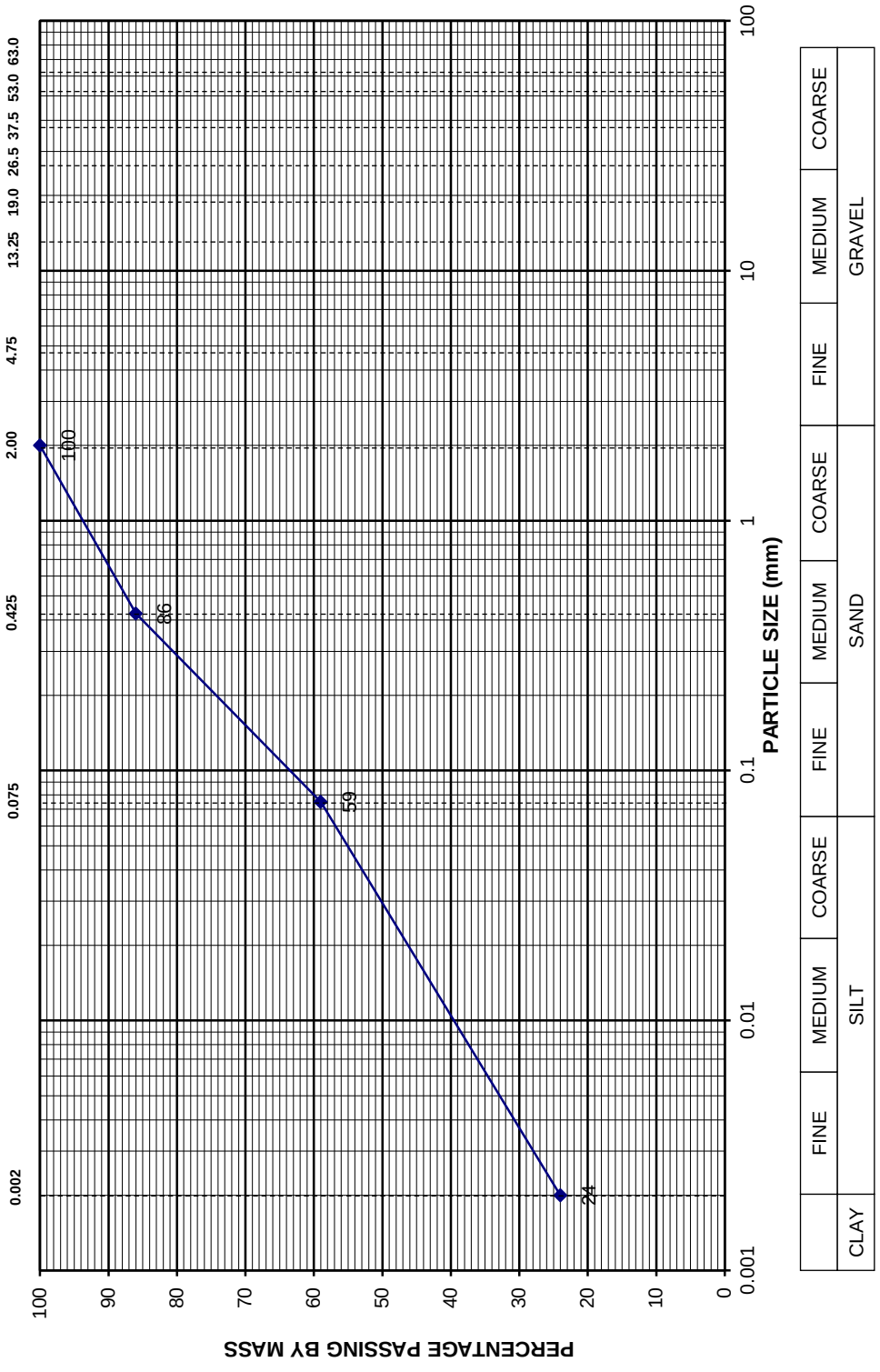
* PARTICLE SIZE DISTRIBUTION



HOLE No. :	TP 47
DEPTH :	1000 -2200mm
POTENTIAL EXPANSIVENESS :	Medium / 12.2mm
SAMPLE No. :	VD44, 012/3615
DESCRIPTION :	N/A
PAGE No. :	44 of 53

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447 0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

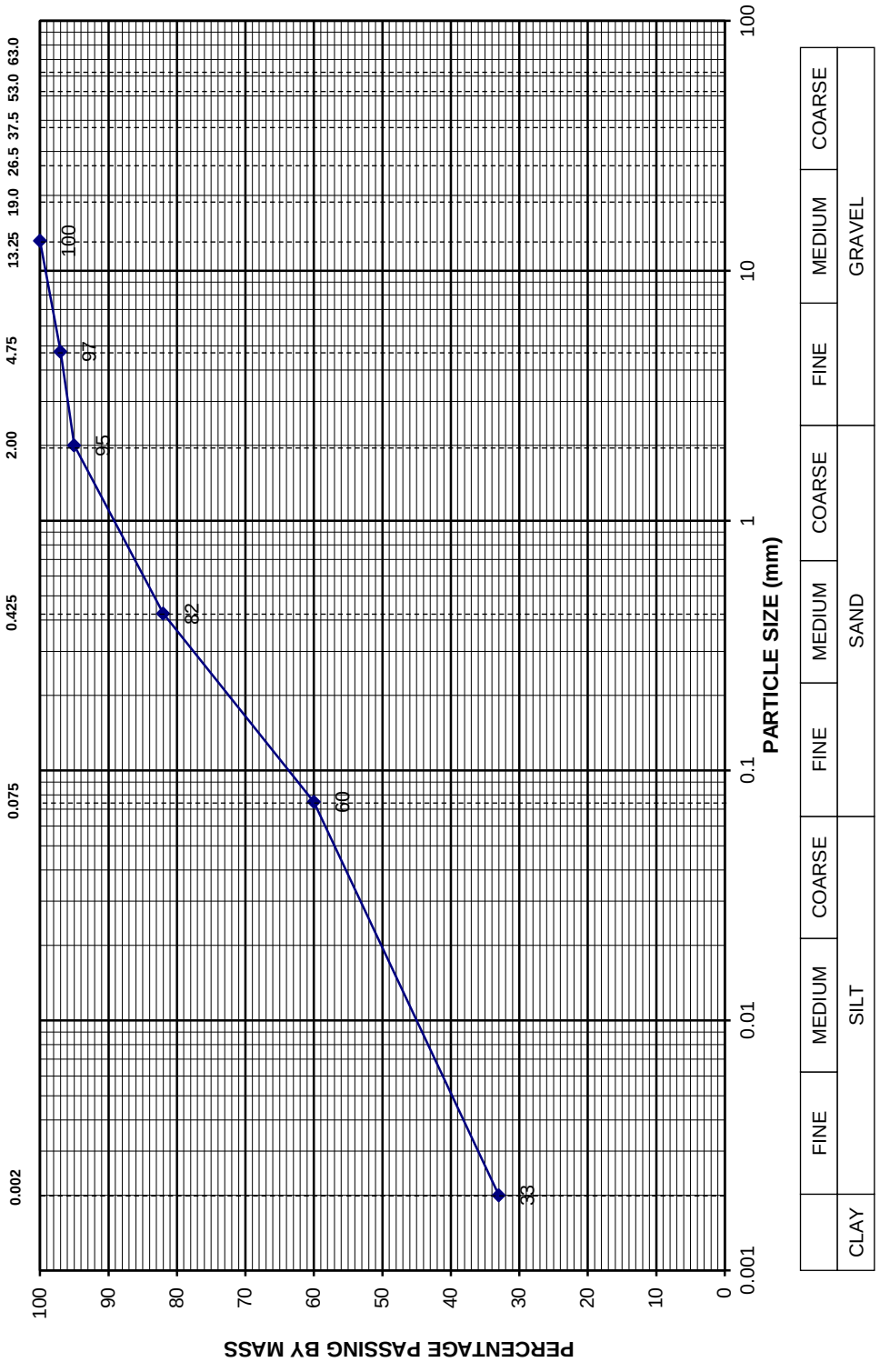
* PARTICLE SIZE DISTRIBUTION



HOLE No. :	TP 48
DEPTH :	300 - 600mm
POTENTIAL EXPANSIVENESS :	Medium / 5.0mm
SAMPLE No. :	VD45, 012/3626
DESCRIPTION :	N/A
PAGE No. :	45 of 53

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447 0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

* PARTICLE SIZE DISTRIBUTION

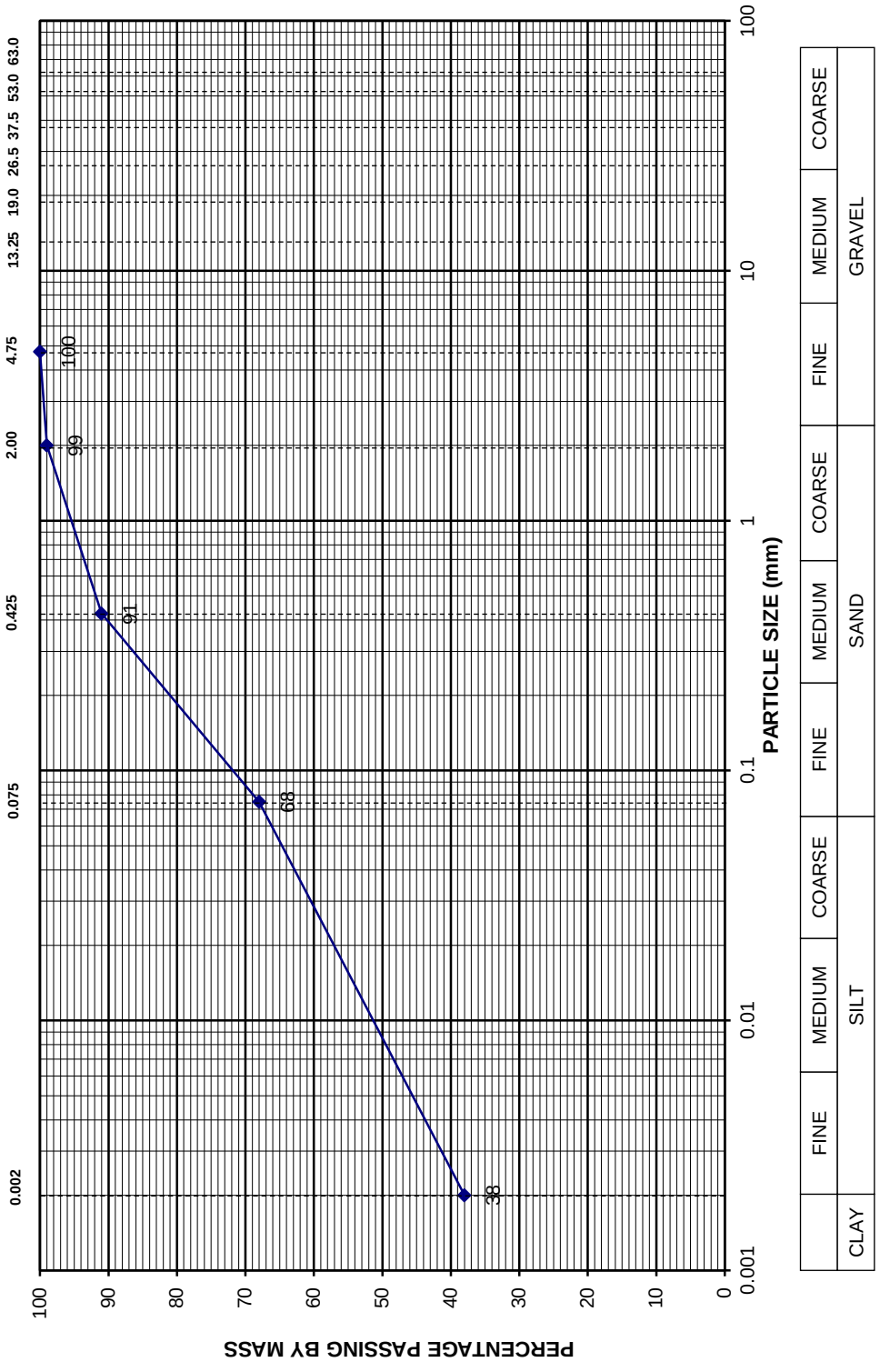


HOLE No. : TP 48
DEPTH : 600 -2500mm
POTENTIAL EXPANSIVENESS : Medium / 21.0mm

SAMPLE No. : VD46, 012/3617
DESCRIPTION : N/A
PAGE No. : 46 of 53

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447 0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

