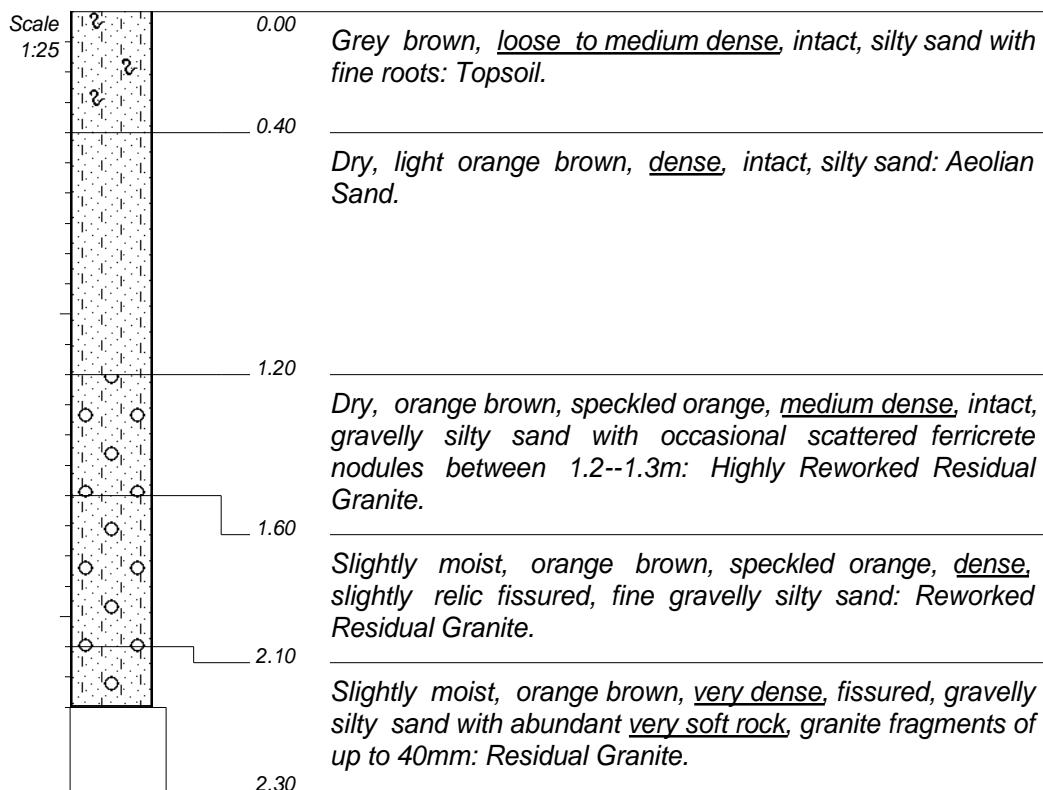


Sivest
Kalplaats

HOLE No: KAL1-6
Sheet 1 of 1

JOB NUMBER: 10162/2



NOTES

- 1) Refusal of TLB @ 2.3m on very soft rock
- 2) No water seepage observed

CONTRACTOR : Die Timmerman
MACHINE : JCB
DRILLED BY : David
PROFIED BY : M.C.

TYPE SET BY : Rev 1
SETUP FILE : STANDARD.SET

INCLINATION :
DIAM :
DATE : 04/09/2012
DATE :
DATE : 08/10/12 11:26
TEXT : ..\2012\10162--1.TXT

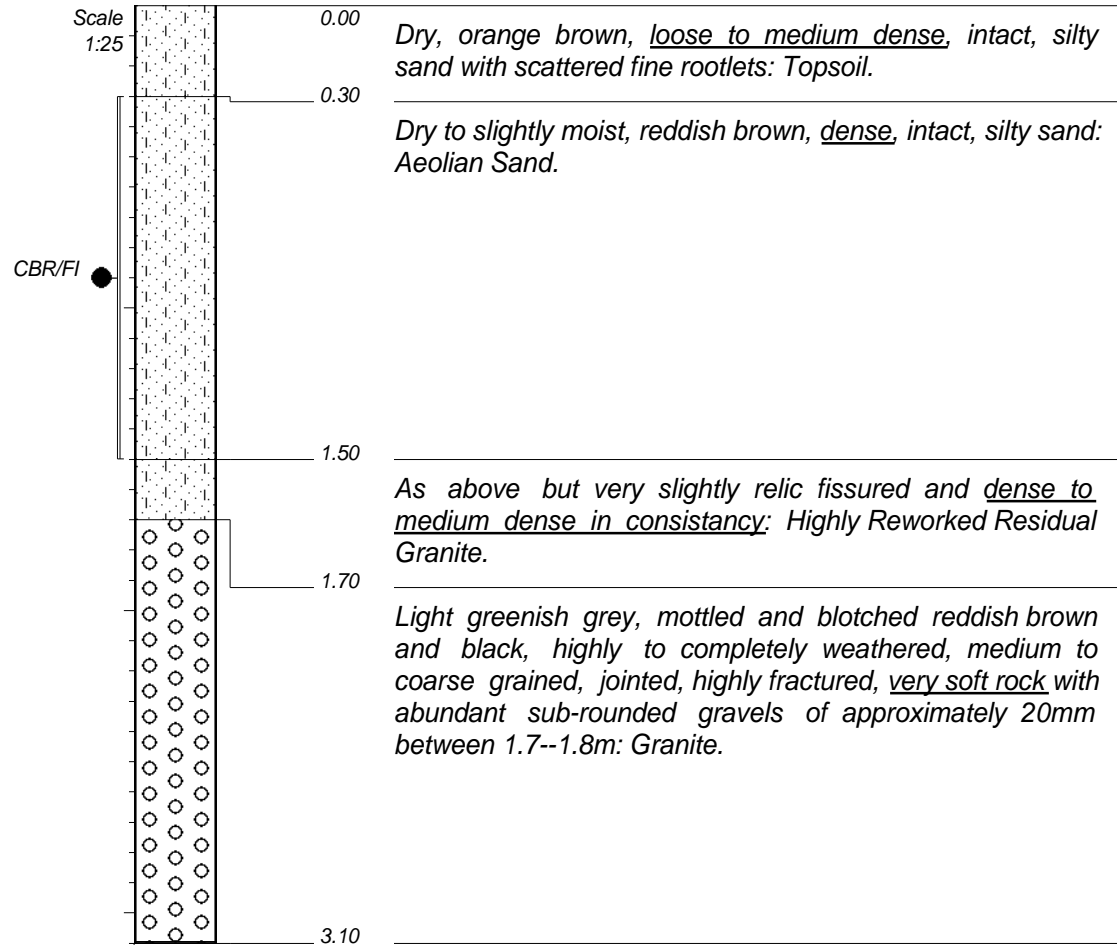
ELEVATION :
X-COORD : 2911574
Y-COORD : 0020611

HOLE No: KAL1-6

Sivest
Kalplaats

HOLE No: KAL2-1
Sheet 1 of 1

JOB NUMBER: 10162/2



NOTES

- 1) Refusal of TLB @ 3.1m
- 2) No water seepage observed
- 3) Disturbed sample CBR/FI 0.3--1.5m

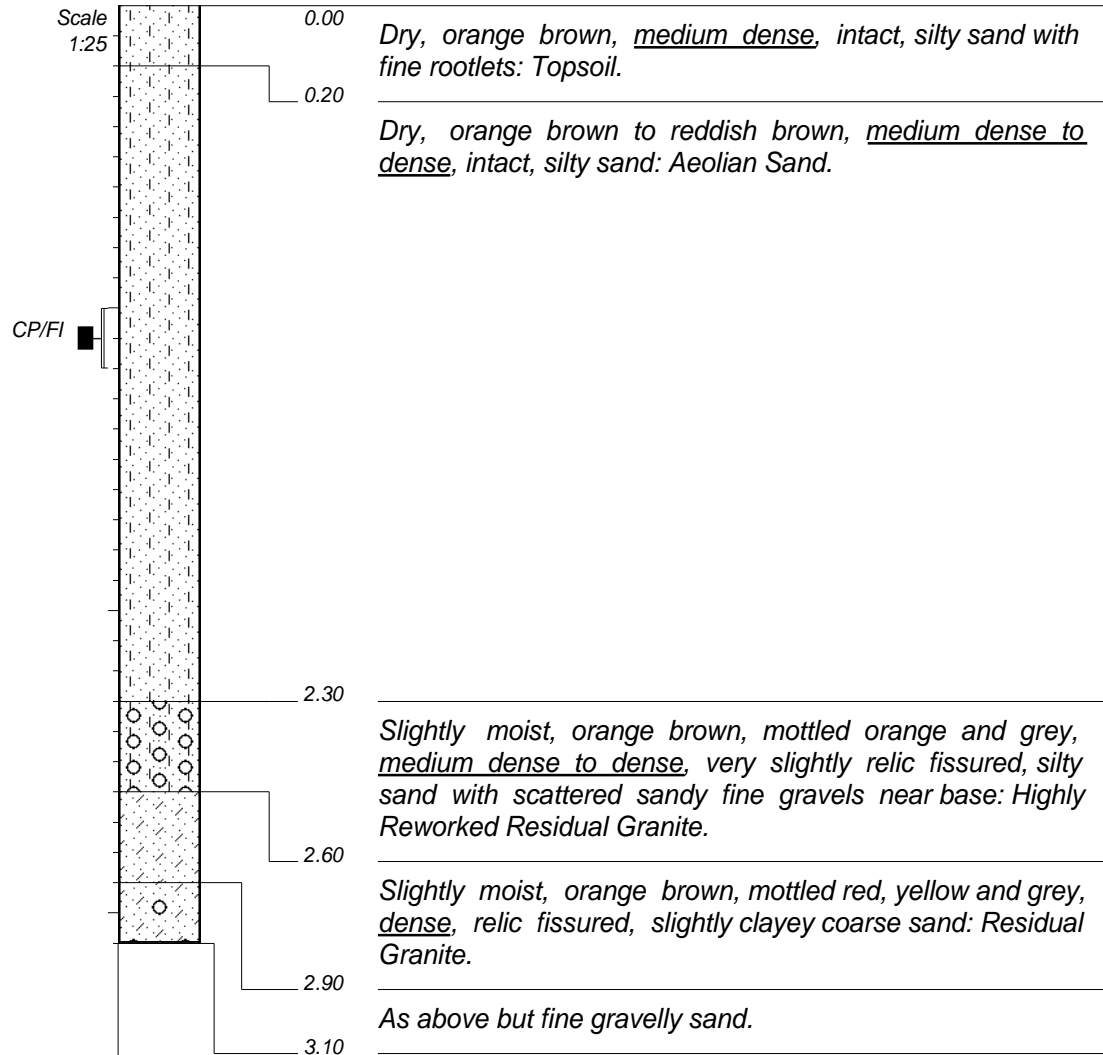
CONTRACTOR : Die Timmerman
MACHINE : JCB
DRILLED BY : David
PROFIED BY : M.C.

TYPE SET BY : Rev 1
SETUP FILE : STANDARD.SET

INCLINATION :
DIAM :
DATE : 04/09/2012
DATE :
DATE : 08/10/12 11:26
TEXT : ..\2012\10162--1.TXT

ELEVATION :
X-COORD : 2911858
Y-COORD : 0020505

HOLE No: KAL2-1



NOTES

- 1) No Refusal of TLB @ 3.1m
- 2) No water seepage observed
- 3) On the north face of the trial pit is a large very soft rock corestone between 2.2-3.1m
- 4) Undisturbed sample CP/FI 1.0--1.2m

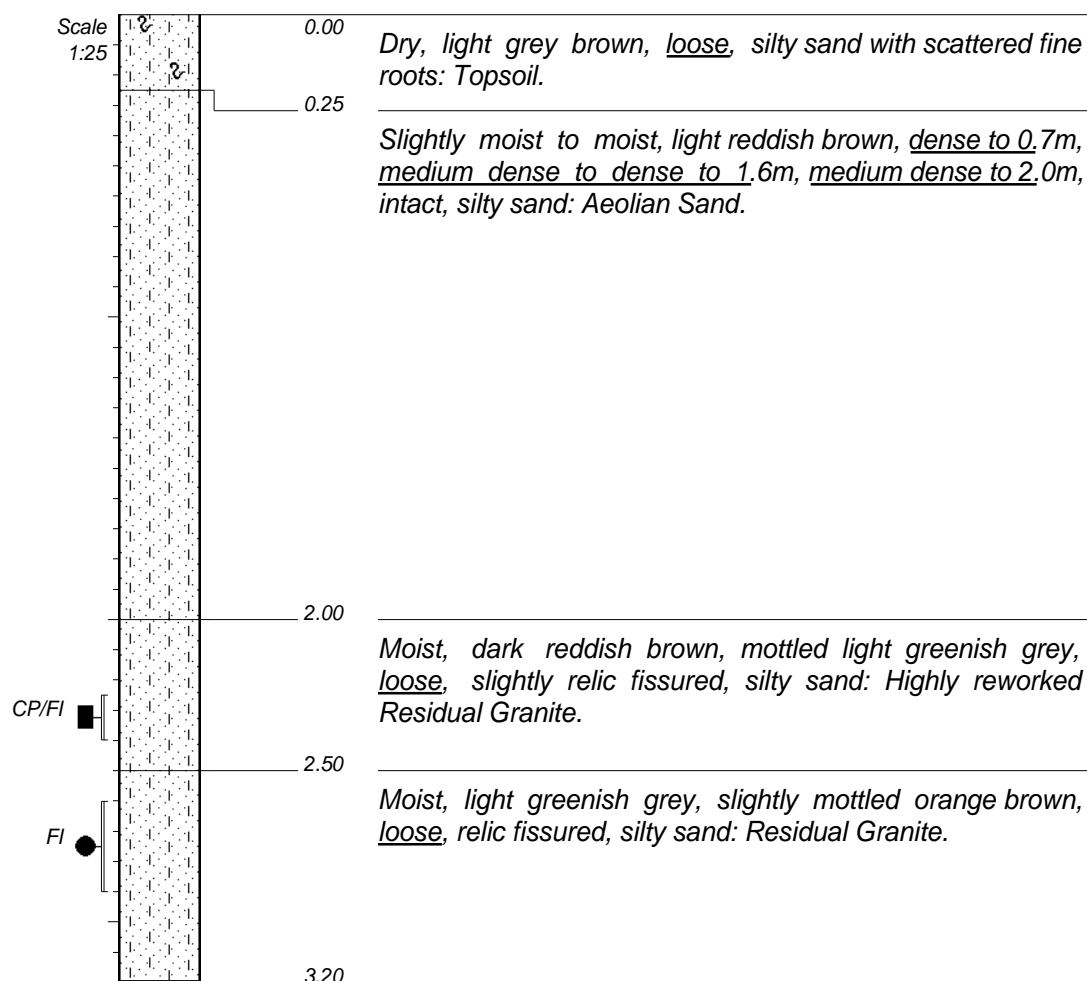
CONTRACTOR : Die Timmerman
MACHINE : JCB
DRILLED BY : David
PROFILED BY : M.C.