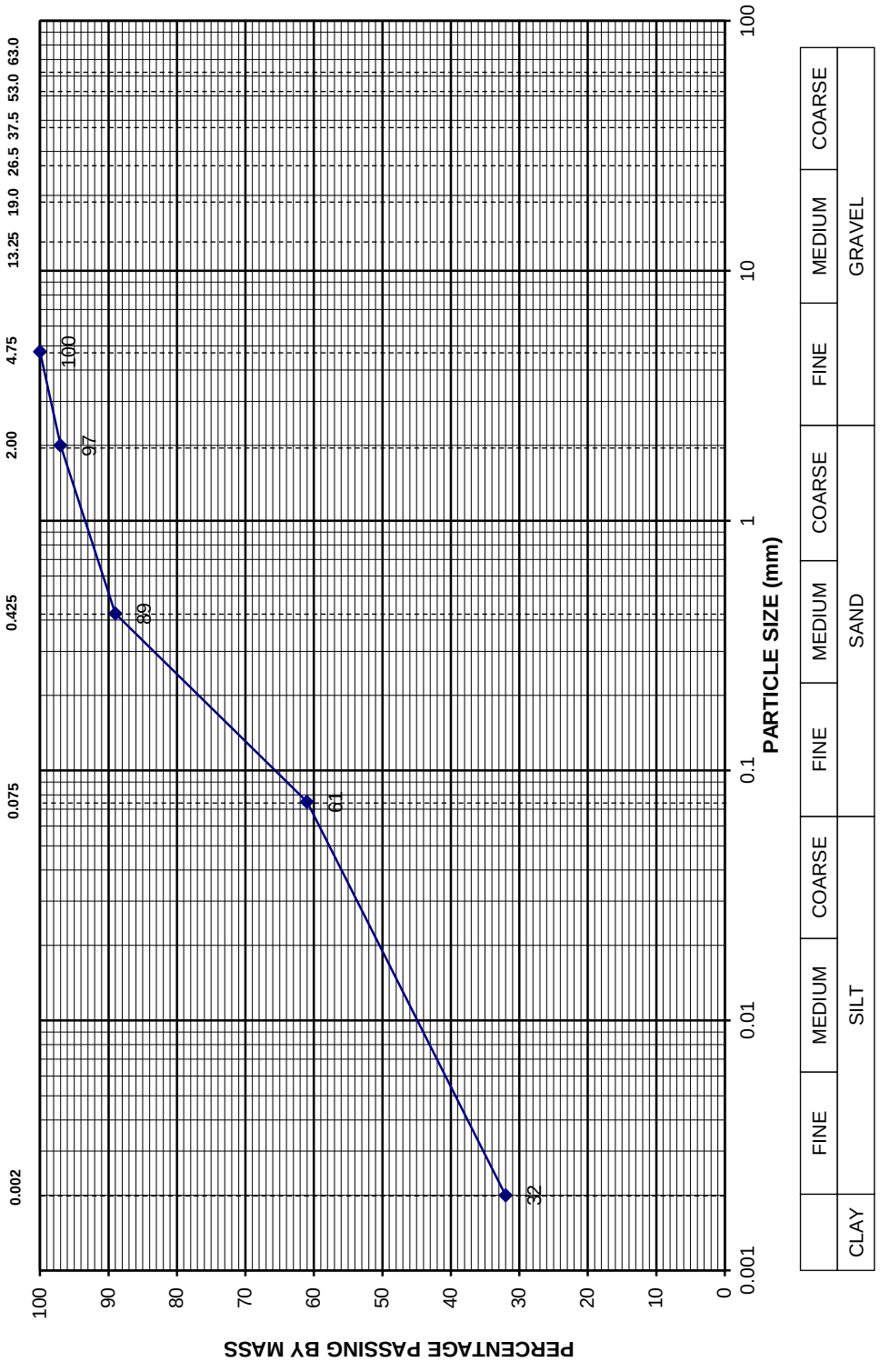
* PARTICLE SIZE DISTRIBUTION



SAMPLE No. :	VD47, 012/3618
DESCRIPTION :	N/A
PAGE No. :	47 of 53
HOLE No. :	TP 50
DEPTH :	300 - 700mm
POTENTIAL EXPANSIVENESS :	High / 12.7mm

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447 0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

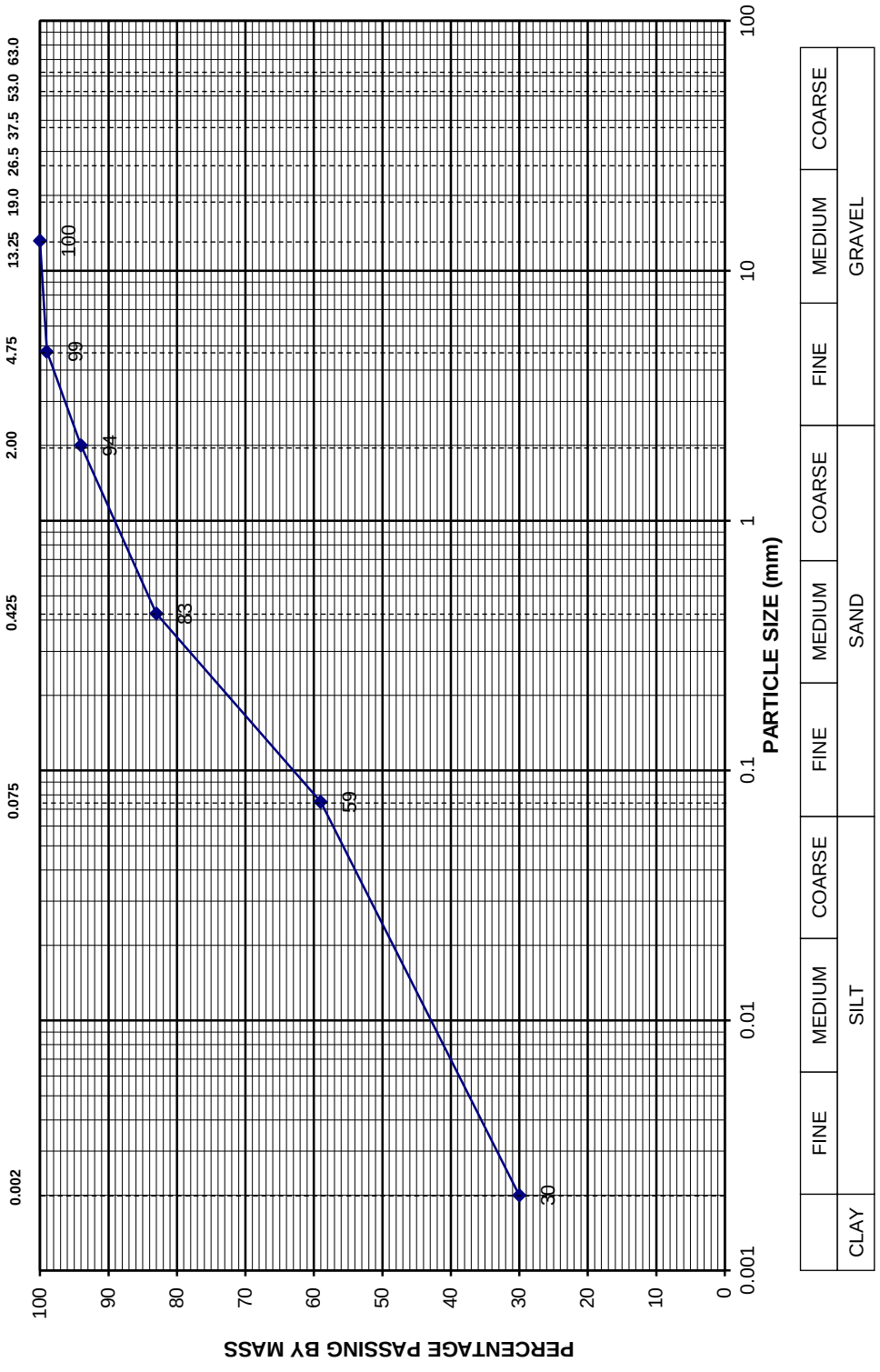
* PARTICLE SIZE DISTRIBUTION



HOLE No. :	TP 50
DEPTH :	700 - 1300mm
POTENTIAL EXPANSIVENESS :	Medium / 7.6mm
SAMPLE No. :	VD48, 012/3619
DESCRIPTION :	N/A
PAGE No. :	48 of 53

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447 0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

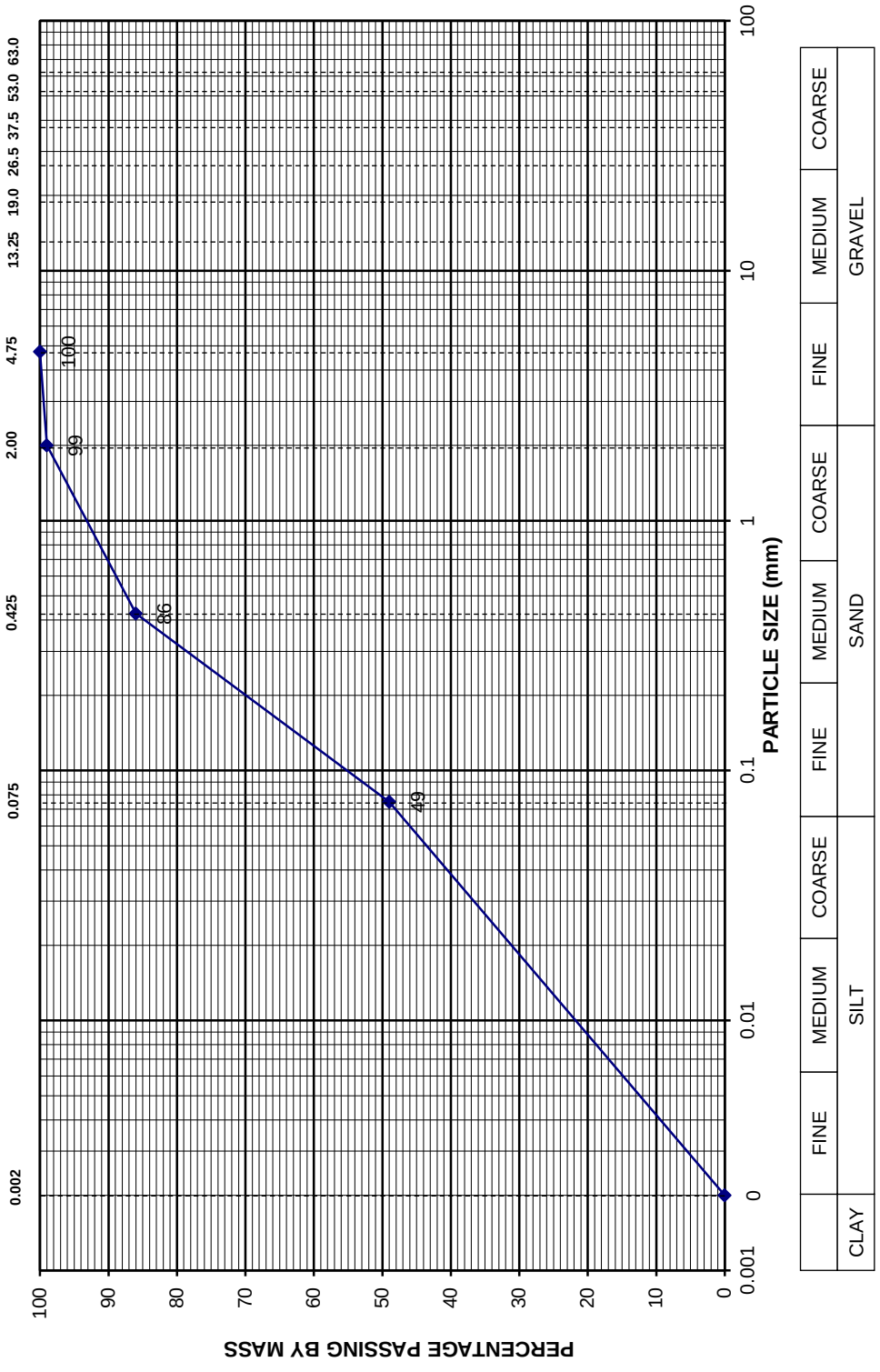
* PARTICLE SIZE DISTRIBUTION



HOLE No.	: TP 51
DEPTH	: 500 - 1300mm
POTENTIAL EXPANSIVENESS :	Medium / 9.8mm
SAMPLE No.	: VD49, 012/3620
DESCRIPTION :	N/A
PAGE No.	: 49 of 53

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447 0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

* PARTICLE SIZE DISTRIBUTION

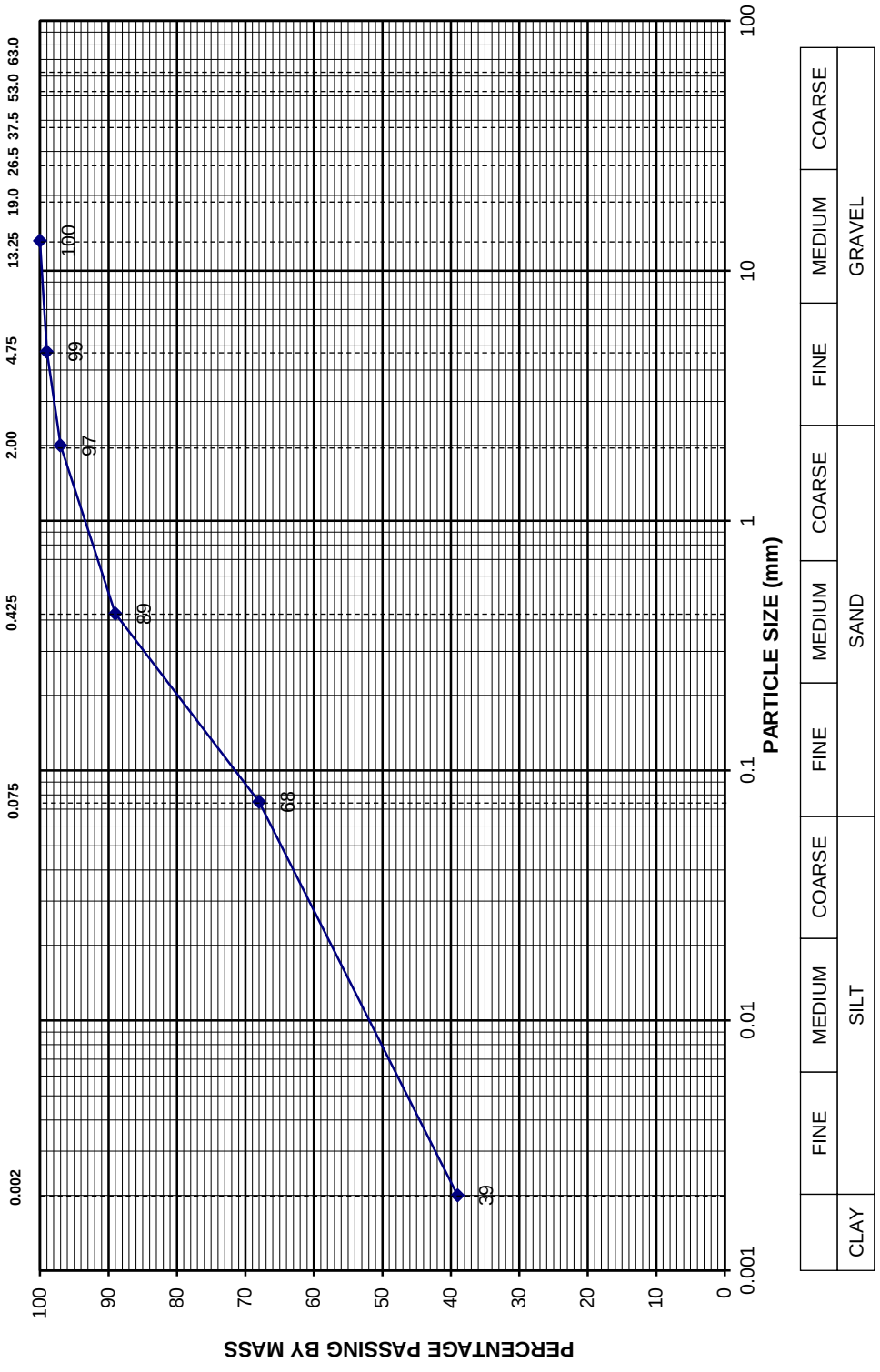


HOLE No. : TP 52
DEPTH : 0 - 400mm
POTENTIAL EXPANSIVENESS : Low

SAMPLE No. : VD50, 012/3621
DESCRIPTION : N/A
PAGE No. : 50 of 53

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447 0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