TYPE SET BY : Rev 1
SETUP FILE : STANDARD.SET

INCLINATION :
DIAM :
DATE : 04/09/2012
DATE :
DATE : 08/10/12 11:26
TEXT : ..\2012\10162--1.TXT

ELEVATION :
X-COORD : 2911904
Y-COORD : 0020594

HOLE No: KAL2-2



NOTES

- 1) No Refusal of TLB @ 3.2m
- 2) No water seepage observed
- 3) On the north face of the trial pit is a large very soft rock corestone between 2.2-3.1m
- 4) Undisturbed sample CP/FI 2.25--2.4m
- 5) Disturbed sample FI 2.6--2.9m

CONTRACTOR : Die Timmerman
MACHINE : JCB
DRILLED BY : David
PROFIED BY : M.C.

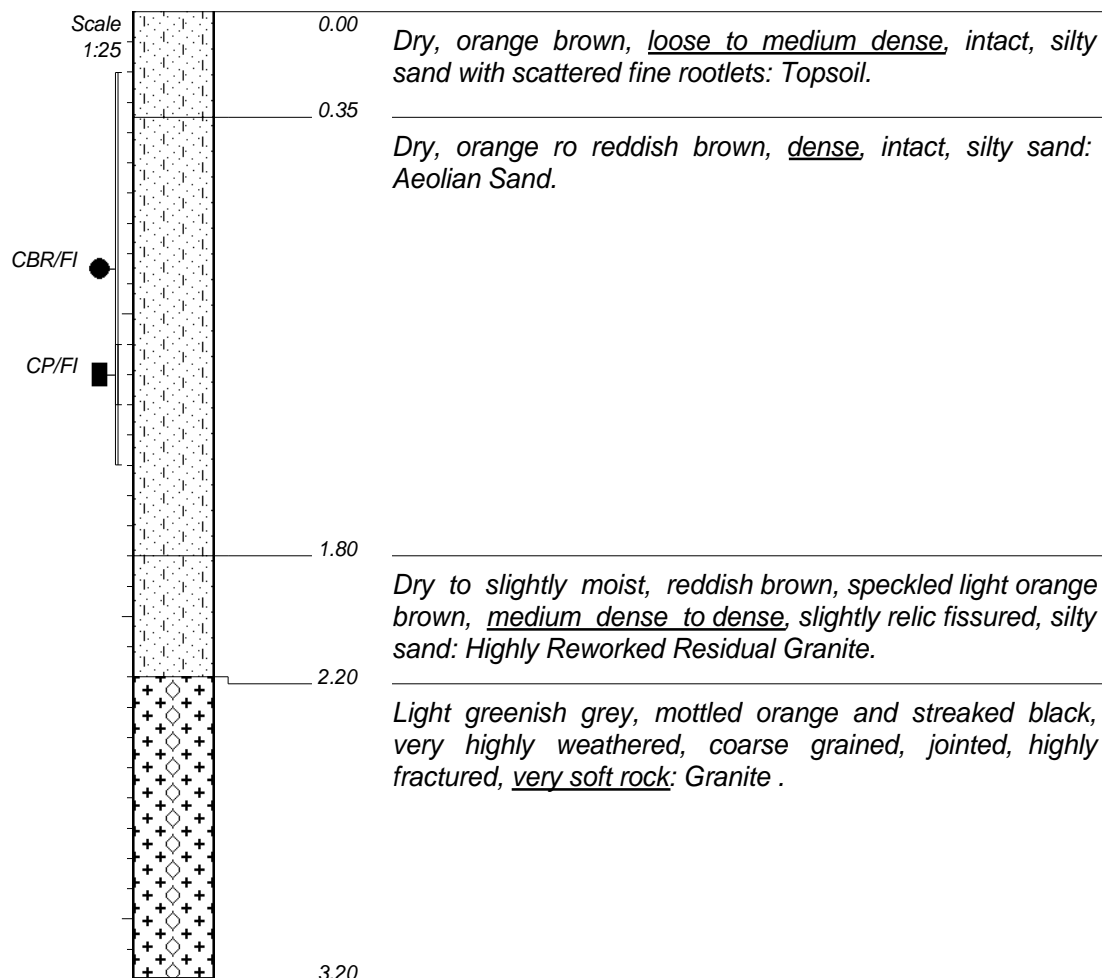
TYPE SET BY : Rev 1
SETUP FILE : STANDARD.SET

INCLINATION :
DIAM :
DATE : 04/09/2012
DATE :

DATE : 08/10/12 11:26
TEXT : ..\2012\10162--1.TXT

ELEVATION :
X-COORD : 2911925
Y-COORD : 0020527

HOLE No: KAL2-3



NOTES

- 1) Partial Refusal of TLB @ 3.2m
- 2) No water seepage observed
- 3) hard granite corestone on the western face of the trial pit below 1.7m and approximately 1.2m in diameter
- 4) Disturbed sample CBR/FI 0.2--1.5m
- 5) Undisturbed sample CP/FI 1.1--1.3m

CONTRACTOR : Die Timmerman
MACHINE : JCB
DRILLED BY : David
PROFIED BY : M.C.

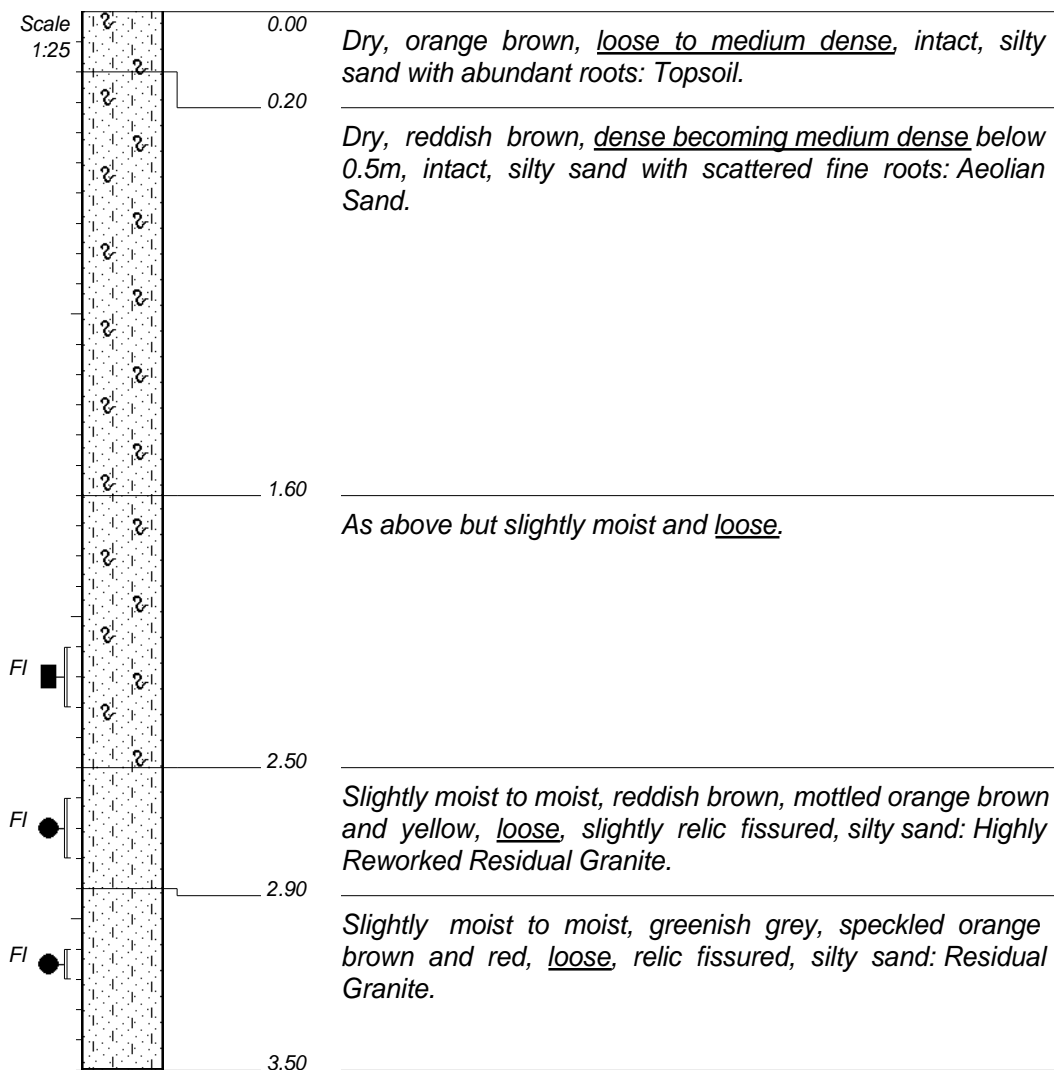
TYPE SET BY : Rev 1
SETUP FILE : STANDARD.SET

INCLINATION :
DIAM :
DATE : 04/09/2012
DATE :

DATE : 08/10/12 11:26
TEXT : ..\2012\10162--1.TXT

ELEVATION :
X-COORD : 2911947
Y-COORD : 0020455

HOLE No: KAL2-4



NOTES

- 1) No Refusal of TLB @ 3.5m
- 2) No water seepage observed
- 3) Undisturbed sample FI 2.1--2.3m
- 4) Disturbed sample FI 2.6--2.8m
- 5) Disturbed sample FI 3.1--3.2m

CONTRACTOR : Die Timmerman
MACHINE : JCB
DRILLED BY : David
PROFIED BY : M.C.













TYPE SET BY : Rev 1
SETUP FILE : STANDARD.SET

INCLINATION :
DIAM :
DATE : 04/09/2012
DATE :

DATE : 08/10/12 11:26
TEXT : ..\2012\10162--1.TXT

ELEVATION :
X-COORD : 2911993
Y-COORD : 0020549

HOLE No: KAL2-5

Name 		GRAVELS	{SA02}
		GRAVELLY	{SA03}
		SAND	{SA04}
		SANDY	{SA05}
		SILTY	{SA07}
		CLAYEY	{SA09}
		PLUTONIC/norite/syenite	{SA17}
		FREE QUARTZ/visible quartz	{SA44}
		UNDISTURBED SAMPLE	{SA37}
		DISTURBED SAMPLE	{SA38}
		ROOTS	{SA40}

CONTRACTOR :
MACHINE :
DRILLED BY :
PROFIED BY :

TYPE SET BY : Rev 1
SETUP FILE : STANDARD.SET

INCLINATION :
DIAM :
DATE :
DATE :

DATE : 08/10/12 11:26
TEXT : ..\2012\10162--1.TXT

ELEVATION :
X-COORD :
Y-COORD :