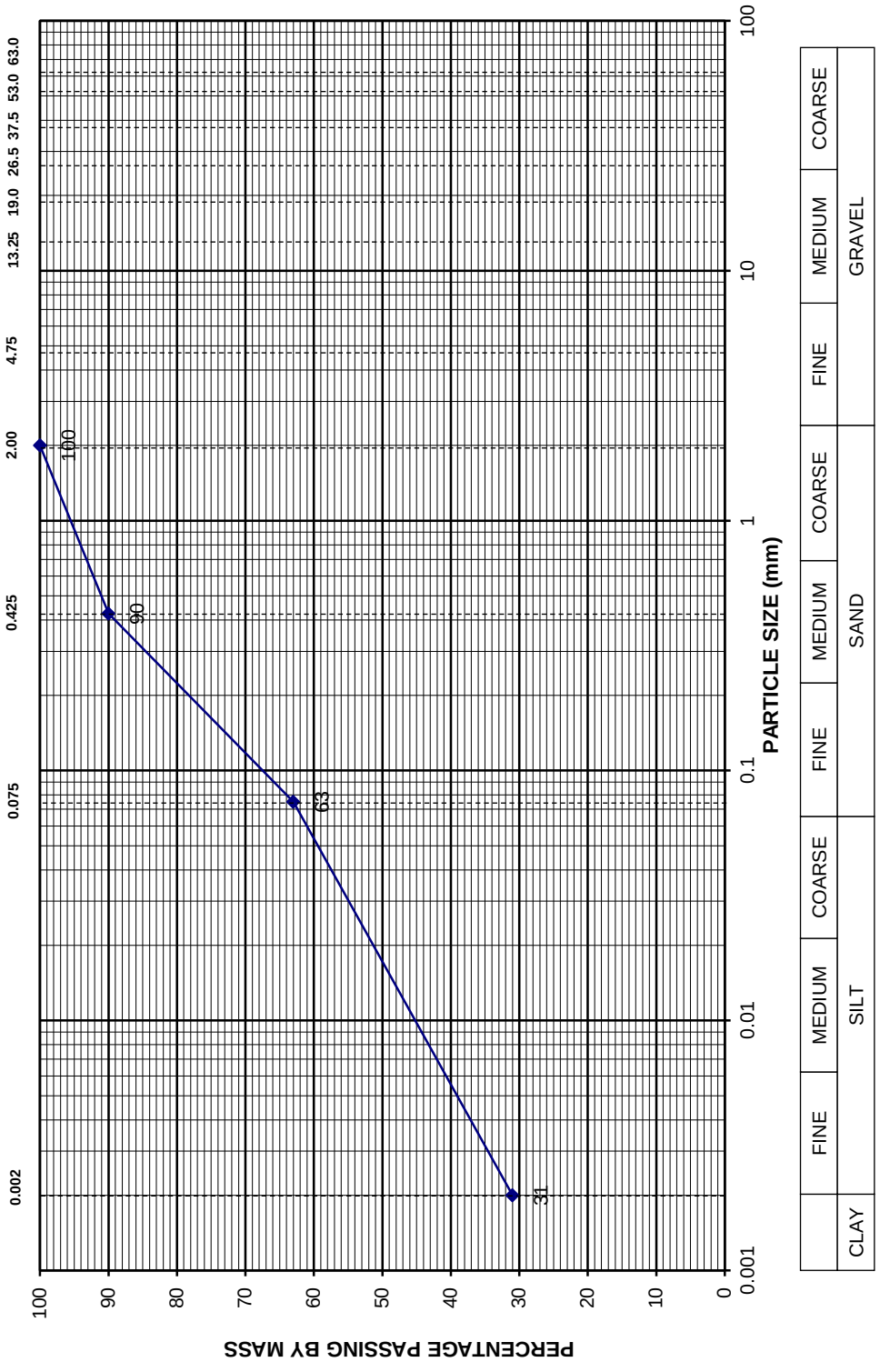
* PARTICLE SIZE DISTRIBUTION



HOLE No.	: TP 52
DEPTH	: 400 -1500mm
POTENTIAL EXPANSIVENESS :	Medium / 13.5mm
SAMPLE No.	: VD51, 012/3622
DESCRIPTION :	N/A
PAGE No.	: 51 of 53

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447 0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

* PARTICLE SIZE DISTRIBUTION



SAMPLE No. : VD52, 012/3623

DESCRIPTION : N/A

PAGE No. : 52 of 53

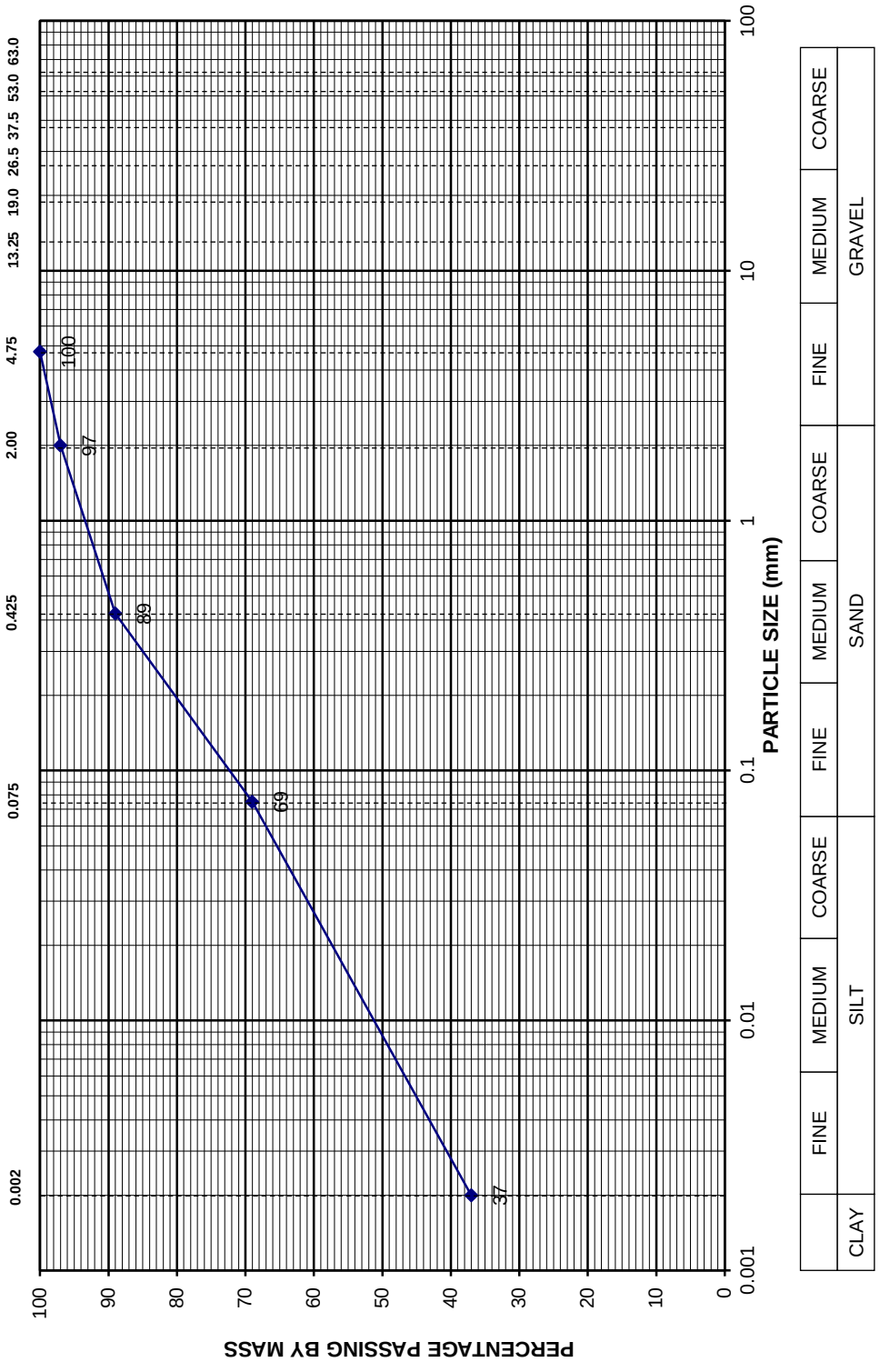
HOLE No. : TP 53

DEPTH : 300 - 900mm

POTENTIAL EXPANSIVENESS : Medium / 8.7mm

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447 0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

* PARTICLE SIZE DISTRIBUTION



HOLE No.	: TP 53
DEPTH	: 900 -1600mm
POTENTIAL EXPANSIVENESS :	Medium / 8.0mm
SAMPLE No.	: VD53, 012/3624
DESCRIPTION :	N/A
PAGE No.	: 53 of 53

APPENDIX E
DYNAMIC CONE PENETRATION TEST (DCP)

REG. No. 1987/004282/07
Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448-8329, simbfn@simlab.co.za

*DYNAMIC CONE PENETRATION TEST

POSITION : TP 24 **DEPTH BELOW NGL :** 0.0 m

DYNAMIC CONE PENETRATION TEST RESULTS

No of Blows	Depth (mm)	Corrective Depth (mm)	Penetration Tempo	dn mm/blow	Consistency	Estimated Bearing Ratio (kPa)	In Situ CBR (TMH 6)
0	31	0	0	0			
5	210	179	179	35.8	Loose	41	4
10	282	251	72	14.4	Medium Dense	80	14
15	440	409	158	31.6	Loose	45	5
20	695	664	255	51.0	Loose	32	3
25	715	684	20	4.0	Very Dense	200	77
30	900	869	185	37.0	Loose	40	4
35	991	960	91	18.2	Medium Dense	68	10
40	1112	1081	121	24.2	Medium Dense	55	7
45	1243	1212	131	26.2	Medium Dense	52	6
50	1295	1264	52	10.4	Dense	102	21
55	1383	1352	88	17.6	Medium Dense	69	11
60	1461	1430	78	15.6	Medium Dense	76	12
65	1512	1481	51	10.2	Dense	103	22
70	1618	1587	106	21.2	Medium Dense	60	8
75	1728	1697	110	22.0	Medium Dense	59	8

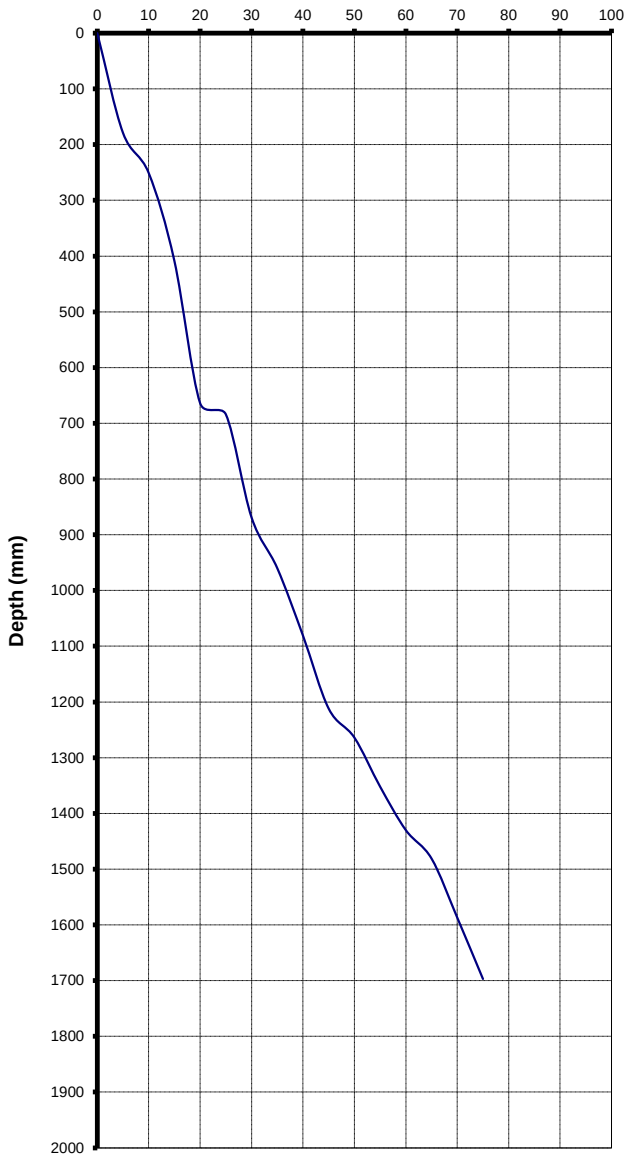
** According to Dr B van Wyk's Method
Tests marked * are not Sanas accredited and are not included in the Sanas Schedule of Accreditation for this laboratory

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448-8329, simbfn@simlab.co.za