LEGEND
SUMMARY OF SYMBOLS

APPENDIX 9

LABORATORY TEST RESULTS



FOUNDATION INDICATOR

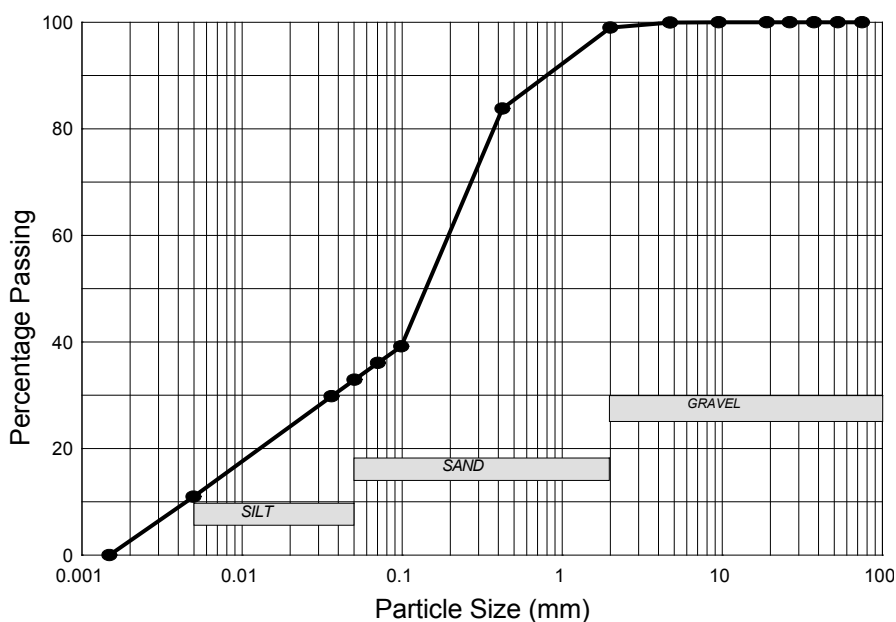
Client	SIVEST		
Location	KALPLAATS SUB-STATION , VRYBURG. KAL 1 TP 1 @ 0,3 - 1,5m		
Date	19 SEPTEMBER 2012	Test No	2156
Job No	10162/2	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	100.00
26.50	100.00
19.00	100.00
9.50	100.00
4.75	99.94
2.00	99.03
0.425	83.81

GRADING ANALYSIS



HYDROMETER ANALYSIS

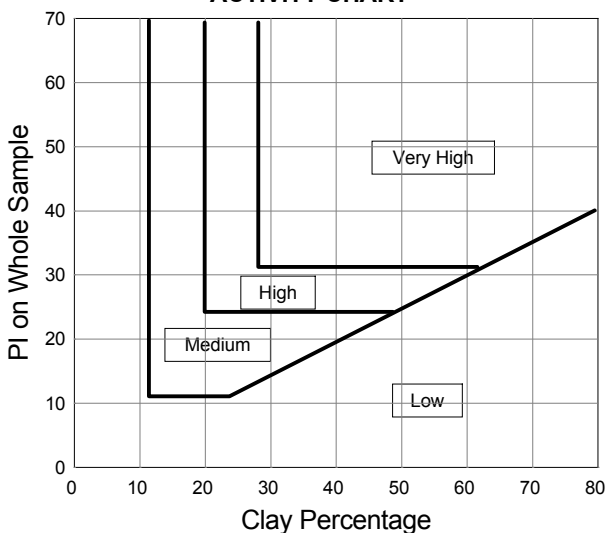
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0989	39.24
0.0708	36.10
0.0507	32.96
0.0362	29.82
0.0050	10.99
0.0015	0.00

ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	0.78
Moisture Content	2.99
PI on Whole Sample	Non Plastic

ACTIVITY CHART





C.B.R. DETERMINATION

Client	SIVEST		
Location	KALPLAATS SUB - STATION , VRYBURG KAL 1 TP 1 @ 0,3 - 1,5m		
Date	19 SEPTEMBER 2012	Test No	2156
Job No	10162/2	Checked By	EB
Calibration Date	21 April 2010	Calibration Certificate	2029

Direct Results from Test Procedure

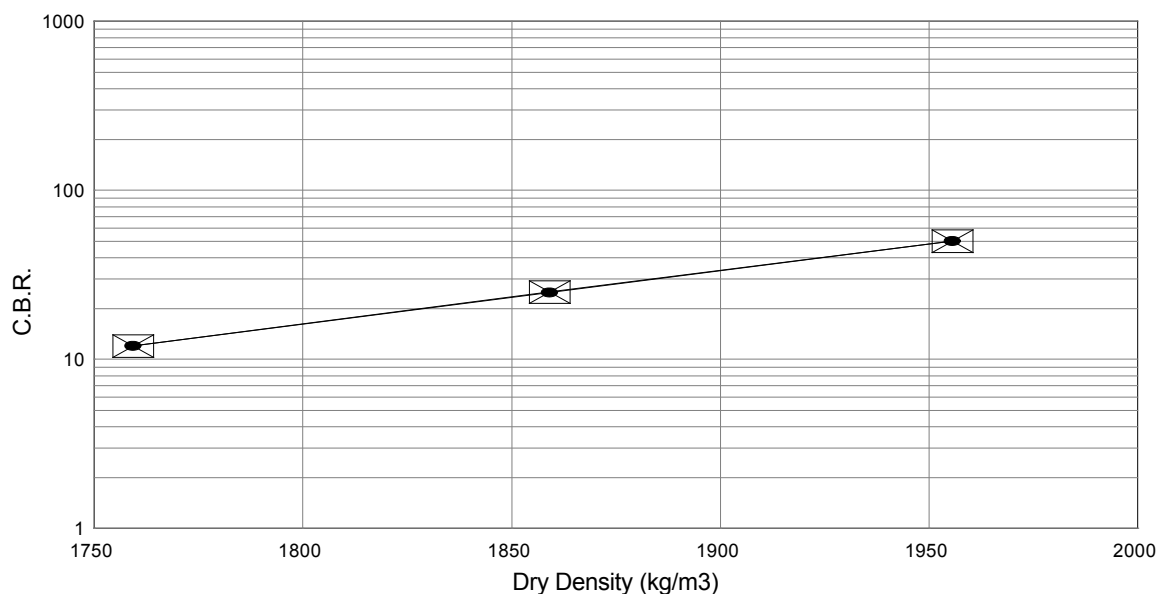
Maximum Dry Density (kg/m3)	1957
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Optimum Moisture Content (%)	7.6
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Percentage Mod AASHTO	99.9	95.0	89.9
CBR @ 2.54mm	50	25	12
CBR @ 5.08mm	45	24	12
CBR@ 7.62mm	45	23	12
Average Moisture Content (%)	7.8		
Percentage Swell	0.31	0.41	0.47

Interpolated Results

Percentage Mod AASHTO	90	93	95	98	100
CBR	12	19	25	38	51





FOUNDATION INDICATOR

Client	SIVEST		
Location	KALPLAATS SUB-STATION , VRYBURG.		KAL 1 TP 1 @ 1,0 - 1,2m
Date	19 SEPTEMBER 2012	Test No	2176
Job No	10162/2	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	100.00
26.50	100.00
19.00	100.00
9.50	100.00
4.75	100.00
2.00	99.22
0.425	82.75

HYDROMETER ANALYSIS

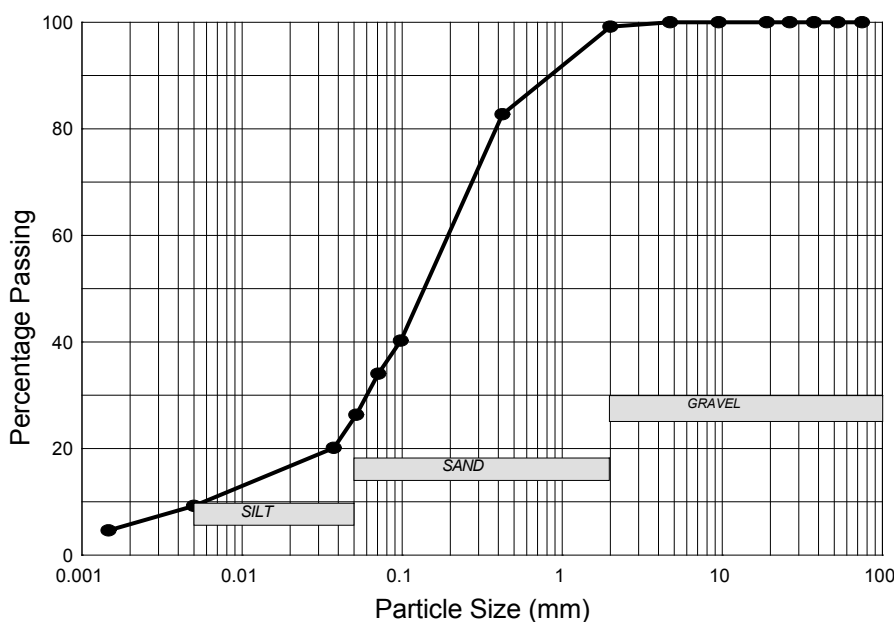
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0983	40.29
0.0712	34.09
0.0518	26.34
0.0374	20.15
0.0050	9.30
0.0015	4.65

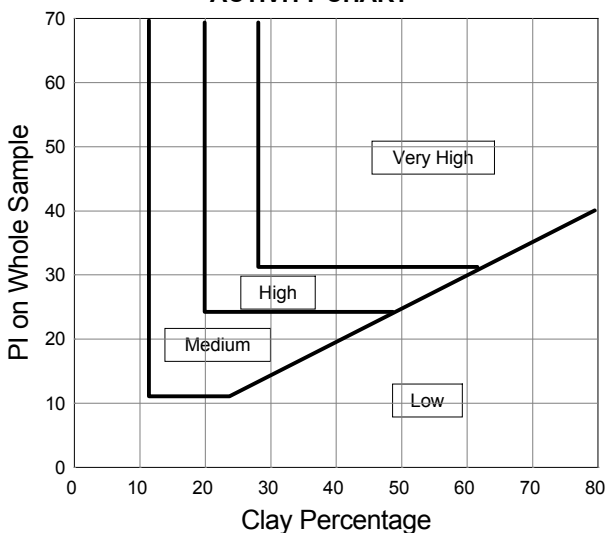
ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	0.78
Moisture Content	16.39
PI on Whole Sample	Non Plastic

GRADING ANALYSIS



ACTIVITY CHART



DOUBLE OEDOMETER

Client	SIVEST		
Location	KALPLAATS SUB-STATION	KAL 1 TP 1 @ 1,0 - 1,2m	
Date	19 SEPTEMBER 2012	Test No	2175
Job No	10162/2	Checked By	EB

Sample Height (mm)	20	Sample Diameter (mm)	64	Sample Specific Gravity	2.648
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Sample at NMC

Effective Stress (kPa)	Time (mins)	Consolidation Reading	Voids Ratio	Strain (%)
10	120	956	0.764	0.00
10	1560	957	0.763	0.05
33	1680	960	0.760	0.20
65	1800	966	0.755	0.50
127	1920	972	0.750	0.80
251	2040	988	0.735	1.60
498	3480	1000	0.725	2.20
993	4290	1012	0.714	2.80
1868	5730	1028	0.700	3.60
743	5850	1025	0.703	3.45
118	5970	1019	0.708	3.15
10	6090	1003	0.722	2.35

Sample Soaked

Effective Stress (kPa)	Time (mins)	Consolidation Reading	Voids Ratio	Strain (%)
10	20	1066	0.760	0.00
10	1560	1067	0.759	0.05
33	1680	1106	0.725	2.00
65	1800	1153	0.683	4.35
127	1920	1188	0.653	6.10
251	2040	1207	0.636	7.05
498	3480	1226	0.619	8.00
993	4290	1243	0.604	8.85
1868	3730	1262	0.588	9.80
743	5850	1253	0.595	9.35
118	5970	1245	0.603	8.95
10	6090	1235	0.611	8.45

Moisture Content Calculations

Mass wet sample plus ring before test (gms)	328.60
Mass wet sample plus ring after test (gms)	324.80
Mass dry sample plus ring (gms)	312.20
Mass ring (gms)	215.60
Moisture content before test (%)	16.98
Moisture content after test (%)	13.04

Moisture Content Calculations

Mass wet sample plus ring before test (gms)	330.00
Mass wet sample plus ring after test (gms)	328.00
Mass dry sample plus ring (gms)	312.40
Mass ring (gms)	215.60
Moisture content before test (%)	18.18
Moisture content after test (%)	16.12

Other Data

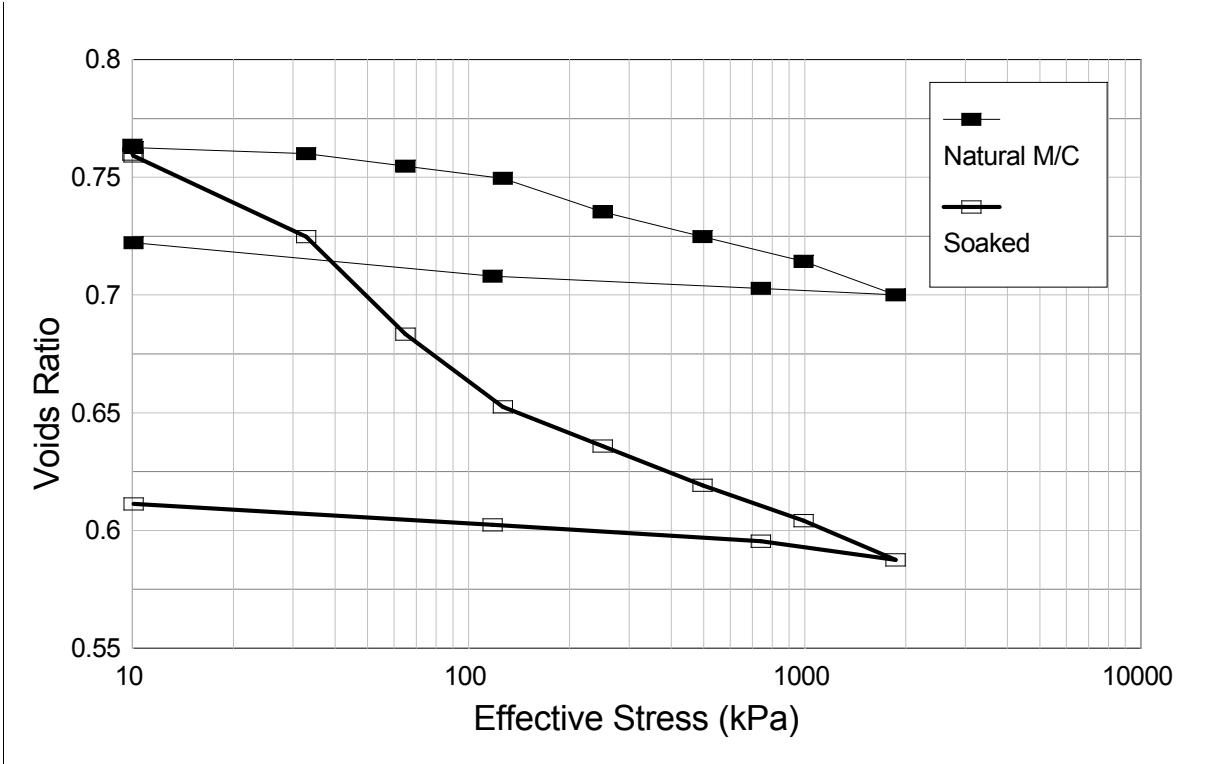
Initial Dry Density (kg/m ³)	1501
Initial Void Ratio	0.76