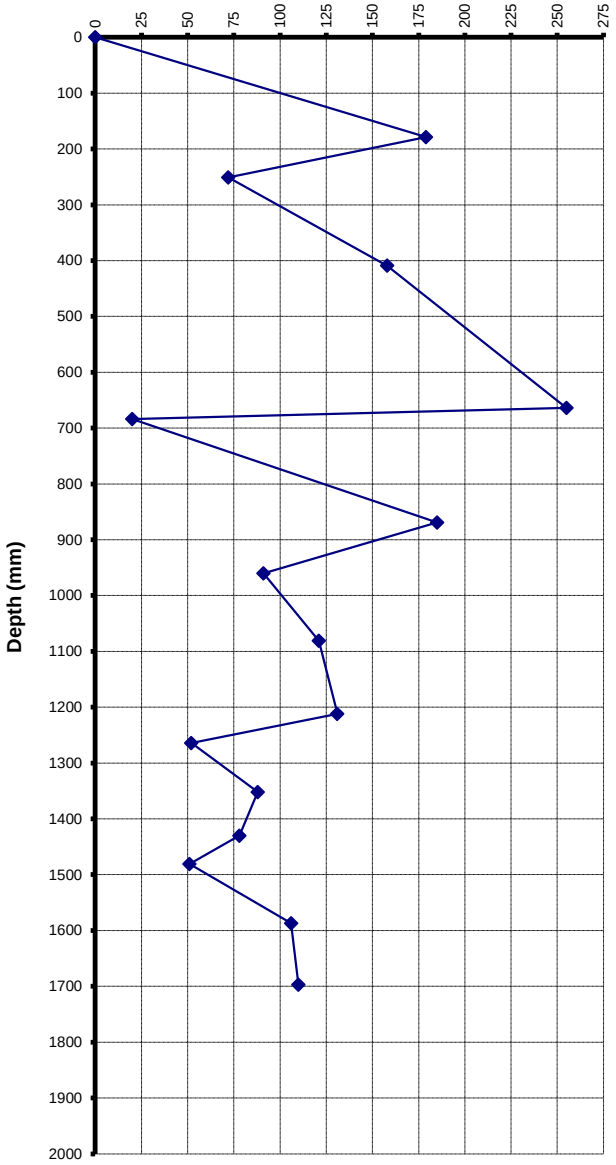
*DYNAMIC CONE PENETRATION TEST

POSITION : TP 24 **DEPTH BELOW NGL :** 0.0 m

Blows Vs Depth



Depth vs. Penetration Tempo



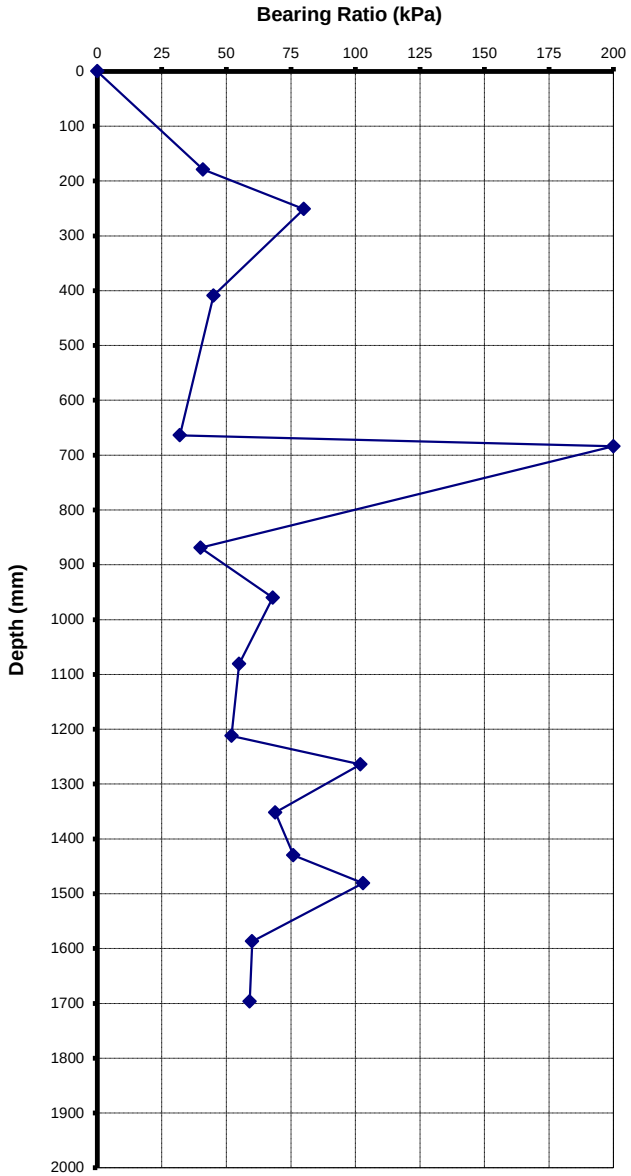
** According to Dr B van Wyk's Method
Tests marked * are not Sanas accredited and are not included in the Sanas Schedule of Accreditation for this laboratory

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448-8329, simbfn@simlab.co.za

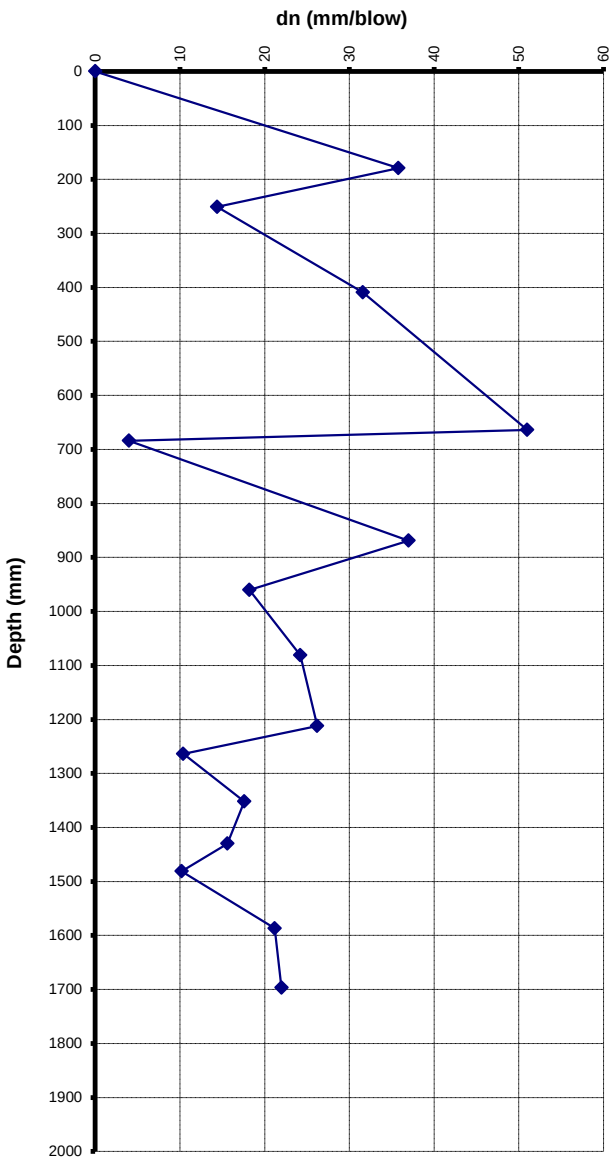
*DYNAMIC CONE PENETRATION TEST

POSITION : TP 24 **DEPTH BELOW NGL :** 0.0 m

Estimated Bearing Ratio Vs Depth



Penetration Tempo



** According to Dr B van Wyk's Method
Tests marked * are not Sanas accredited and are not included in the Sanas Schedule of Accreditation for this laboratory

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448-8329, simbfn@simlab.co.za

*DYNAMIC CONE PENETRATION TEST

POSITION : TP 28 **DEPTH BELOW NGL :** 0.0 m

DYNAMIC CONE PENETRATION TEST RESULTS

No of Blows	Depth (mm)	Corrective Depth (mm)	Penetration Tempo	dn mm/blow	Consistency	Estimated Bearing Ratio (kPa)	In Situ CBR (TMH 6)
0	46	0	0	0			
5	243	197	197	39.4	Loose	38	4
10	381	335	138	27.6	Medium Dense	50	6
15	415	369	34	6.8	Dense	139	38
20	663	617	248	49.6	Loose	32	3
25	718	672	55	11.0	Dense	98	20
30	893	847	175	35.0	Loose	42	4
35	1053	1007	160	32.0	Loose	45	5
40	1192	1146	139	27.8	Medium Dense	50	6
45	1271	1225	79	15.8	Medium Dense	75	12
50	1392	1346	121	24.2	Medium Dense	55	7
55	1481	1435	89	17.8	Medium Dense	69	10
60	1610	1564	129	25.8	Medium Dense	52	6
65	1723	1677	113	22.6	Medium Dense	58	8
70	1853	1807	130	26.0	Medium Dense	52	6

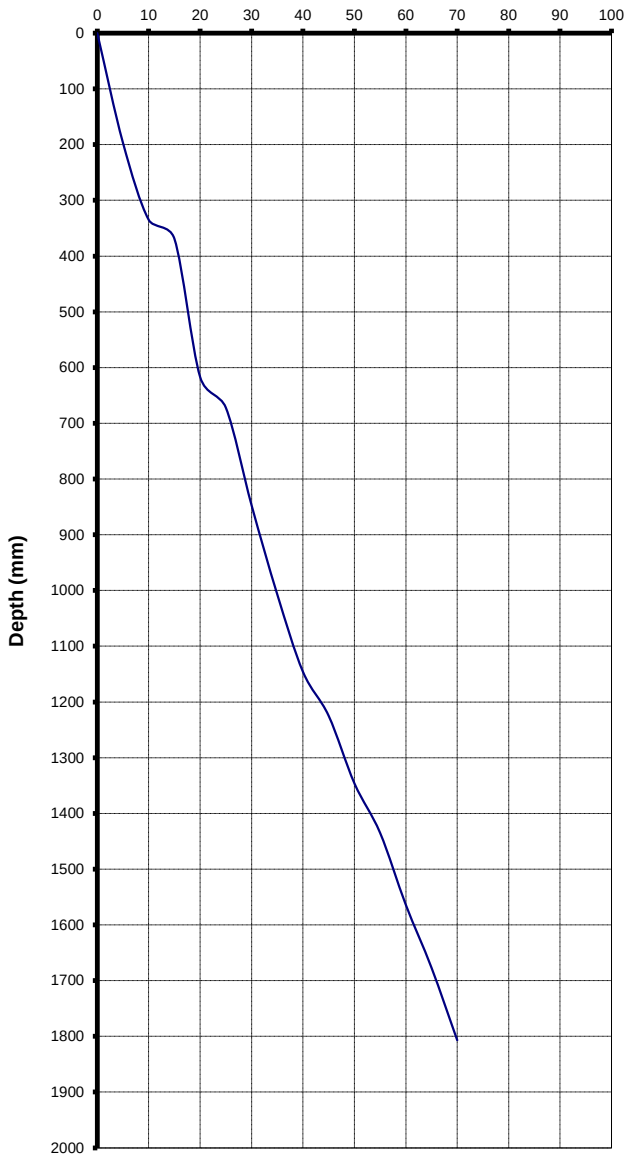
** According to Dr B van Wyk's Method
Tests marked * are not Sanas accredited and are not included in the Sanas Schedule of Accreditation for this laboratory

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448-8329, simbfn@simlab.co.za

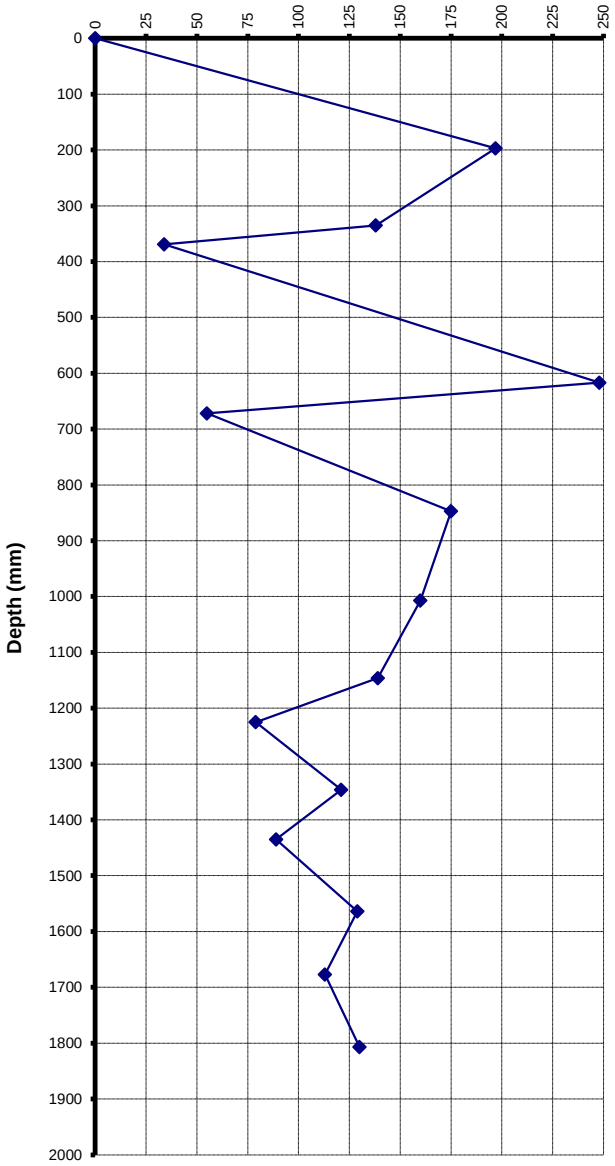
*DYNAMIC CONE PENETRATION TEST

POSITION : TP 28 **DEPTH BELOW NGL :** 0.0 m

Blows Vs Depth



Depth vs. Penetration Tempo



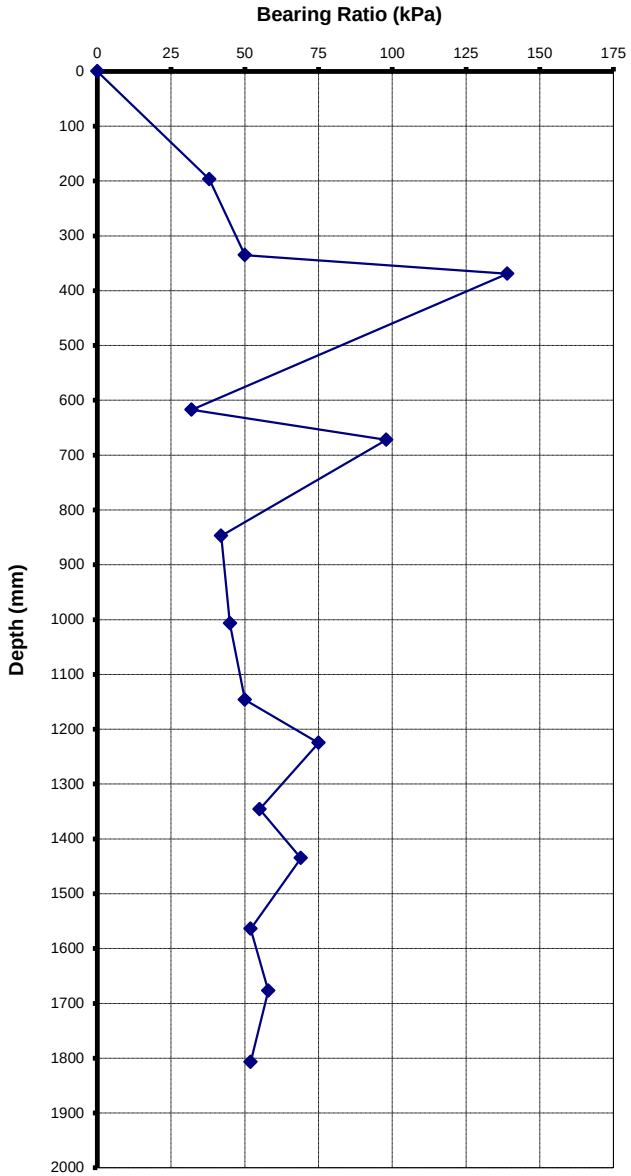
** According to Dr B van Wyk's Method
Tests marked * are not Sanas accredited and are not included in the Sanas Schedule of Accreditation for this laboratory

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448-8329, simbfn@simlab.co.za

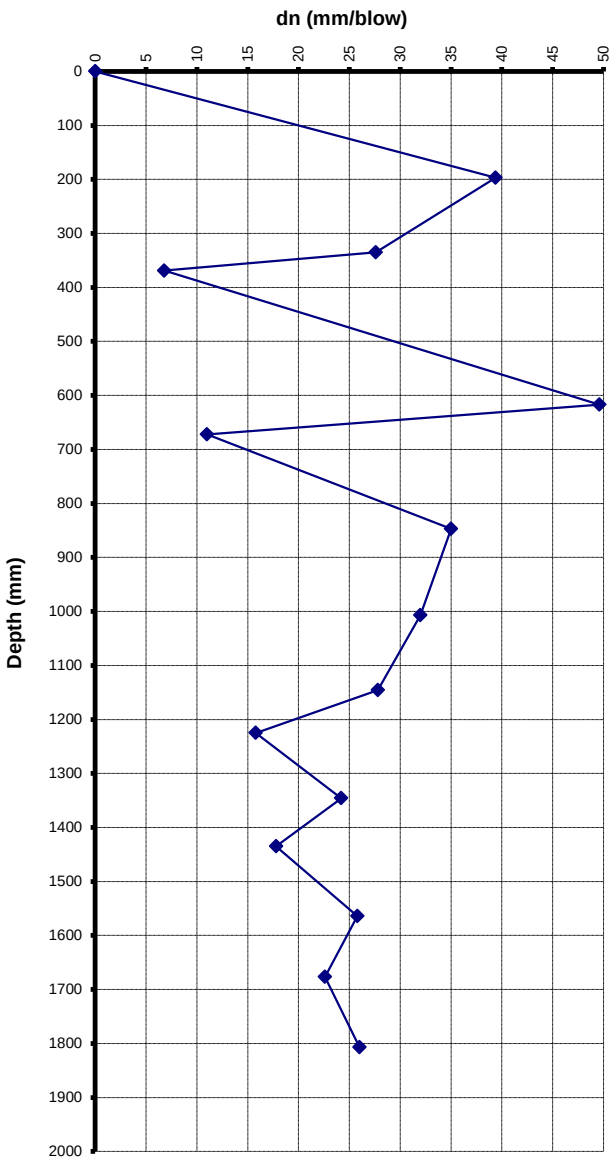
*DYNAMIC CONE PENETRATION TEST

POSITION : TP 28 **DEPTH BELOW NGL :** 0.0 m

Estimated Bearing Ratio Vs Depth



Penetration Tempo



** According to Dr B van Wyk's Method
Tests marked * are not Sanas accredited and are not included in the Sanas Schedule of Accreditation for this laboratory

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448-8329, simbfn@simlab.co.za

*DYNAMIC CONE PENETRATION TEST

POSITION : TP 39 **DEPTH BELOW NGL :** 0.0 m

DYNAMIC CONE PENETRATION TEST RESULTS

No of Blows	Depth (mm)	Corrective Depth (mm)	Penetration Tempo	dn mm/blow	Consistency	Estimated Bearing Ratio (kPa)	In Situ CBR (TMH 6)
0	21	0	0	0			
5	131	110	110	22.0	Medium Dense	59	8
10	285	264	154	30.8	Loose	46	5
15	425	404	140	28.0	Medium Dense	49	6
20	578	557	153	30.6	Loose	46	5
25	710	689	132	26.4	Medium Dense	51	6
30	840	819	130	26.0	Medium Dense	52	6
35	942	921	102	20.4	Medium Dense	62	9
40	1033	1012	91	18.2	Medium Dense	68	10
45	1105	1084	72	14.4	Medium Dense	80	14
50	1198	1177	93	18.6	Medium Dense	66	10
55	1280	1259	82	16.4	Medium Dense	73	12
60	1350	1329	70	14.0	Medium Dense	82	14
65	1410	1389	60	12.0	Dense	92	18
70	1467	1446	57	11.4	Dense	95	19
75	1528	1507	61	12.2	Dense	90	17
80	1621	1600	93	18.6	Medium Dense	66	10
85	1668	1647	47	9.4	Dense	109	25
90	1731	1710	63	12.6	Medium Dense	88	17
95	1760	1739	29	5.8	Dense	156	47

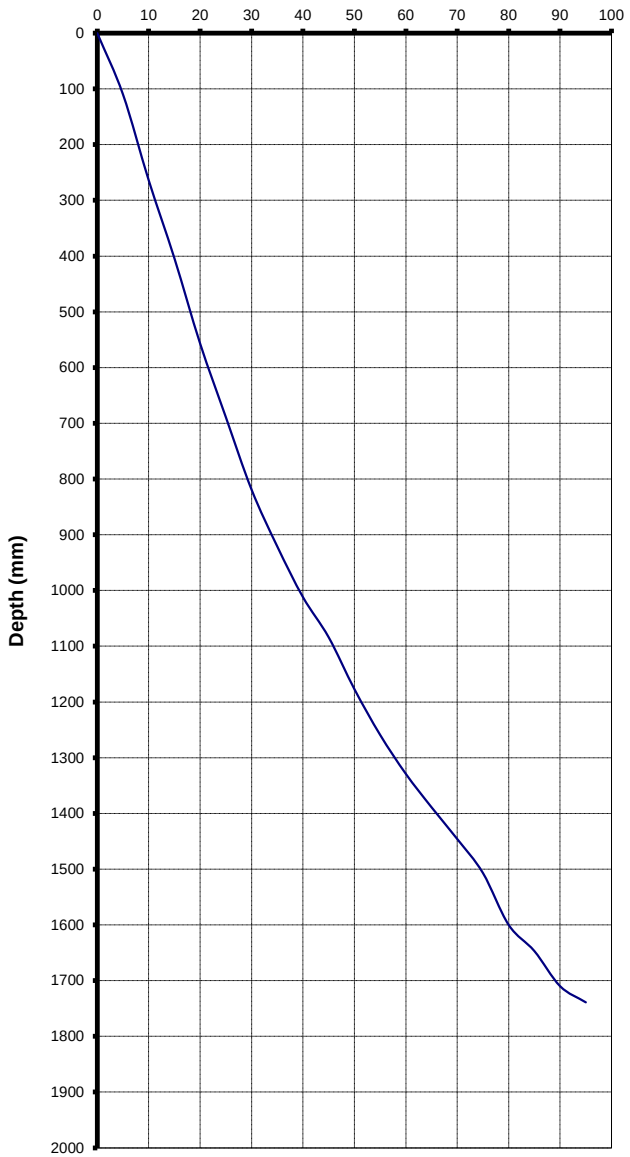
** According to Dr B van Wyk's Method
Tests marked * are not Sanas accredited and are not included in the Sanas Schedule of Accreditation for this laboratory

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448-8329, simbfn@simlab.co.za

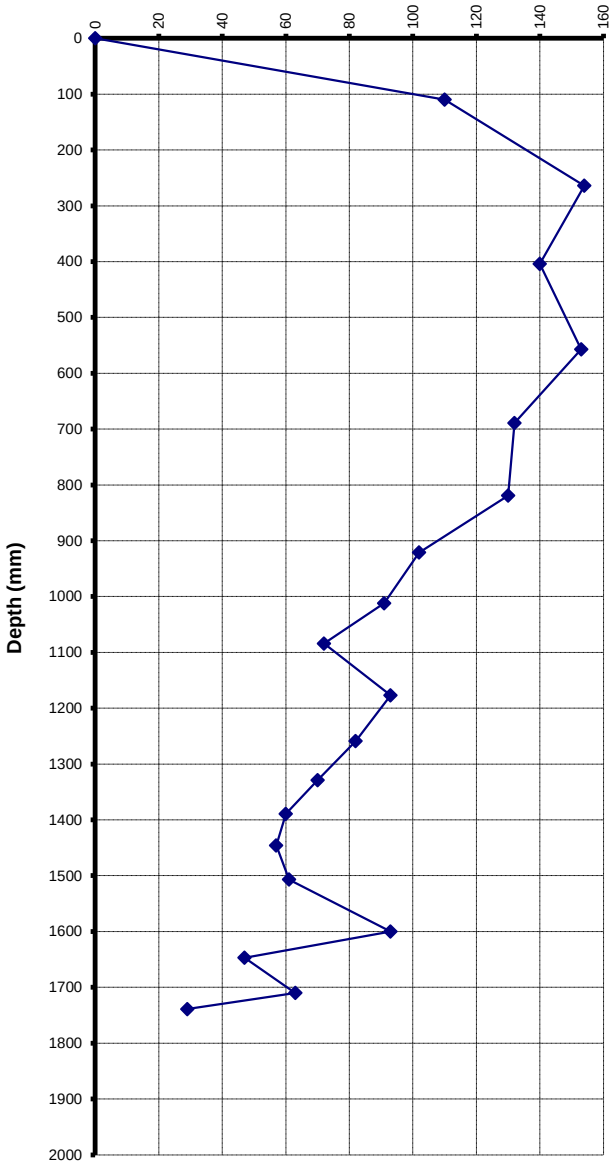
*DYNAMIC CONE PENETRATION TEST

POSITION : TP 39 **DEPTH BELOW NGL :** 0.0 m

Blows Vs Depth



Depth vs. Penetration Tempo



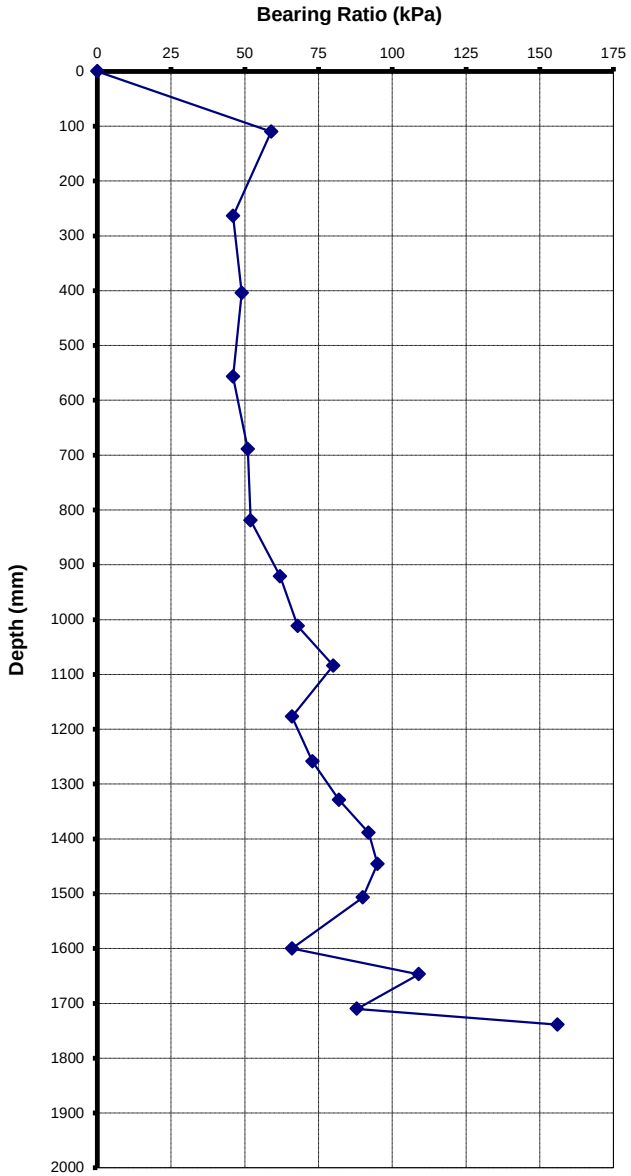
** According to Dr B van Wyk's Method
Tests marked * are not Sanas accredited and are not included in the Sanas Schedule of Accreditation for this laboratory