Other Data

Initial Dry Density (kg/m ³)	1505
Initial Void Ratio	0.76

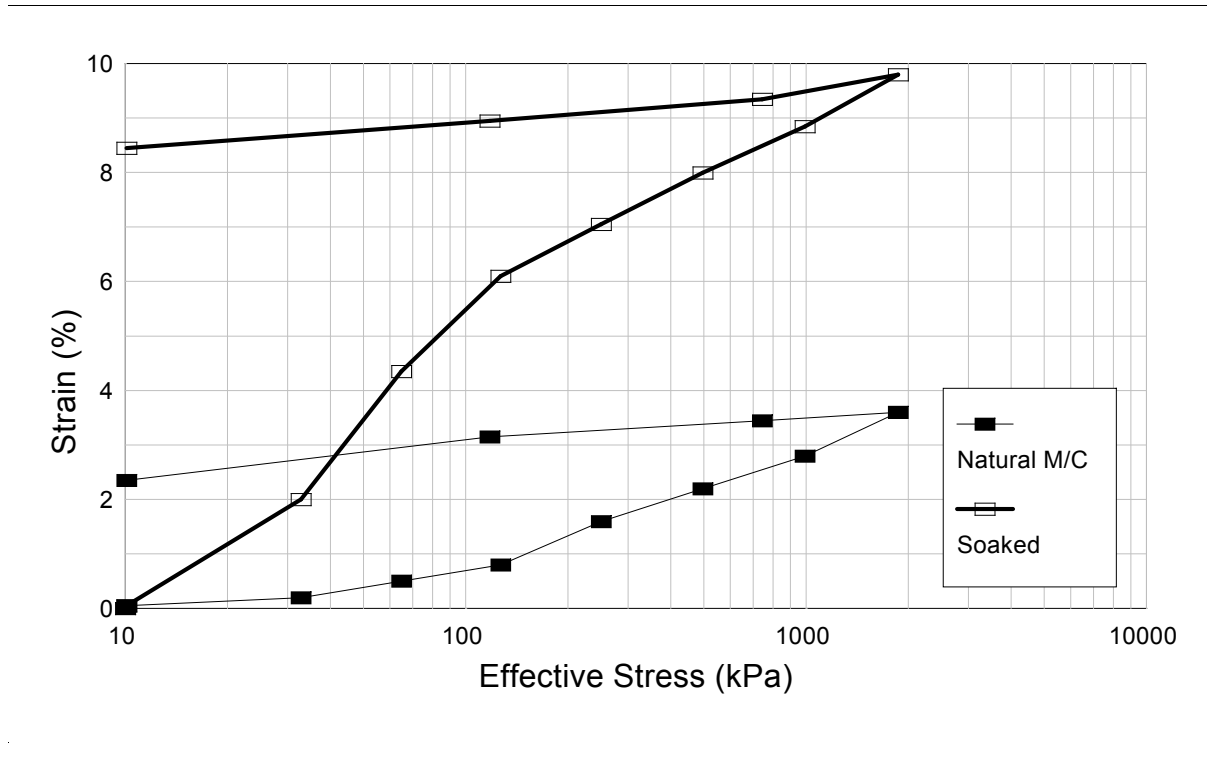
VOIDS RATIO v EFFECTIVE STRESS

Test No: 2175



STRAIN v EFFECTIVE STRESS

Test No: 2175





FOUNDATION INDICATOR

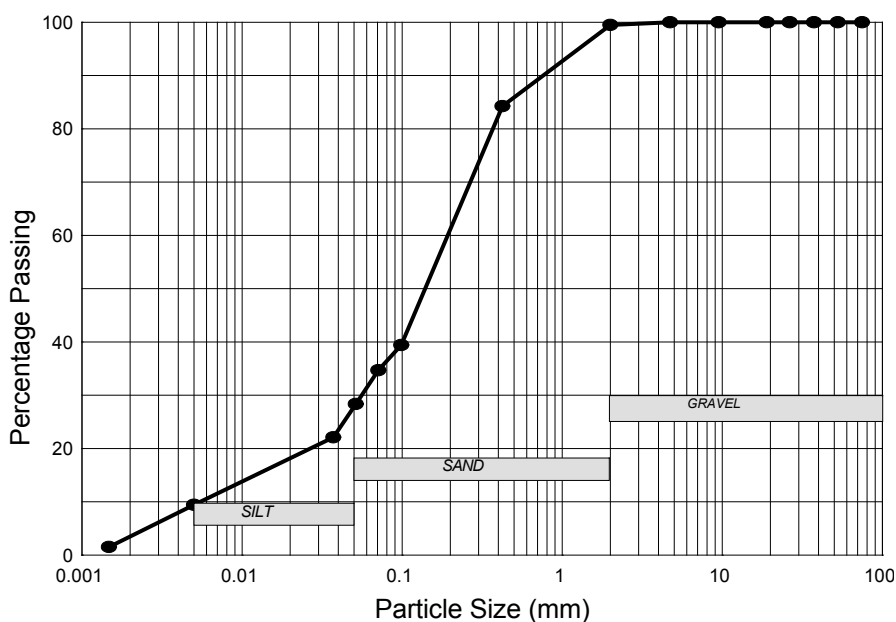
Client	SIVEST		
Location	KALPLAATS SUB-STATION , VRYBURG. KAL 1 TP 3 @ 1,3 - 1,5m		
Date	19 SEPTEMBER 2012	Test No	2157
Job No	10162/2	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	100.00
26.50	100.00
19.00	100.00
9.50	100.00
4.75	100.00
2.00	99.55
0.425	84.30

GRADING ANALYSIS



HYDROMETER ANALYSIS

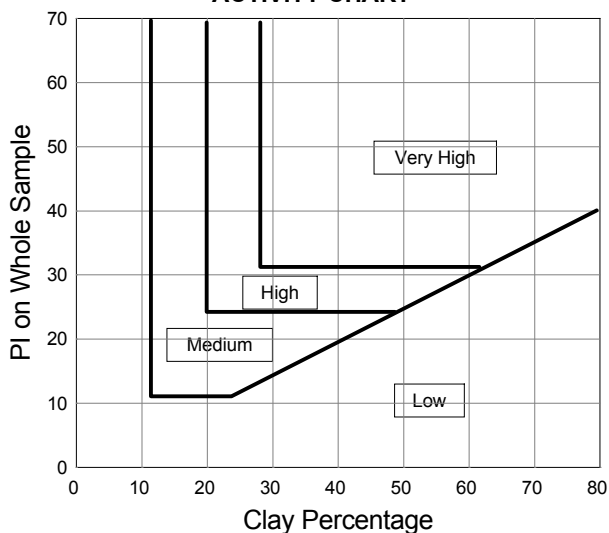
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0989	39.47
0.0712	34.73
0.0515	28.42
0.0372	22.10
0.0050	9.47
0.0015	1.58

ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	0.77
Moisture Content	9.27
PI on Whole Sample	Non Plastic

ACTIVITY CHART



**GEOPRACTICA**SOILS & MATERIALS TESTING
P.O.BOX 227, MARAISBURG, 1700TEL: (011) 674 1325
FAX: (011) 674 4513
e mail: lab@geopractica.co.za**COLLAPSE POTENTIAL at 200 kPa**

Client	SIVEST		
Location	KALPLAAS SUB-STATION , VRYBURG.		KAL 1 TP 3 @ 1,3 - 1,5m
Date	19 SEPTEMBER 2012	Test No	2161
Job No	10162/2	Checked By	EB

Sample Height (mm)	20	Sample Diameter (mm)	64	Sample Specific Gravity	2.569
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Sample Preparation	NMC
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Effective Stress (kPa)	Time (mins)	Consolidation Reading	Voids Ratio	Strain (%)
10	10	686	0.861	0.00
10	70	687	0.860	0.05
33	130	702	0.846	0.80
65	250	720	0.830	1.70
127	340	748	0.804	3.10
200	490	763	0.790	3.85
200	1930	781	0.773	4.75
498	2170	830	0.727	7.20
993	2410	866	0.694	9.00
1868	3850	899	0.663	10.65
743	3970	882	0.679	9.80
118	4090	866	0.694	9.00
10	4210	857	0.702	8.55

Moisture Content Calculations

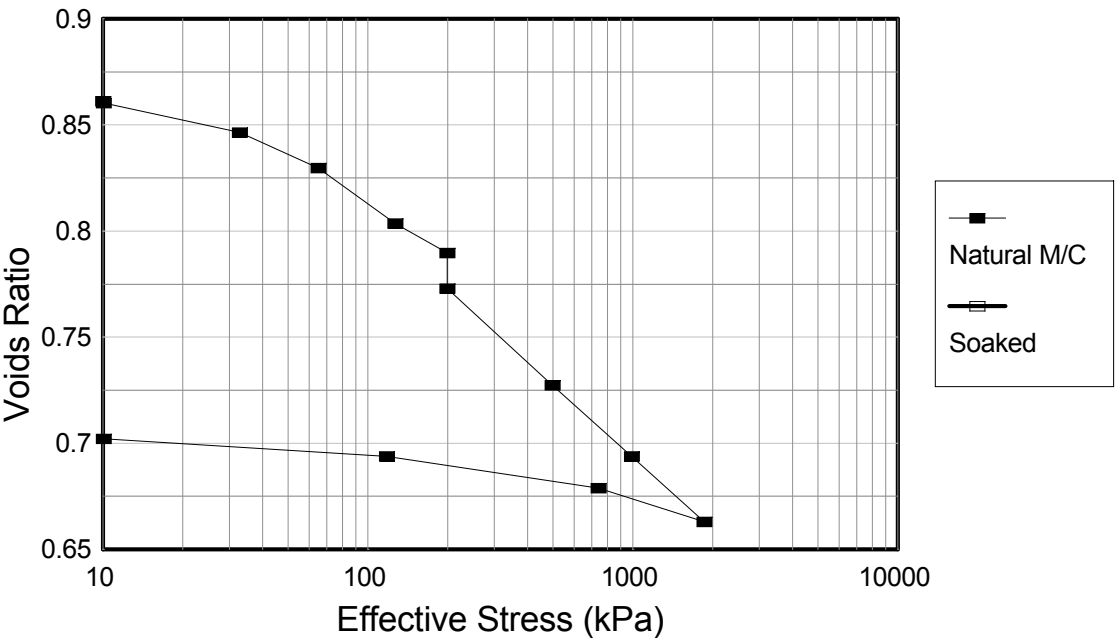
Mass wet sample plus ring before test (gms)	318.80
Mass wet sample plus ring after test (gms)	322.80
Mass dry sample plus ring (gms)	308.00
Mass ring (gms)	219.20
Moisture content before test (%)	12.16
Moisture content after test (%)	16.67

Other Data

Initial Dry Density (kg/m ³)	1380
Initial Void Ratio	0.86

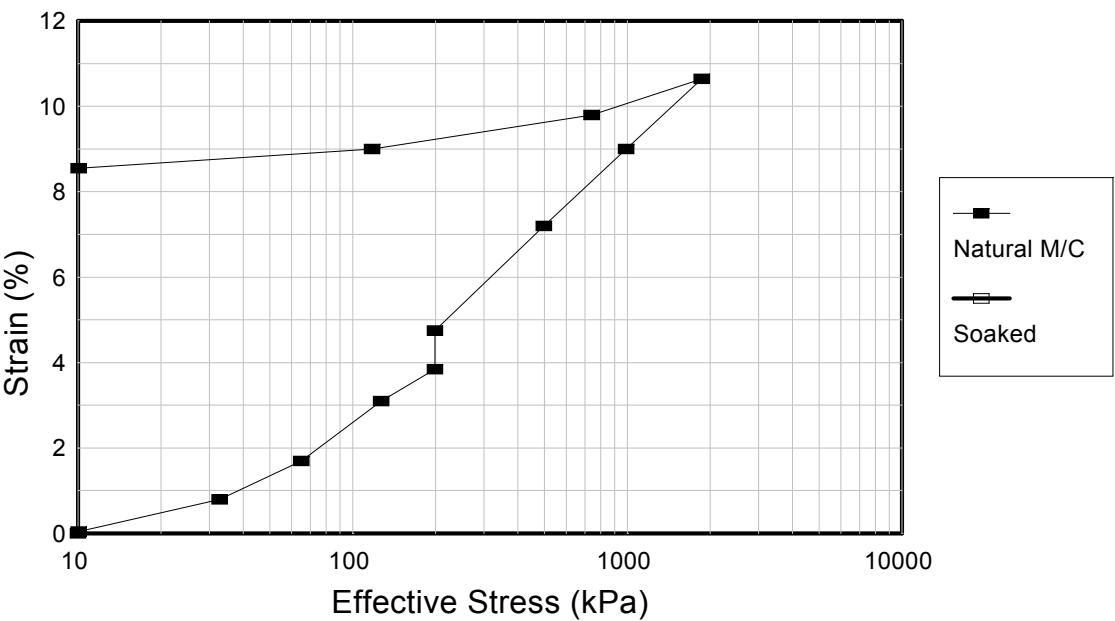
VOIDS RATIO v EFFECTIVE STRESS

Test No: 2161



STRAIN v EFFECTIVE STRESS

Test No: 2161





FOUNDATION INDICATOR

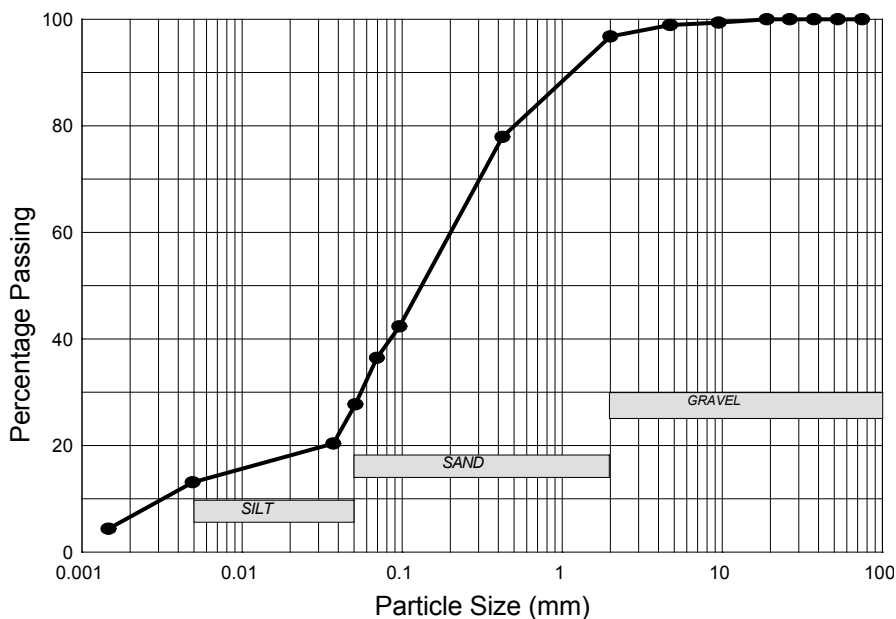
Client	SIVEST		
Location	KALPLAATS SUB-STATION , VRYBURG. KAL 1 TP 3 @ 2,6 - 2,9m		
Date	19 SEPTEMBER 2012	Test No	2159
Job No	10162/2	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	100.00
26.50	100.00
19.00	100.00
9.50	99.39
4.75	98.93
2.00	96.80
0.425	77.97

GRADING ANALYSIS



HYDROMETER ANALYSIS

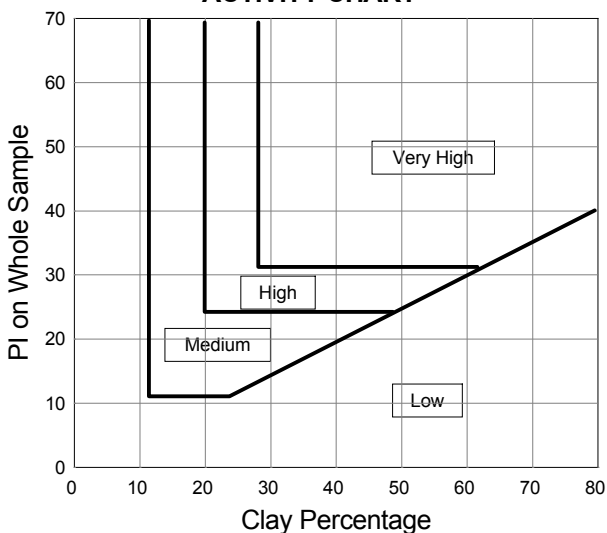
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0965	42.34
0.0700	36.50
0.0512	27.74
0.0372	20.44
0.0049	13.14
0.0015	4.38

ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	0.83
Moisture Content	13.70
PI on Whole Sample	Non Plastic

ACTIVITY CHART





FOUNDATION INDICATOR

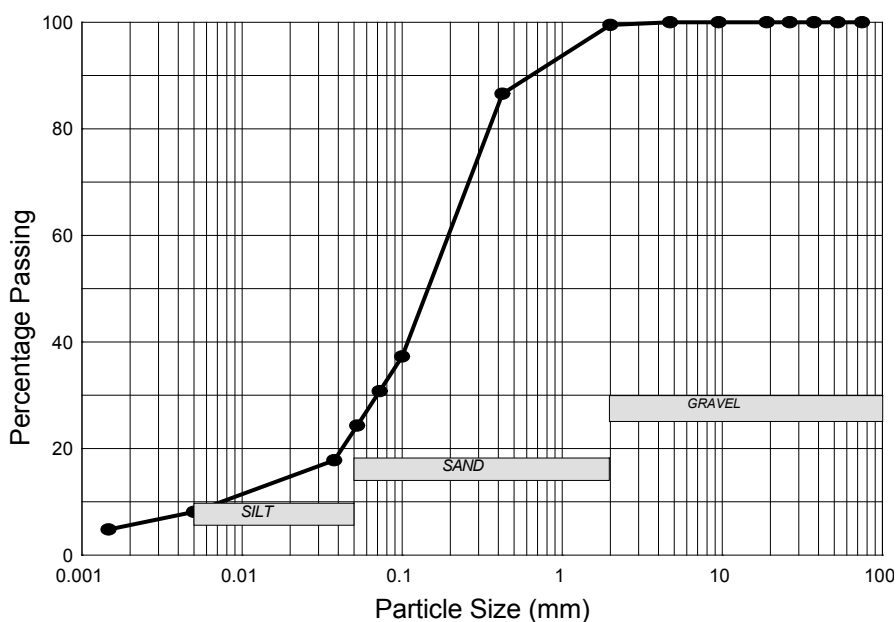
Client	SIVEST		
Location	KALPLAATS SUB-STATION , VRYBURG. KAL 1 TP 4 @ 0,9 - 1,1m		
Date	19 SEPTEMBER 2012	Test No	2148
Job No	10162/2	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	100.00
26.50	100.00
19.00	100.00
9.50	100.00
4.75	100.00
2.00	99.51
0.425	86.60

GRADING ANALYSIS



HYDROMETER ANALYSIS

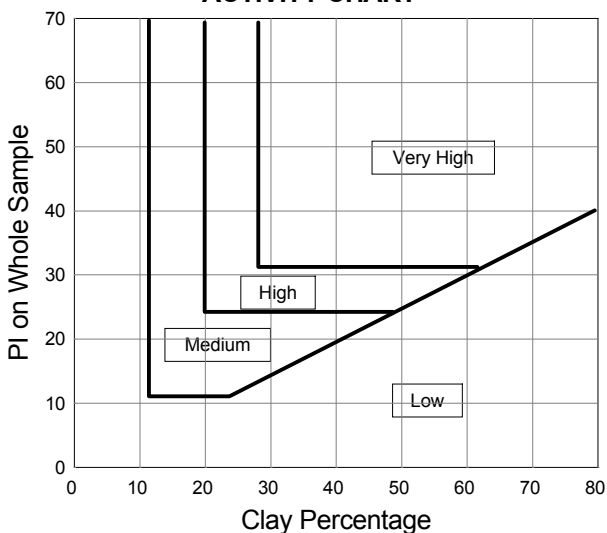
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.1001	37.30
0.0725	30.81
0.0524	24.33
0.0378	17.84
0.0050	8.11
0.0015	4.87

ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	0.77
Moisture Content	1.76
PI on Whole Sample	Non Plastic

ACTIVITY CHART



**GEOPRACTICA**SOILS & MATERIALS TESTING
P.O.BOX 227, MARAISBURG, 1700TEL: (011) 674 1325
FAX: (011) 674 4513
e mail: lab@geopractica.co.za**COLLAPSE POTENTIAL at 200 kPa**

Client	SIVEST		
Location	KALPLAAS SUB-STATION , VRYBURG.		KAL 1 TP 4 @ 0,9 - 1,1m
Date	19 SEPTEMBER 2012	Test No	2162
Job No	10162/2	Checked By	EB

Sample Height (mm)	20	Sample Diameter (mm)	64	Sample Specific Gravity	2.641
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Sample Preparation	NMC
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Effective Stress (kPa)	Time (mins)	Consolidation Reading	Voids Ratio	Strain (%)
10	10	965	0.901	0.00
10	70	965	0.901	0.00
33	130	975	0.891	0.50
65	250	989	0.878	1.20
127	340	1018	0.850	2.65
200	490	1040	0.829	3.75
200	1930	1107	0.766	7.10
498	2170	1170	0.706	10.25
993	2410	1203	0.675	11.90
1868	3850	1228	0.651	13.15
743	3970	1222	0.656	12.85
118	4090	1212	0.666	12.35
10	4210	1202	0.675	11.85

Moisture Content Calculations

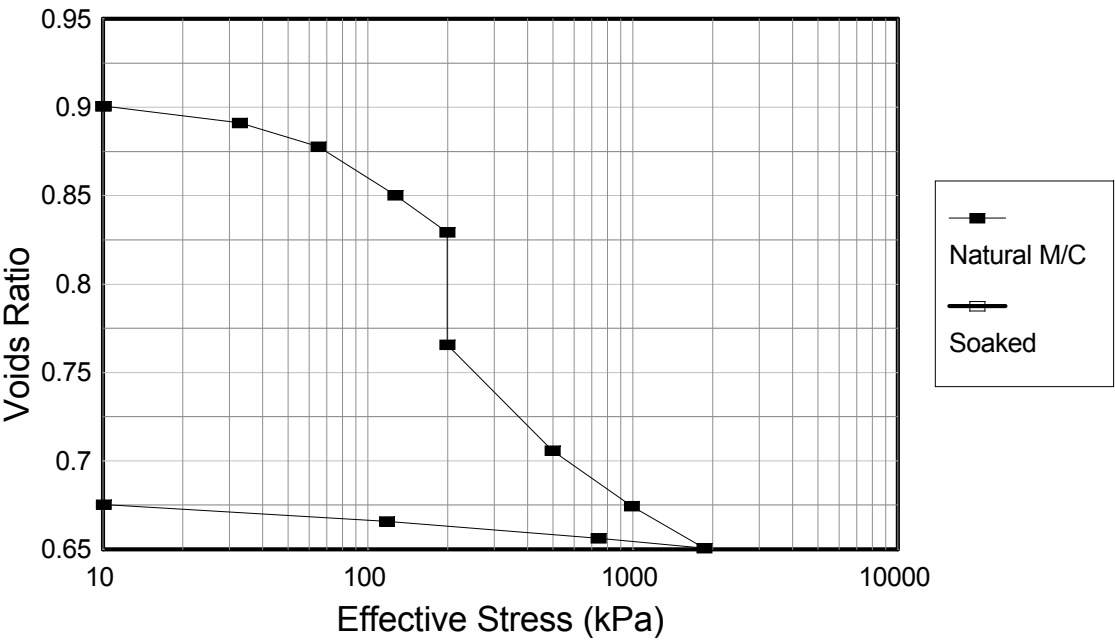
Mass wet sample plus ring before test (gms)	309.60
Mass wet sample plus ring after test (gms)	321.40
Mass dry sample plus ring (gms)	304.80
Mass ring (gms)	215.40
Moisture content before test (%)	5.37
Moisture content after test (%)	18.57