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448-8329, simbfn@simlab.co.za

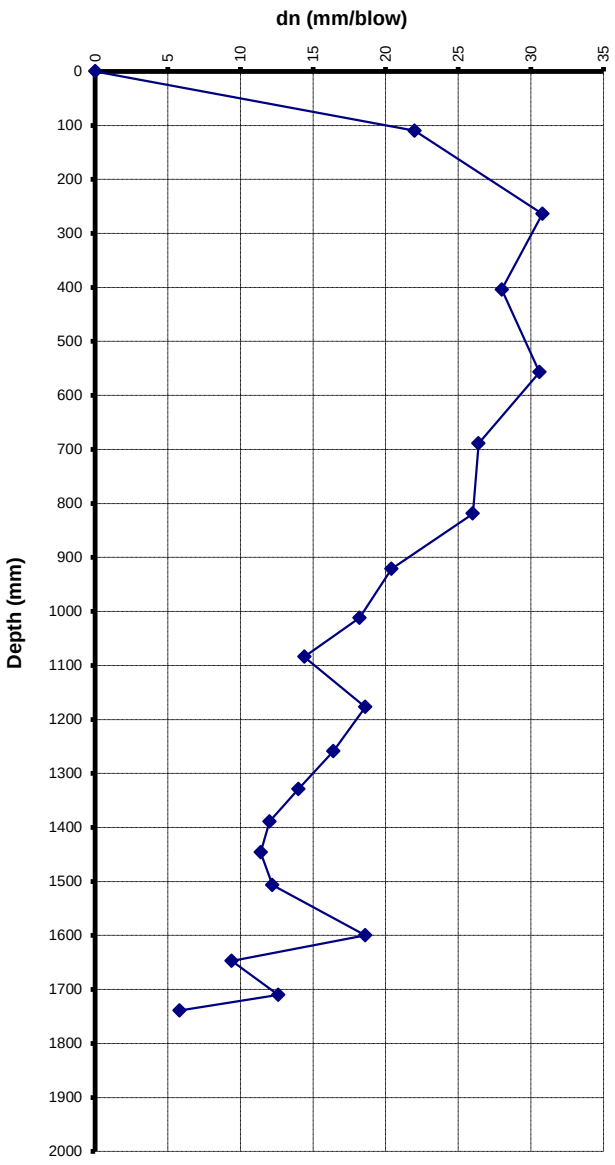
*DYNAMIC CONE PENETRATION TEST

POSITION : TP 39 **DEPTH BELOW NGL :** 0.0 m

Estimated Bearing Ratio Vs Depth



Penetration Tempo



** According to Dr B van Wyk's Method
Tests marked * are not Sanas accredited and are not included in the Sanas Schedule of Accreditation for this laboratory

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448-8329, simbfn@simlab.co.za

*DYNAMIC CONE PENETRATION TEST

POSITION : TP 47 **DEPTH BELOW NGL :** 0.0 m

DYNAMIC CONE PENETRATION TEST RESULTS

No of Blows	Depth (mm)	Corrective Depth (mm)	Penetration Tempo	dn mm/blow	Consistency	Estimated Bearing Ratio (kPa)	In Situ CBR (TMH 6)
0	38	0	0	0			
5	218	180	180	36.0	Loose	41	4
10	347	309	129	25.8	Medium Dense	52	6
15	680	642	333	66.6	Loose	26	2
20	845	807	165	33.0	Loose	44	5
25	960	922	115	23.0	Medium Dense	57	7
30	1041	1003	81	16.2	Medium Dense	74	12
35	1108	1070	67	13.4	Medium Dense	84	15
40	1167	1129	59	11.8	Dense	93	18
45	1224	1186	57	11.4	Dense	95	19
50	1280	1242	56	11.2	Dense	96	19
55	1328	1290	48	9.6	Dense	108	24
60	1360	1322	32	6.4	Dense	145	41
65	1390	1352	30	6.0	Dense	152	45
70	1431	1393	41	8.2	Dense	121	30
75	1465	1427	34	6.8	Dense	139	38
80	1508	1470	43	8.6	Dense	117	28
85	1560	1522	52	10.4	Dense	102	21
90	1610	1572	50	10.0	Dense	105	23
95	1660	1622	50	10.0	Dense	105	23

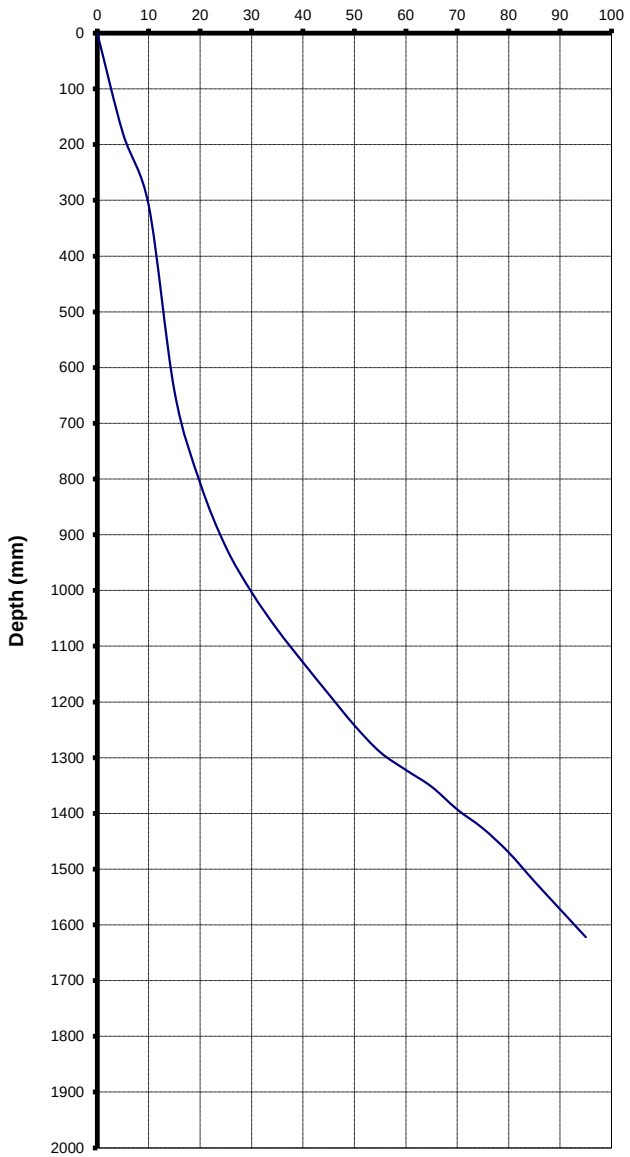
** According to Dr B van Wyk's Method
Tests marked * are not Sanas accredited and are not included in the Sanas Schedule of Accreditation for this laboratory

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448-8329, simbfn@simlab.co.za

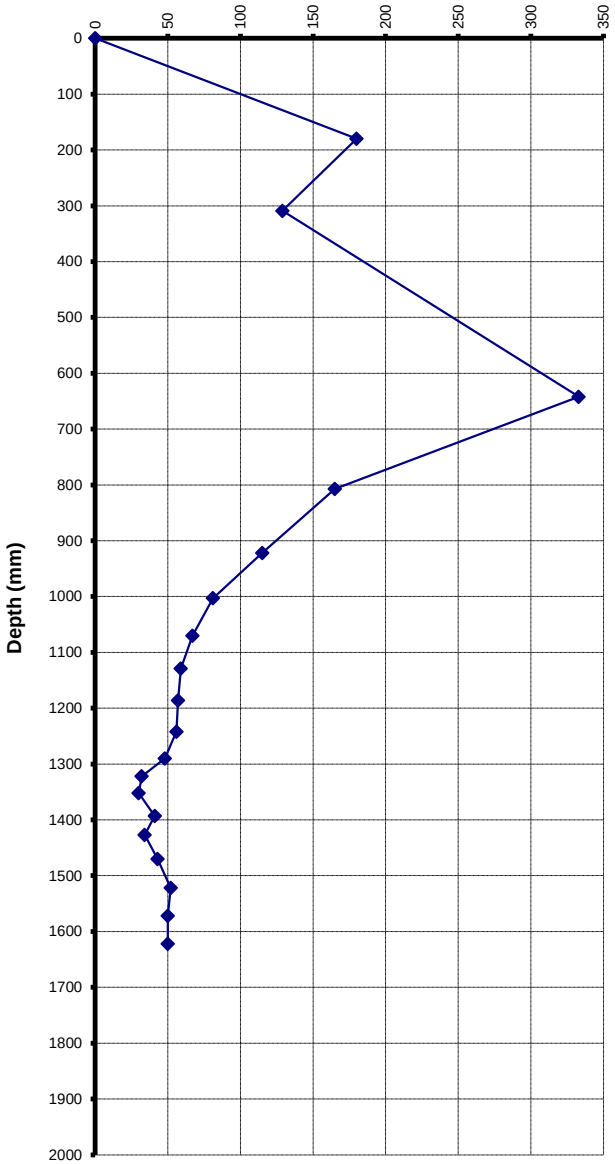
*DYNAMIC CONE PENETRATION TEST

POSITION : TP 47 **DEPTH BELOW NGL :** 0.0 m

Blows Vs Depth



Depth vs. Penetration Tempo



** According to Dr B van Wyk's Method
Tests marked * are not Sanas accredited and are not included in the Sanas Schedule of Accreditation for this laboratory

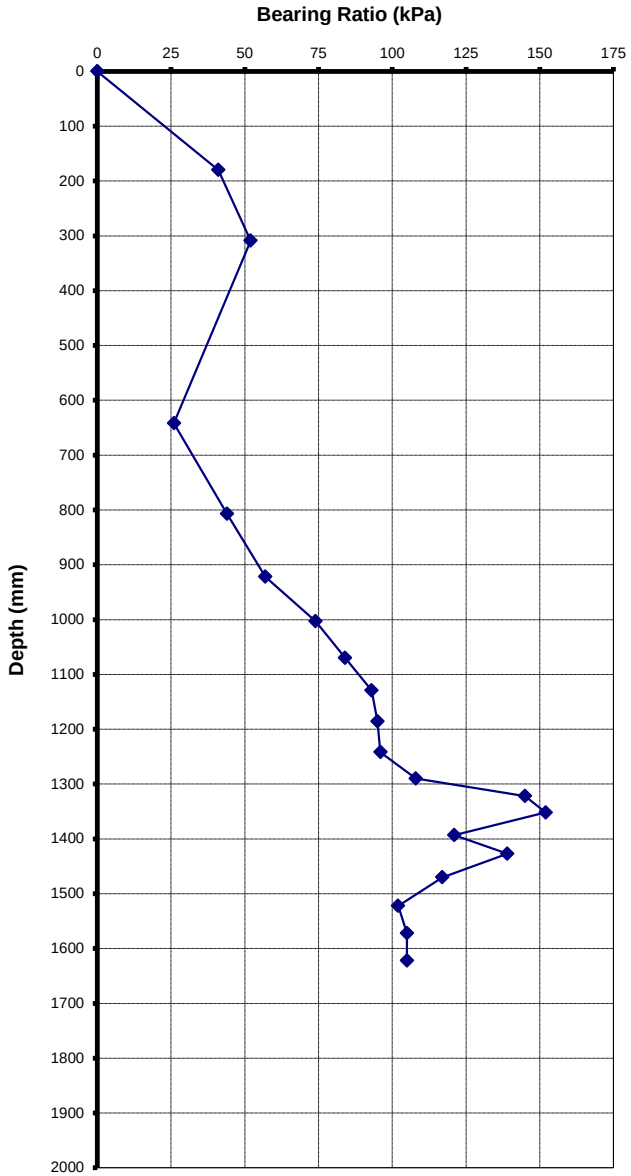
Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448-8329, simbfn@simlab.co.za