Other Data

Initial Dry Density (kg/m ³)	1389
Initial Void Ratio	0.90

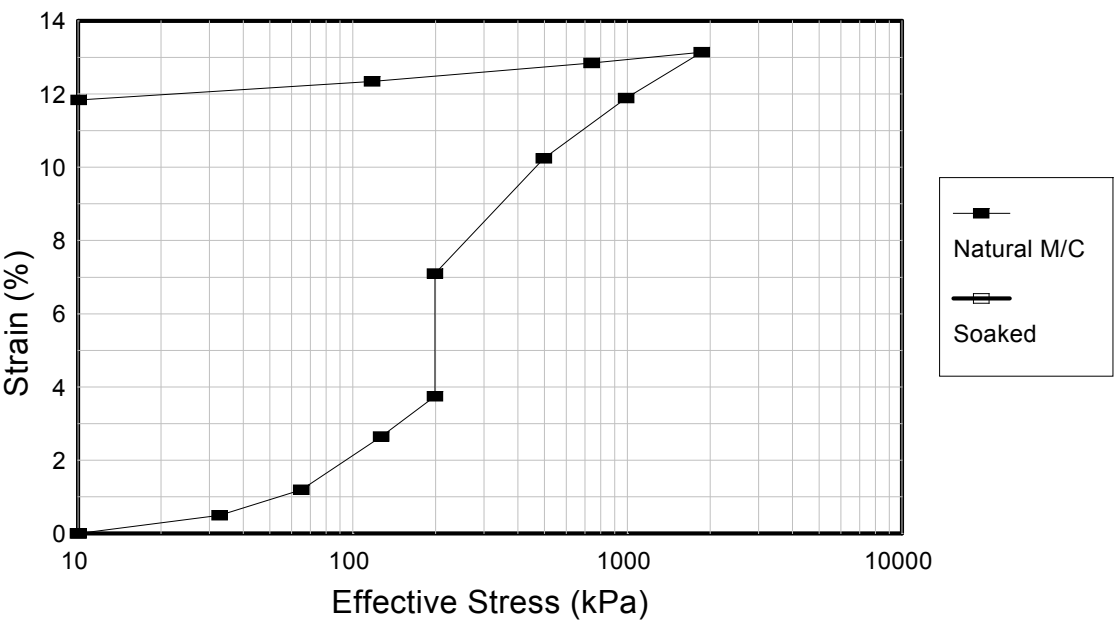
VOIDS RATIO v EFFECTIVE STRESS

Test No: 2162



STRAIN v EFFECTIVE STRESS

Test No: 2162





FOUNDATION INDICATOR

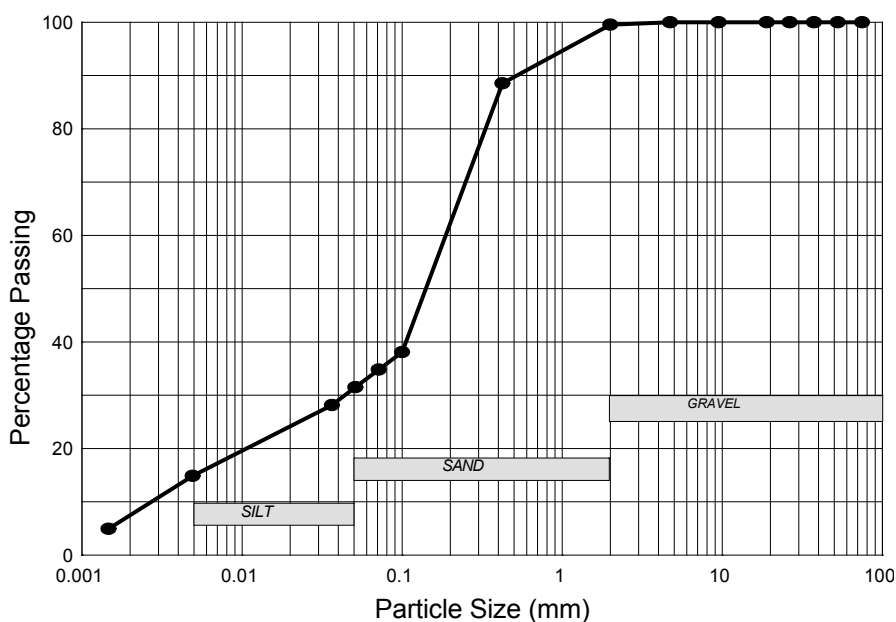
Client	SIVEST		
Location	KALPLAATS SUB-STATION , VRYBURG. KAL 1 TP 5 @ 0,2 - 1,5m		
Date	19 SEPTEMBER 2012	Test No	2158
Job No	10162/2	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	100.00
26.50	100.00
19.00	100.00
9.50	100.00
4.75	100.00
2.00	99.57
0.425	88.58

GRADING ANALYSIS



HYDROMETER ANALYSIS

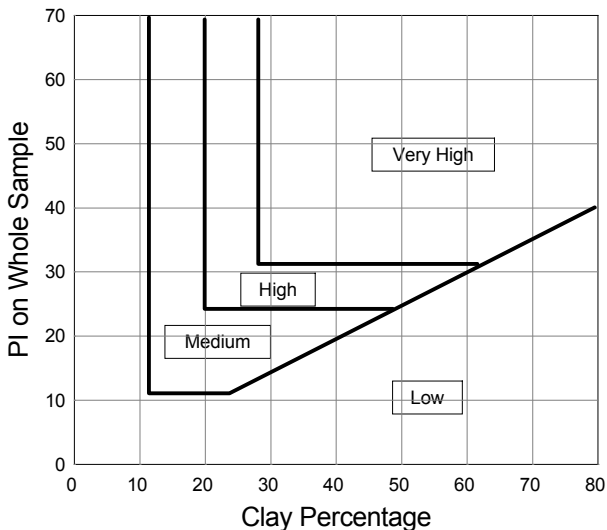
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.1001	38.16
0.0716	34.84
0.0512	31.52
0.0366	28.20
0.0049	14.93
0.0015	4.98

ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	0.74
Moisture Content	5.91
PI on Whole Sample	Non Plastic

ACTIVITY CHART



**GEO PRACTICA**SOILS & MATERIALS TESTING
P.O.BOX 227, MARAISBURG, 1700

TEL: (011) 674 1325

FAX: (011) 674 4513

e mail: lab@geopractica.co.za

C.B.R. DETERMINATION

Client	SIVEST		
Location	KALPLAATS SUB - STATION , VRYBURG KAL 1 TP 5 @ 0,2 - 1,5m		
Date	19 SEPTEMBER 2012	Test No	2183
Job No	10162/2	Checked By	EB
Calibration Date	21 April 2010	Calibration Certificate	2029

Direct Results from Test Procedure

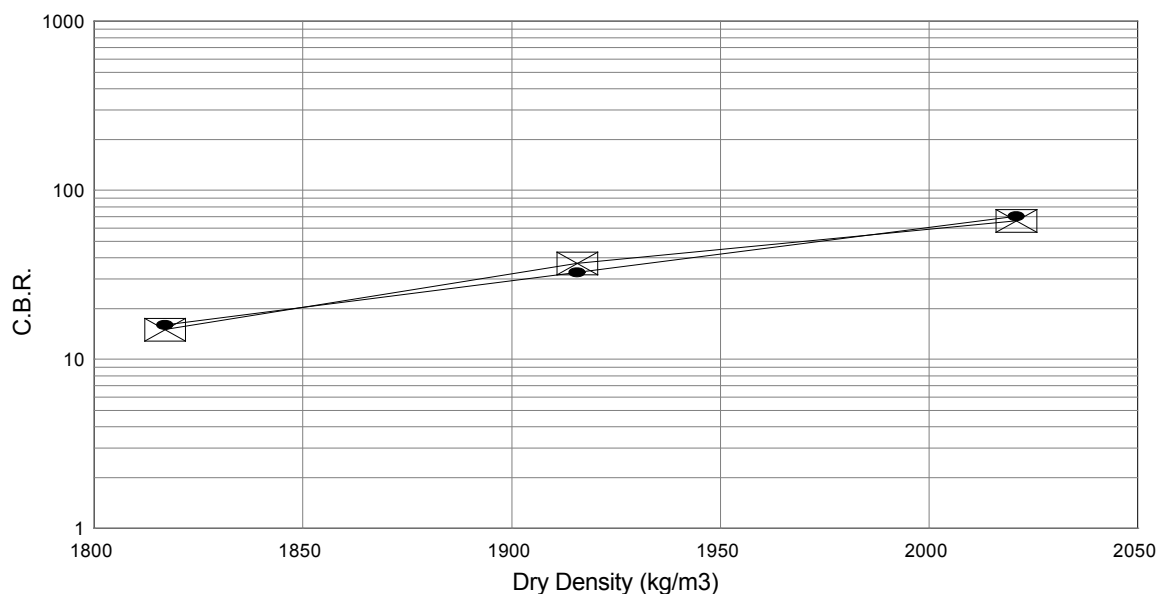
Maximum Dry Density (kg/m3)	2020
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Optimum Moisture Content (%)	7.7
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Percentage Mod AASHTO	100.1	94.9	90.0
CBR @ 2.54mm	66	37	15
CBR @ 5.08mm	67	38	17
CBR@ 7.62mm	69	41	19
Average Moisture Content (%)	7.8		
Percentage Swell	0.60	0.77	0.98

Interpolated Results

Percentage Mod AASHTO	90	93	95	98	100
CBR	16	25	33	52	69



Programed Data

Revision No 4 (1/5/2010)



FOUNDATION INDICATOR

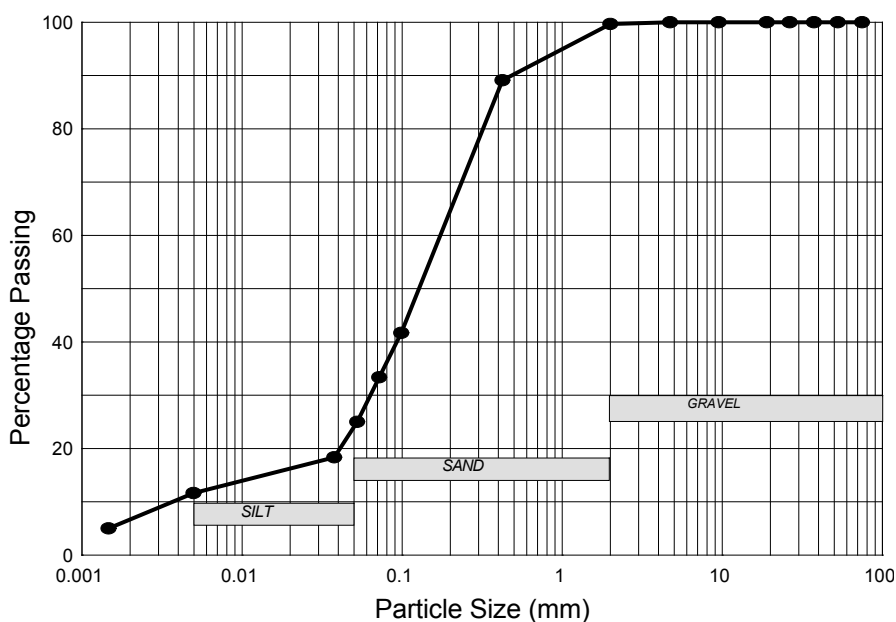
Client	SIVEST		
Location	KALPLAATS SUB-STATION , VRYBURG. KAL 1 TP 5 @ 0,7 - 0,9m		
Date	19 SEPTEMBER 2012	Test No	2160
Job No	10162/2	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	100.00
26.50	100.00
19.00	100.00
9.50	100.00
4.75	100.00
2.00	99.73
0.425	89.17

GRADING ANALYSIS



HYDROMETER ANALYSIS

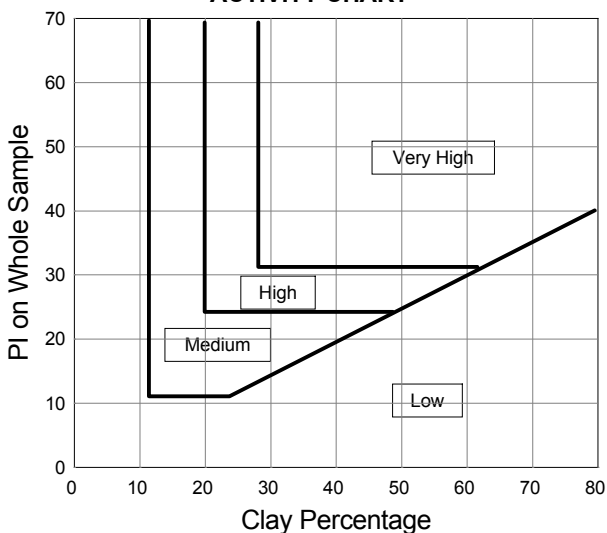
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0989	41.75
0.0721	33.40
0.0524	25.05
0.0378	18.37
0.0050	11.69
0.0015	5.01

ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	0.69
Moisture Content	3.03
PI on Whole Sample	Non Plastic

ACTIVITY CHART



**GEOPRACTICA**SOILS & MATERIALS TESTING
P.O.BOX 227, MARAISBURG, 1700TEL: (011) 674 1325
FAX: (011) 674 4513
e mail: lab@geopractica.co.za**COLLAPSE POTENTIAL at 200 kPa**

Client	SIVEST		
Location	KALPLAAS SUB-STATION , VRYBURG.		KAL 1 TP 5 @ 0,7 - 0,9m
Date	19 SEPTEMBER 2012	Test No	2163
Job No	10162/2	Checked By	EB

Sample Height (mm)	20	Sample Diameter (mm)	64	Sample Specific Gravity	2.633
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Sample Preparation	NMC
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Effective Stress (kPa)	Time (mins)	Consolidation Reading	Voids Ratio	Strain (%)
10	10	574	1.022	0.00
10	70	575	1.021	0.05
33	130	600	0.995	1.30
65	250	625	0.970	2.55
127	340	663	0.932	4.45
200	490	687	0.907	5.65
200	1930	821	0.772	12.35
498	2170	882	0.710	15.40
993	2410	927	0.665	17.65
1868	3850	976	0.615	20.10
743	3970	951	0.640	18.85
118	4090	925	0.667	17.55
10	4210	910	0.682	16.80

Moisture Content Calculations

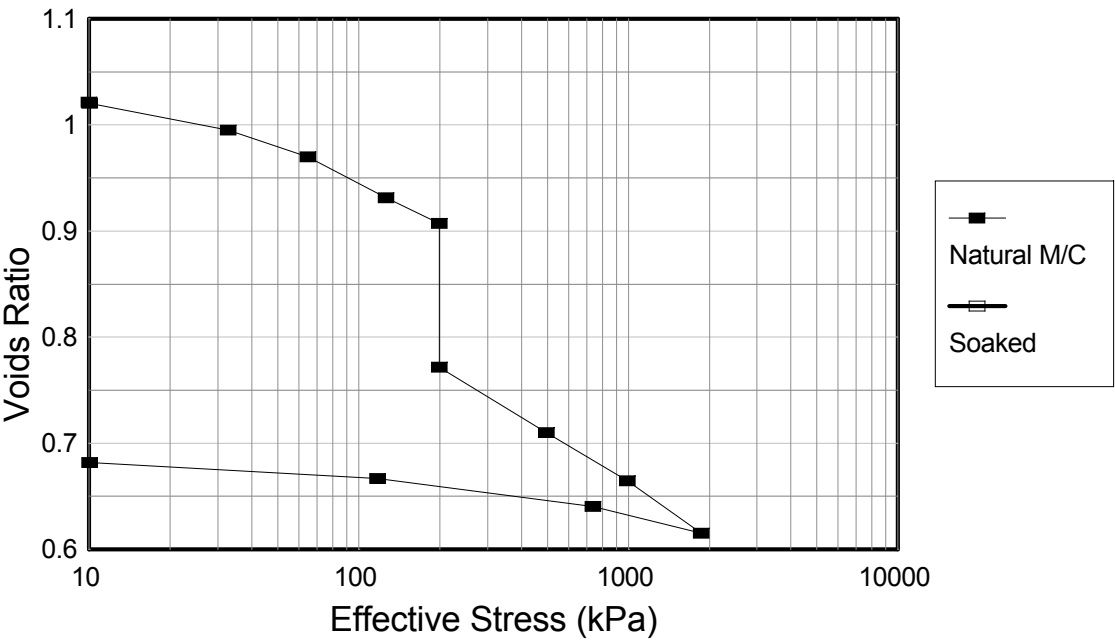
Mass wet sample plus ring before test (gms)	303.80
Mass wet sample plus ring after test (gms)	314.80
Mass dry sample plus ring (gms)	299.20
Mass ring (gms)	215.40
Moisture content before test (%)	5.49
Moisture content after test (%)	18.62

Other Data

Initial Dry Density (kg/m ³)	1302
Initial Void Ratio	1.02

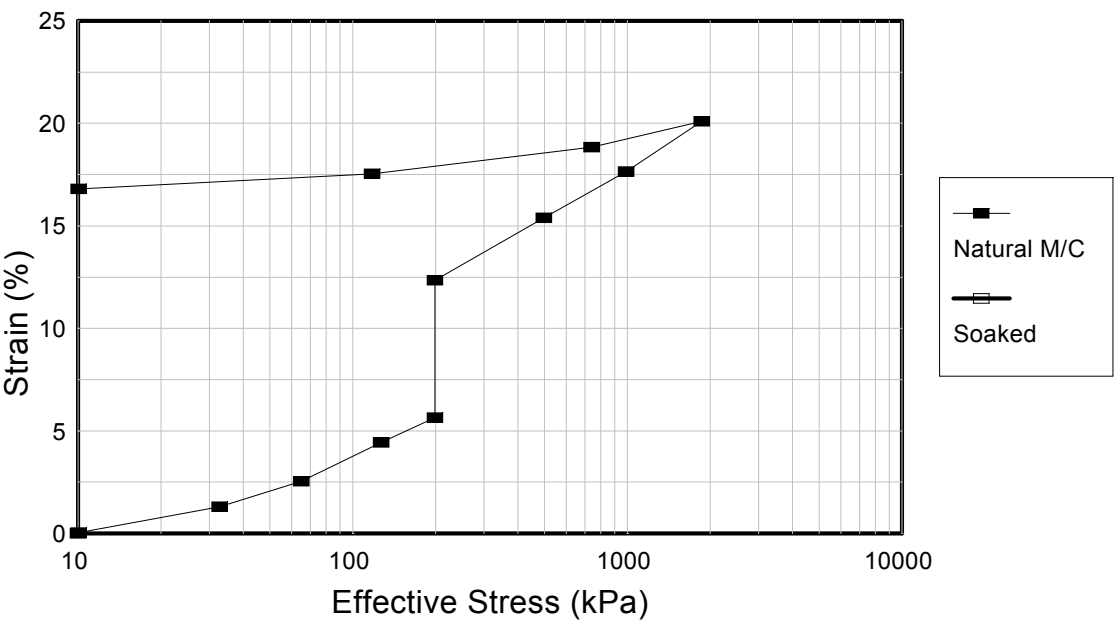
VOIDS RATIO v EFFECTIVE STRESS

Test No: 2163



STRAIN v EFFECTIVE STRESS

Test No: 2163





FOUNDATION INDICATOR

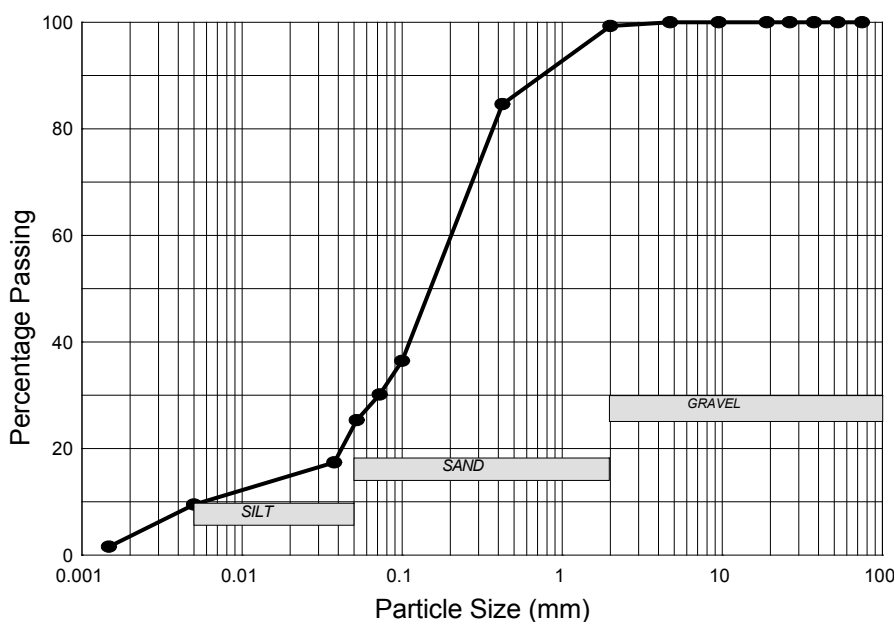
Client	SIVEST		
Location	KALPLAAS SUBSTATION	KAL 2 TP1 @ 0.3 - 1.5m	
Date	19 SEPTEMBER 2012	Test No	2177
Job No	10162/2	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	100.00
26.50	100.00
19.00	100.00
9.50	100.00
4.75	100.00
2.00	99.33
0.425	84.68

GRADING ANALYSIS



HYDROMETER ANALYSIS

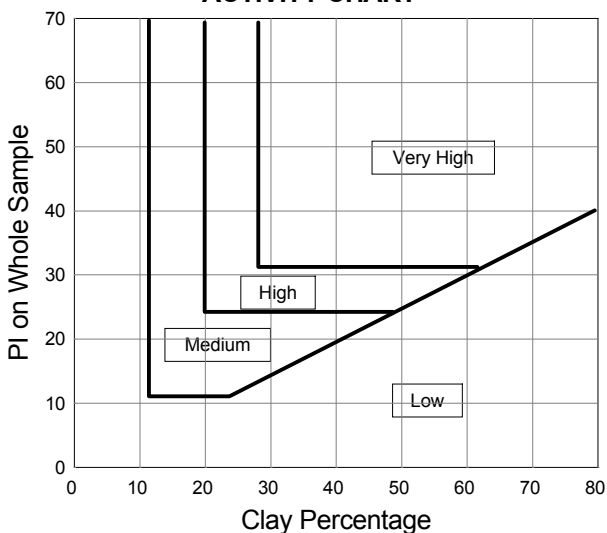
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.1001	36.48
0.0725	30.13
0.0521	25.37
0.0378	17.44
0.0050	9.52
0.0015	1.59

ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	6
Grading Modulus	0.80
Moisture Content	4.66
PI on Whole Sample	Non Plastic

ACTIVITY CHART



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e mail: lab@geopractica.co.za

C.B.R. DETERMINATION

Client	SIVEST		
Location	KALPLAATS SUB - STATION KAL 2 TP 1 @ 0,3 - 1,5m		
Date	19 SEPTEMBER 2012	Test No	2177
Job No	10162/2	Checked By	EB
Calibration Date	21 April 2010	Calibration Certificate	2029

Direct Results from Test Procedure

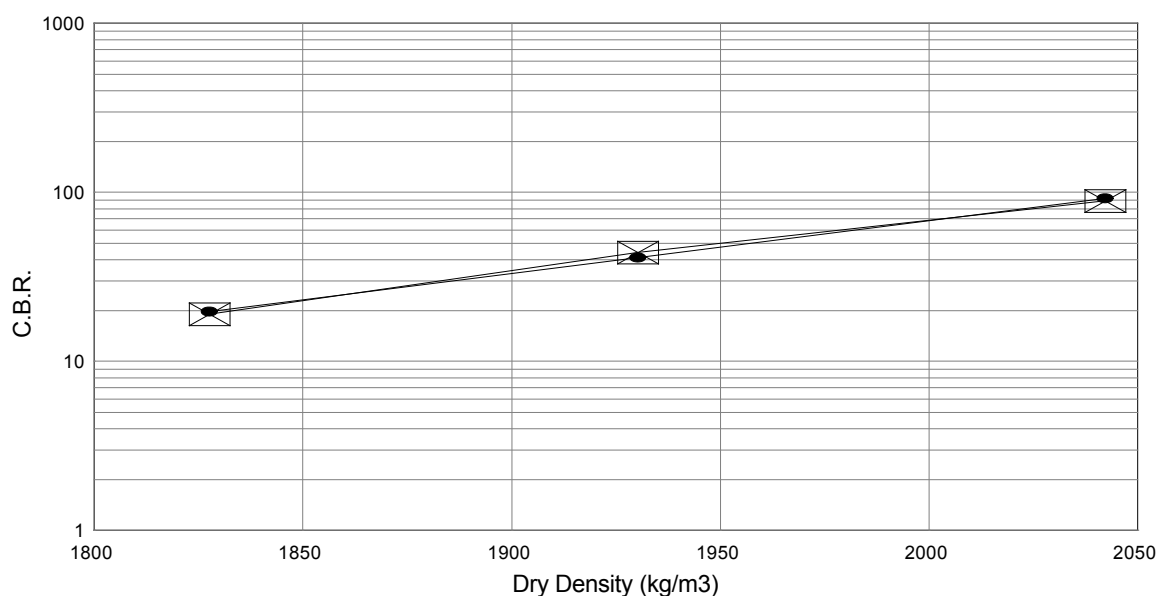
Maximum Dry Density (kg/m ³)	2034
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Optimum Moisture Content (%)	6.1
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Percentage Mod AASHTO	100.4	94.9	89.9
CBR @ 2.54mm	89	44	19
CBR @ 5.08mm	82	44	20
CBR@ 7.62mm	82	42	21
Average Moisture Content (%)	6.1		
Percentage Swell	0.15	0.20	0.28

Interpolated Results

Percentage Mod AASHTO	90	93	95	98	100
CBR	20	31	42	65	86



Programed Data

Revision No 4 (1/5/2010)



FOUNDATION INDICATOR

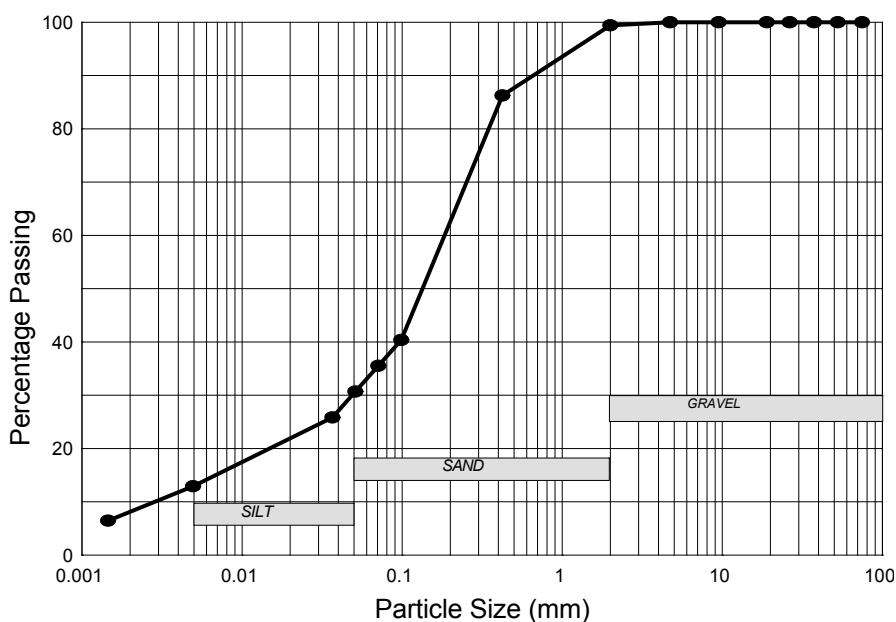
Client	SIVEST		
Location	KALPLAATS SUB-STATION , VRYBURG. KAL 2 TP 2 @ 1,0 - 1,2m		
Date	19 SEPTEMBER 2012	Test No	2151
Job No	10162/2	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	100.00
26.50	100.00
19.00	100.00
9.50	100.00
4.75	100.00
2.00	99.44
0.425	86.31