sanas Testing Laboratory T0455

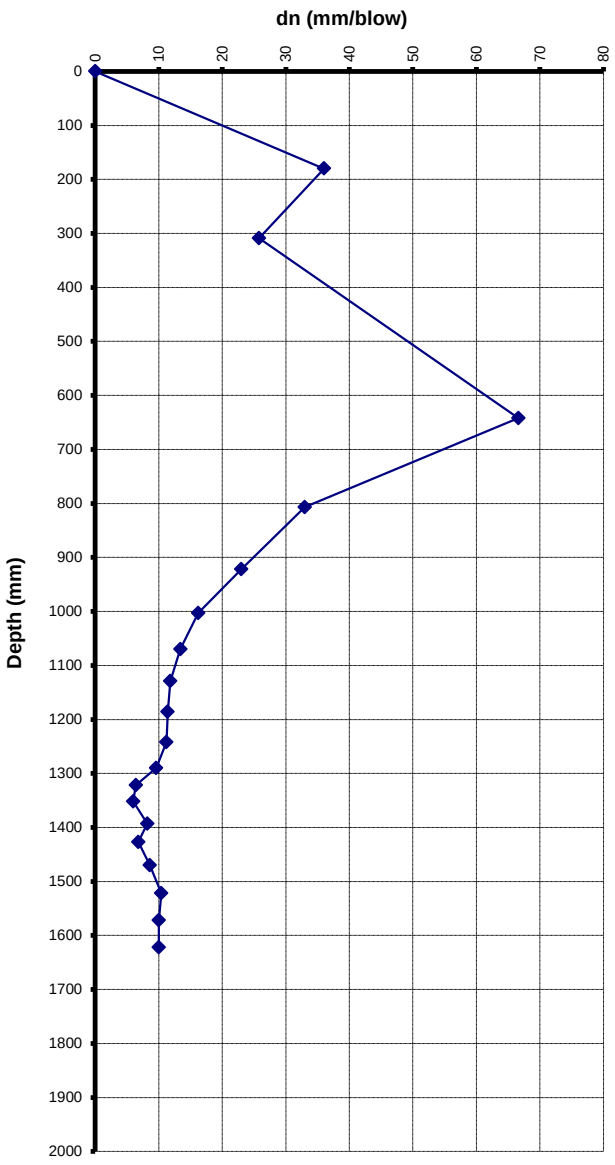
*DYNAMIC CONE PENETRATION TEST

POSITION : TP 47 **DEPTH BELOW NGL :** 0.0 m

Estimated Bearing Ratio Vs Depth



Penetration Tempo



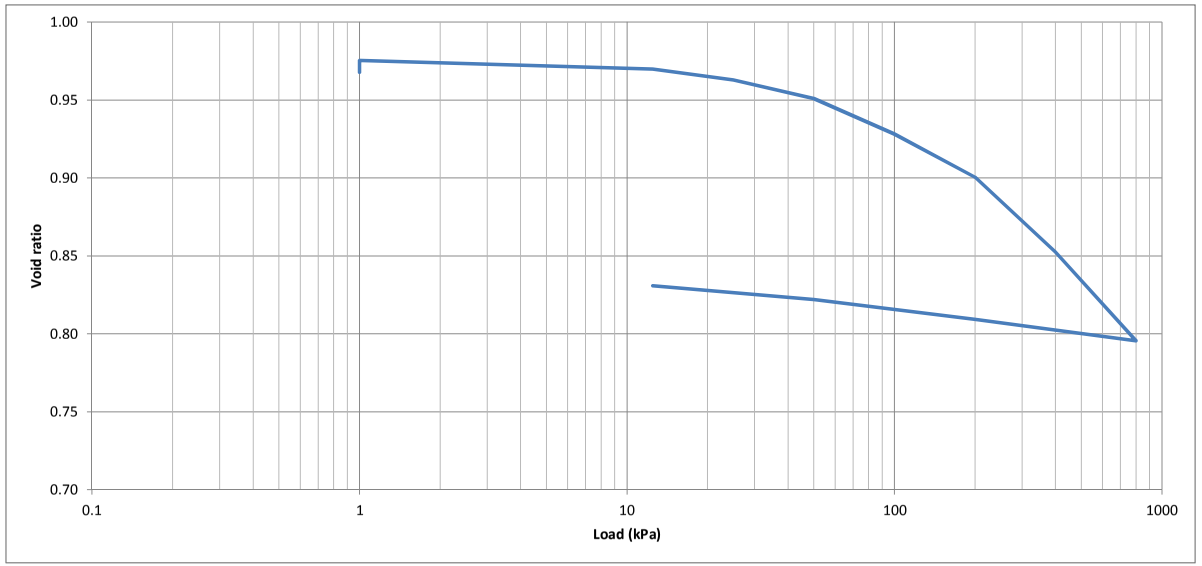
** According to Dr B van Wyk's Method
Tests marked * are not Sanas accredited and are not included in the Sanas Schedule of Accreditation for this laboratory

APPENDIX F
CONSOLIDATION TEST RESULTS

Oedometer

PROJECT:	Vrede Township Development
SAMPLE NO:	TP2 vrede
DEPTH (m):	0-0.9m
INITIAL HEIGHT (mm)	19.97
SAMPLE STATE:	Undisturbed
SOILLAB JOB NO.:	S12-1576
INITIAL DRY DENSITY (kg/m³):	1221
INITIAL MOISTURE CONTENT (%):	40.57
MOISTURE CONTENT AFTER TEST (%):	36.48
RELATIVE DENSITY:	2.402
SATURATION (%):	105.46

Load (kPa)	Height (mm)	Void ratio	
1	19.97	0.968	
1	20.05	0.975	*
12.5	19.99	0.970	
25	19.92	0.963	
50	19.80	0.951	
100	19.57	0.928	
200	19.29	0.900	
400	18.80	0.852	
800	18.22	0.795	
200	18.36	0.809	
50	18.49	0.822	
12.5	18.58	0.831	



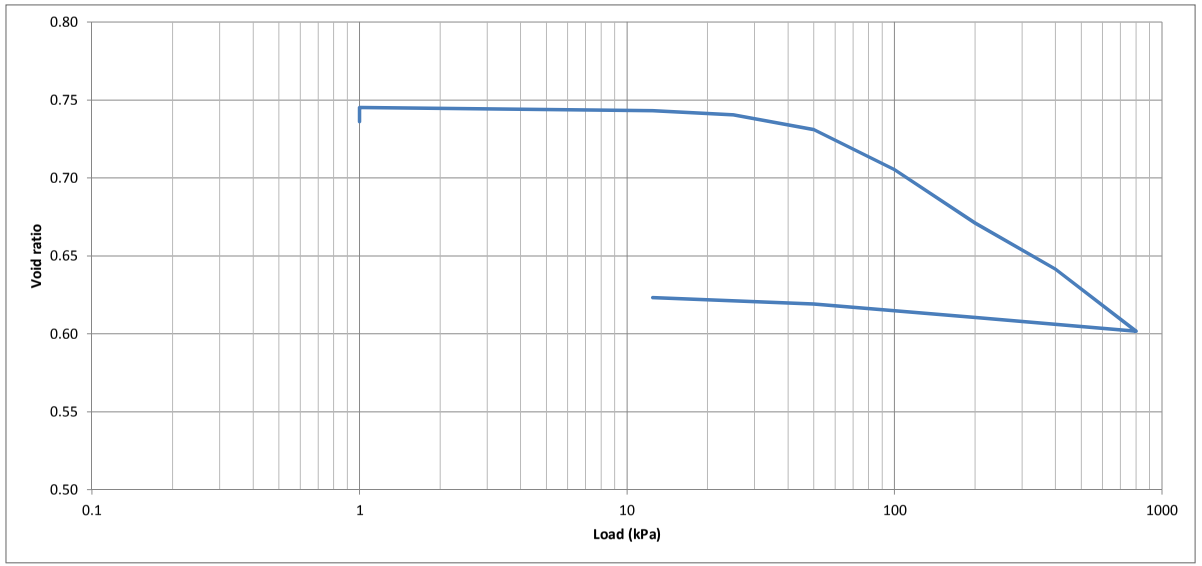
* - water added

SOILLAB (PTY) LTD
Reg No 1971/000112/07
230 Albertus Street
La Montagne 0184
Tel (012) 481-3999
P O Box 72928
Lynnwood Ridge 0040
Fax (012) 481-3812

Oedometer

PROJECT:	Vrede Township Development
SAMPLE NO:	TP24 vrede
DEPTH (m):	0.4-2.1m
INITIAL HEIGHT (mm)	18.54
SAMPLE STATE:	Undisturbed
SOILLAB JOB NO.:	S12-1576
INITIAL DRY DENSITY (kg/m³):	1543
INITIAL MOISTURE CONTENT (%):	19.57
MOISTURE CONTENT AFTER TEST (%):	23.67
RELATIVE DENSITY:	2.679
SATURATION (%):	101.72

Load (kPa)	Height (mm)	Void ratio	
1	18.54	0.736	
1	18.64	0.745	*
12.5	18.61	0.743	
25	18.59	0.741	
50	18.48	0.731	
100	18.21	0.705	
200	17.84	0.671	
400	17.53	0.641	
800	17.10	0.602	
200	17.20	0.611	
50	17.29	0.619	
12.5	17.33	0.623	



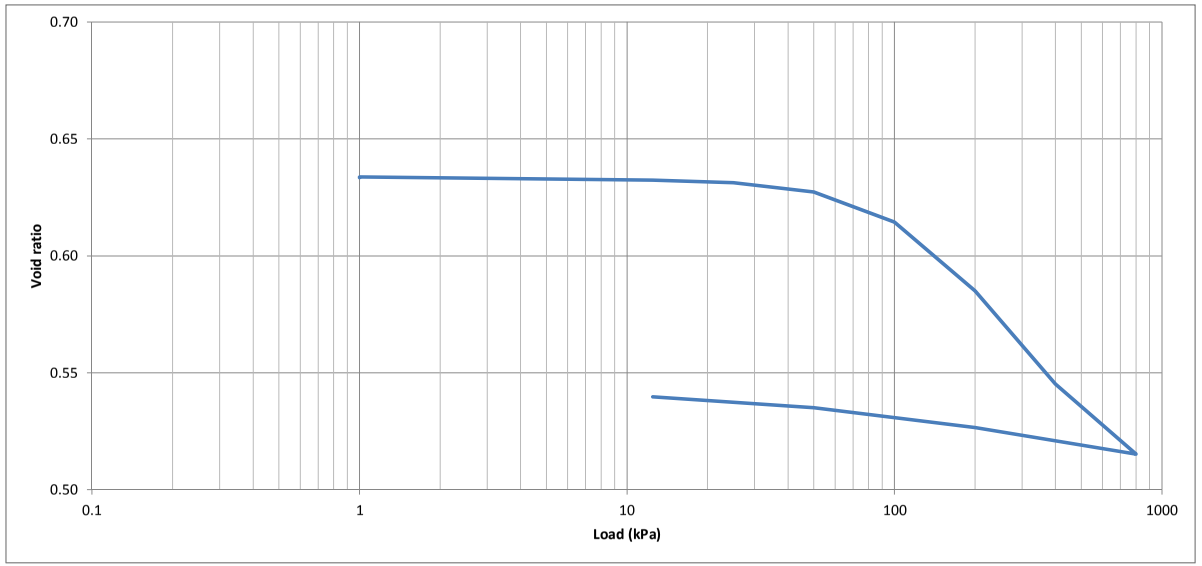
* - water added

SOILLAB (PTY) LTD
Reg No 1971/000112/07
230 Albertus Street
La Montagne 0184
Tel (012) 481-3999
P O Box 72928
Lynnwood Ridge 0040
Fax (012) 481-3812

Oedometer

PROJECT:	Vrede Township Development
SAMPLE NO:	TP39 vrede
DEPTH (m):	0.5-1.0m
INITIAL HEIGHT (mm)	20.00
SAMPLE STATE:	Undisturbed
SOILLAB JOB NO.:	S12-1576
INITIAL DRY DENSITY (kg/m³):	1620
INITIAL MOISTURE CONTENT (%):	15.93
MOISTURE CONTENT AFTER TEST (%):	20.97
RELATIVE DENSITY:	2.646
SATURATION (%):	102.78

Load (kPa)	Height (mm)	Void ratio	
1	20.00	0.634	
1	20.00	0.634	*
12.5	19.99	0.632	
25	19.97	0.631	
50	19.93	0.627	
100	19.77	0.614	
200	19.41	0.585	
400	18.92	0.545	
800	18.55	0.515	
200	18.69	0.527	
50	18.79	0.535	
12.5	18.85	0.540	



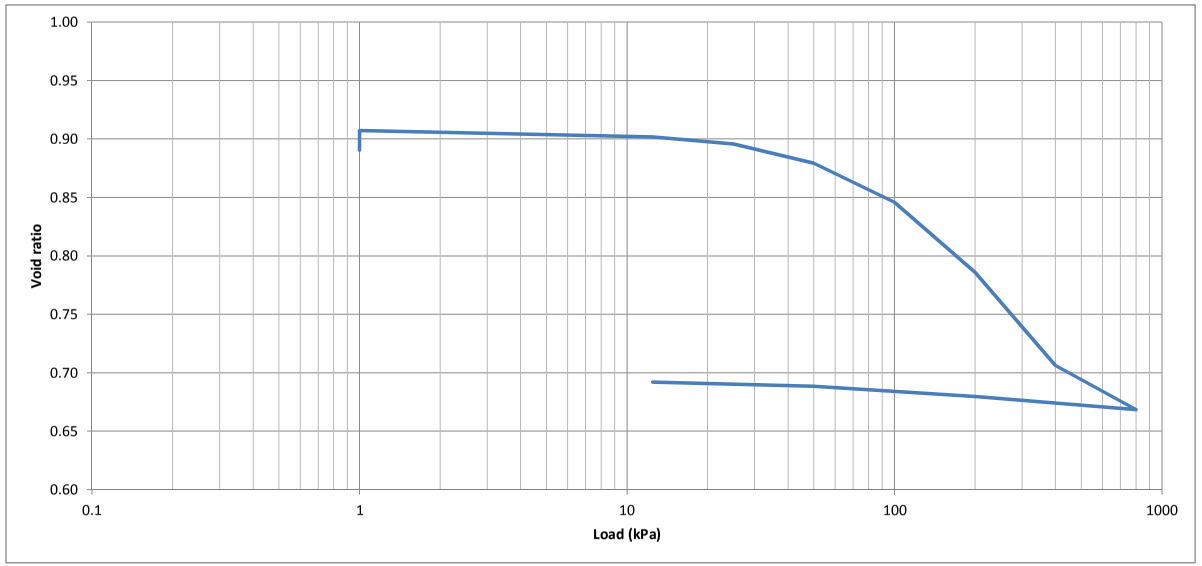
* - water added

SOILLAB (PTY) LTD
Reg No 1971/000112/07
230 Albertus Street
La Montagne 0184
Tel (012) 481-3999
P O Box 72928
Lynnwood Ridge 0040
Fax (012) 481-3812

Oedometer

PROJECT:	Vrede Township Development
SAMPLE NO:	TP39 vrede
DEPTH (m):	1.0-2.0m
INITIAL HEIGHT (mm)	18.55
SAMPLE STATE:	Undisturbed
SOILLAB JOB NO.:	S12-1576
INITIAL DRY DENSITY (kg/m³):	1483
INITIAL MOISTURE CONTENT (%):	22.22
MOISTURE CONTENT AFTER TEST (%):	41.67
RELATIVE DENSITY:	2.804
SATURATION (%):	168.81

Load (kPa)	Height (mm)	Void ratio	
1	18.55	0.891	
1	18.72	0.907	*
12.5	18.66	0.902	
25	18.60	0.896	
50	18.44	0.879	
100	18.11	0.846	
200	17.52	0.786	
400	16.74	0.706	
800	16.37	0.668	
200	16.48	0.680	
50	16.57	0.688	
12.5	16.60	0.692	



* - water added

SOILLAB (PTY) LTD
Reg No 1971/000112/07
230 Albertus Street
La Montagne 0184
Tel (012) 481-3999
P O Box 72928
Lynnwood Ridge 0040
Fax (012) 481-3812

APPENDIX G
TEST PIT PHOTOS

6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

TEST PIT PHOTOS

TEST PIT 1

TEST PIT 2

6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

TEST PIT PHOTOS

TEST PIT 3

TEST PIT 4

6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

TEST PIT PHOTOS

TEST PIT 5

TEST PIT 6

6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

TEST PIT PHOTOS

TEST PIT 7

TEST PIT 8

6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

TEST PIT PHOTOS

TEST PIT 9

TEST PIT 10

6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

TEST PIT PHOTOS

TEST PIT 11

TEST PIT 12

6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

TEST PIT PHOTOS

TEST PIT 13

TEST PIT 14

6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

TEST PIT PHOTOS

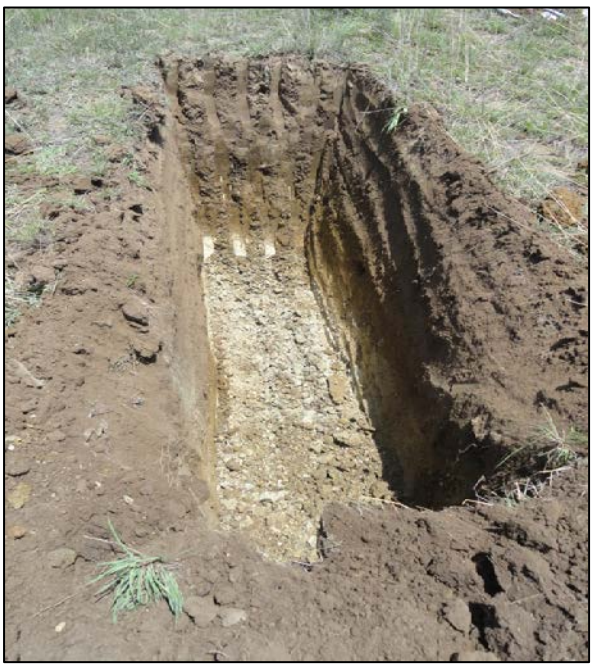
TEST PIT 15

TEST PIT 16

6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

TEST PIT PHOTOS

TEST PIT 17



TEST PIT 18

6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

TEST PIT PHOTOS

TEST PIT 22

TEST PIT 23

6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

TEST PIT PHOTOS

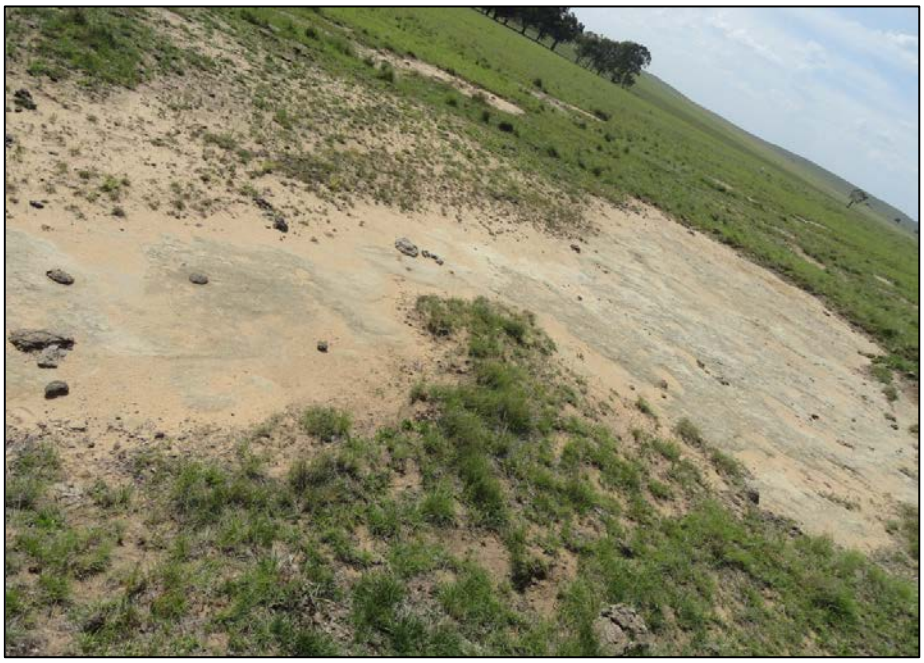
TEST PIT 24

TEST PIT 25

6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

TEST PIT PHOTOS

TEST PIT 26



TEST PIT 27

6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

TEST PIT PHOTOS

TEST PIT 28

TEST PIT 29

6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

TEST PIT PHOTOS

TEST PIT 30

TEST PIT 31

6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

TEST PIT PHOTOS

TEST PIT 32

TEST PIT 33

6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

TEST PIT PHOTOS

TEST PIT 34

TEST PIT 35

6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

TEST PIT PHOTOS

TEST PIT 36

TEST PIT 37

6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

TEST PIT PHOTOS

TEST PIT 38

TEST PIT 39

6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

TEST PIT PHOTOS

TEST PIT 40

TEST PIT 41

6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

TEST PIT PHOTOS

TEST PIT 42

TEST PIT 45

6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

TEST PIT PHOTOS

TEST PIT 46

TEST PIT 47

6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

TEST PIT PHOTOS

TEST PIT 48

TEST PIT 49

6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

TEST PIT PHOTOS

TEST PIT 50

TEST PIT 51

6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

TEST PIT PHOTOS

TEST PIT 52

TEST PIT 53

APPENDIX H
SITE PHOTOS

Simlab (EDMS) BEPERK (PTY) LIMITED GEOTEGNIESE DIENSTE GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07 SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

SITE PHOTOS

Sandstone outcrop Test Pit 14

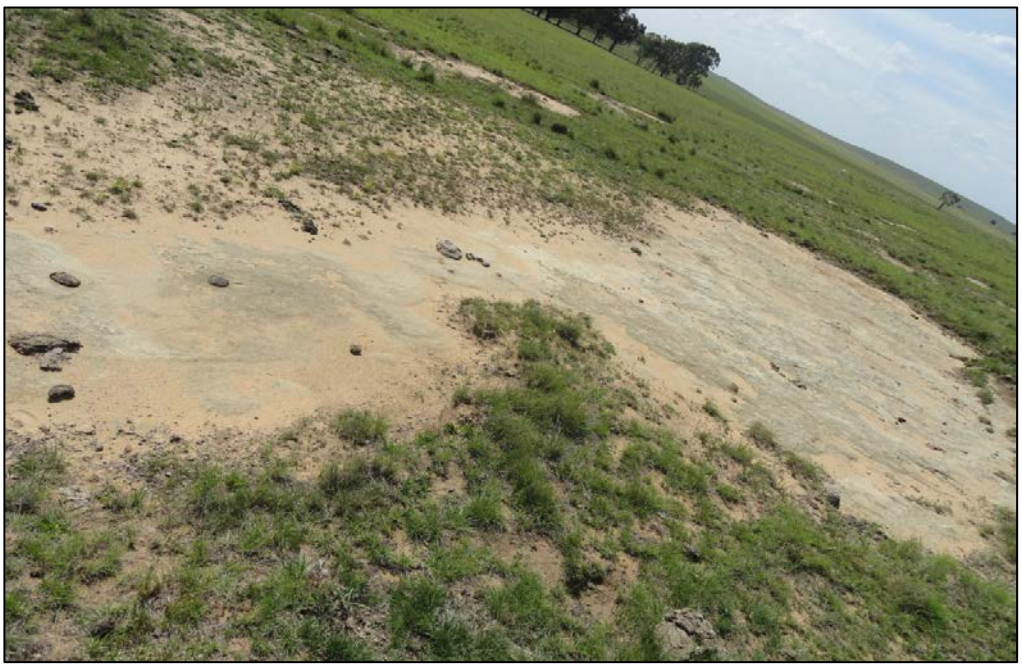
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

SITE PHOTOS

Sandstone outcrop Test Pit 26

6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

SITE PHOTOS



Sandstone outcrop Test Pit 27

6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

SITE PHOTOS

6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

SITE PHOTOS

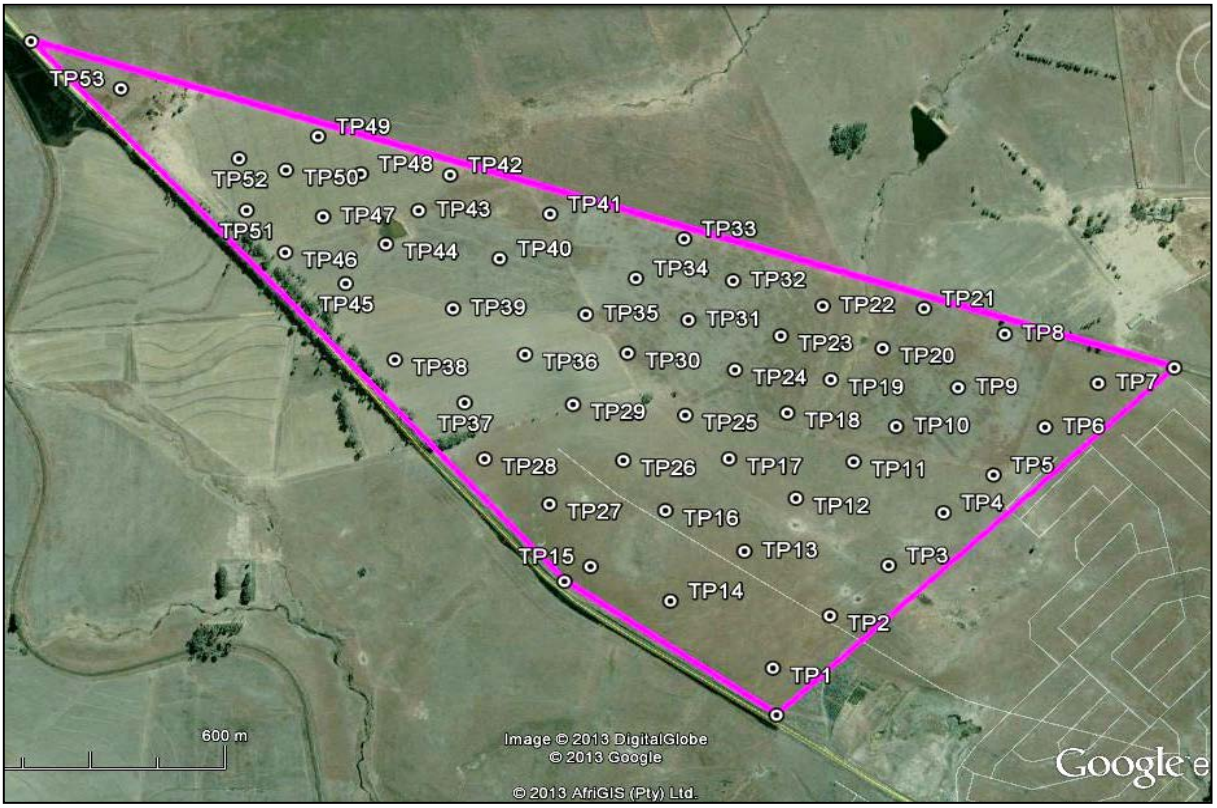
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

SITE PHOTOS

APPENDIX I
LAYOUT PLAN

Simlab (EDMS) BEPERK (PTY) LIMITED
GEOTEGNIESE DIENSTE
GEOTECHNICAL SERVICES
sanas Testing Laboratory T0455
REG. No. 1987/004282/07
SAASIL/SAACEL No. 208
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA, Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447-0224/5, 082 821 9435, +27 (0) 51 448-8329, simbfn@simlab.co.za

LAYOUT PLAN



GPS CO-ORDINATES

TP1	29 Y-013743	X3034651	TP19	29 Y-013876	X3033954	TP37	29 Y-013054	X3034009
TP2	29 Y-013871	X3034524	TP20	29 Y-013993	X3033878	TP38	29 Y-012897	X3033905
TP3	29 Y-014001	X3034402	TP21	29 Y-014087	X3033781	TP39	29 Y-013028	X3033782
TP4	29 Y-014124	X3034275	TP22	29 Y-013859	X3033775	TP40	29 Y-013132	X3033661
TP5	29 Y-014236	X3034184	TP23	29 Y-013763	X3033848	TP41	29 Y-013245	X3033552
TP6	29 Y-014352	X3034069	TP24	29 Y-013659	X3033930	TP42	29 Y-013021	X3033458
TP7	29 Y-014470	X3033963	TP25	29 Y-013547	X3034039	TP43	29 Y-012950	X3033544
TP8	29 Y-014266	X3033844	TP26	29 Y-013408	X3034148	TP44	29 Y-012877	X3033626
TP9	29 Y-014160	X3033974	TP27	29 Y-013243	X3034253	TP45	29 Y-012787	X3033721
TP10	29 Y-014021	X3034067	TP28	29 Y-013098	X3034145	TP46	29 Y-012653	X3033646
TP11	29 Y-013925	X3034152	TP29	29 Y-013296	X3034013	TP47	29 Y-012737	X3033560
TP12	29 Y-013795	X3034240	TP30	29 Y-013418	X3033890	TP48	29 Y-012821	X3033455
TP13	29 Y-013679	X3034367	TP31	29 Y-013555	X3033810	TP49	29 Y-012725	X3033366
TP14	29 Y-013513	X3034486	TP32	29 Y-013656	X3033714	TP50	29 Y-012654	X3033447
TP15	29 Y-013335	X3034403	TP33	29 Y-013546	X3033612	TP51	29 Y-012566	X3033545
TP16	29 Y-013502	X3034268	TP34	29 Y-013437	X3033709	TP52	29 Y-012550	X3033420
TP17	29 Y-013645	X3034145	TP35	29 Y-013325	X3033796	TP53	29 Y-012288	X3033253
TP18	29 Y-013777	X3034034	TP36	29 Y-013189	X3033893			

WGS 84 South African LO 29