GRADING ANALYSIS



HYDROMETER ANALYSIS

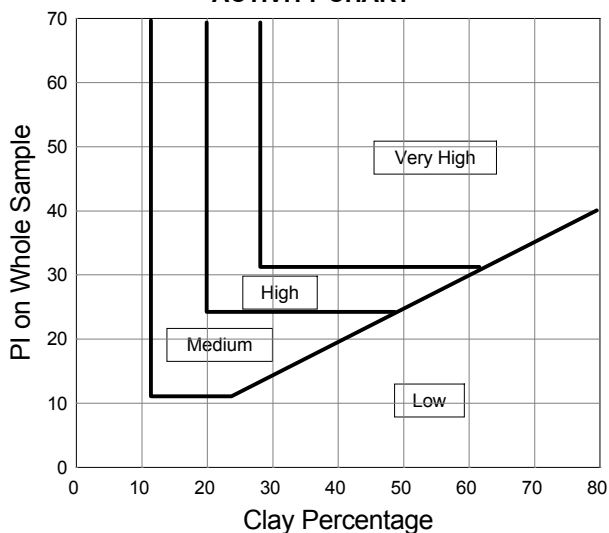
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0989	40.41
0.0712	35.56
0.0512	30.71
0.0368	25.86
0.0050	12.93
0.0015	6.47

ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	0.74
Moisture Content	18.06
PI on Whole Sample	Non Plastic

ACTIVITY CHART



DOUBLE OEDOMETER

Client	SIVEST		
Location	KALPLAATS SUB-STATION	KAL 2 TP 2 @ 1,0 - 1,2m	
Date	19 SEPTEMBER 2012	Test No	2154
Job No	10162/2	Checked By	EB

Sample Height (mm)	20	Sample Diameter (mm)	64	Sample Specific Gravity	2.656
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Sample at NMC

Effective Stress (kPa)	Time (mins)	Consolidation Reading	Voids Ratio	Strain (%)
10	120	964	0.769	0.00
10	1560	967	0.766	0.15
33	1680	982	0.753	0.90
65	1800	994	0.742	1.50
127	1920	1014	0.725	2.50
251	2040	1033	0.708	3.45
498	3480	1058	0.686	4.70
993	4290	1084	0.663	6.00
1868	5730	1109	0.641	7.25
743	5850	1101	0.648	6.85
118	5970	1091	0.657	6.35
10	6090	1083	0.664	5.95

Sample Soaked

Effective Stress (kPa)	Time (mins)	Consolidation Reading	Voids Ratio	Strain (%)
10	20	553	0.780	0.00
10	1560	558	0.776	0.25
33	1680	599	0.739	2.30
65	1800	645	0.698	4.60
127	1920	743	0.611	9.50
251	2040	787	0.572	11.70
498	3480	824	0.539	13.55
993	4290	855	0.511	15.10
1868	3730	880	0.489	16.35
743	5850	878	0.491	16.25
118	5970	873	0.495	16.00
10	6090	860	0.507	15.35

Moisture Content Calculations

Mass wet sample plus ring before test (gms)	328.60
Mass wet sample plus ring after test (gms)	324.80
Mass dry sample plus ring (gms)	312.20
Mass ring (gms)	215.60
Moisture content before test (%)	16.98
Moisture content after test (%)	13.04

Moisture Content Calculations

Mass wet sample plus ring before test (gms)	327.80
Mass wet sample plus ring after test (gms)	328.60
Mass dry sample plus ring (gms)	311.60
Mass ring (gms)	215.60
Moisture content before test (%)	16.87
Moisture content after test (%)	17.71

Other Data

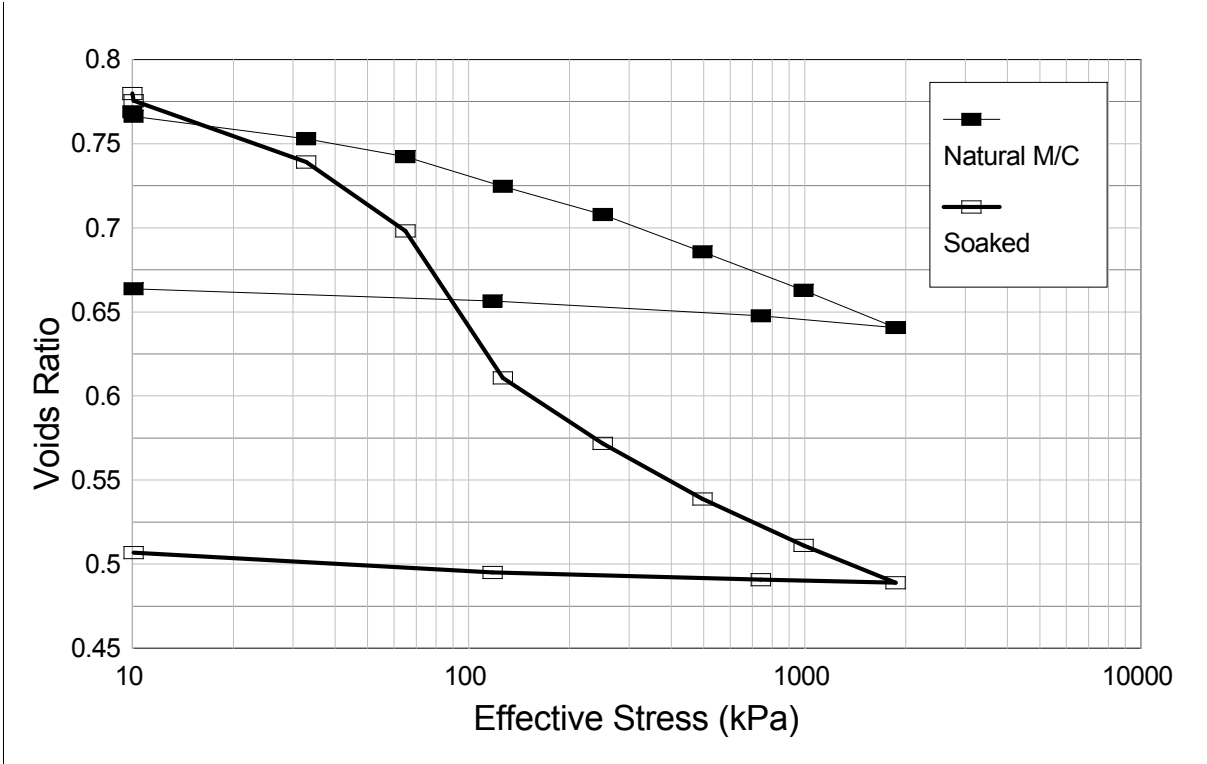
Initial Dry Density (kg/m ³)	1501
Initial Void Ratio	0.77

Other Data

Initial Dry Density (kg/m ³)	1492
Initial Void Ratio	0.78

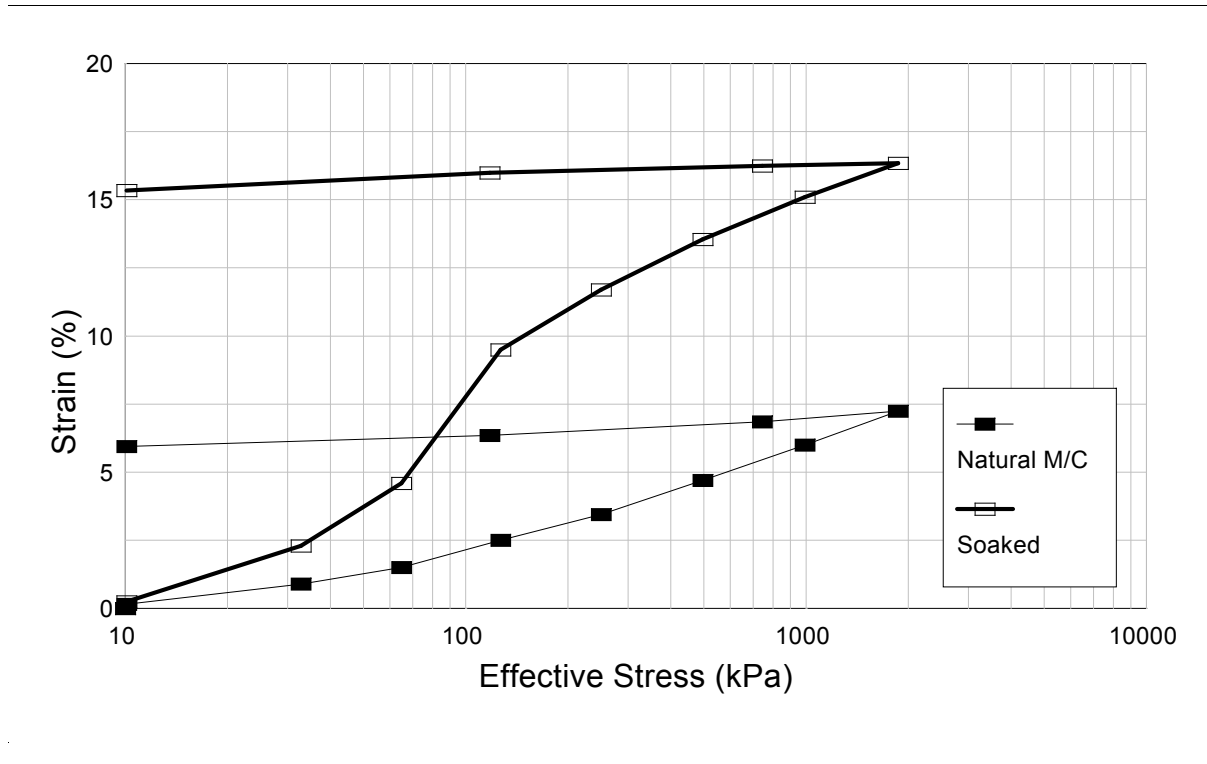
VOIDS RATIO v EFFECTIVE STRESS

Test No: 2154



STRAIN v EFFECTIVE STRESS

Test No: 2154





FOUNDATION INDICATOR

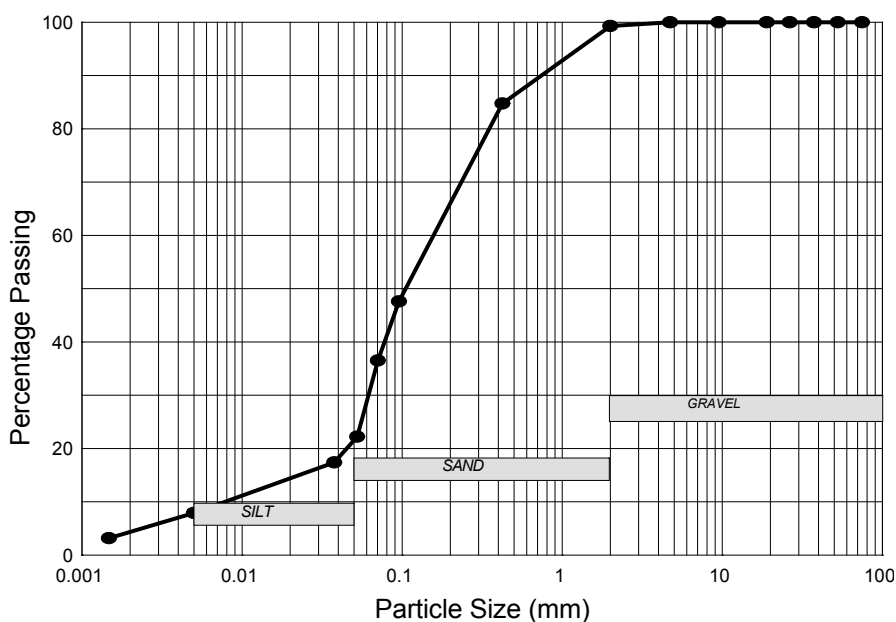
Client	SIVEST		
Location	KALPLAATS SUB-STATION , VRYBURG. KAL 2 TP 3 @ 2,25 - 2,4m		
Date	19 SEPTEMBER 2012	Test No	2146
Job No	10162/2	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	100.00
26.50	100.00
19.00	100.00
9.50	100.00
4.75	100.00
2.00	99.31
0.425	84.79

GRADING ANALYSIS



HYDROMETER ANALYSIS

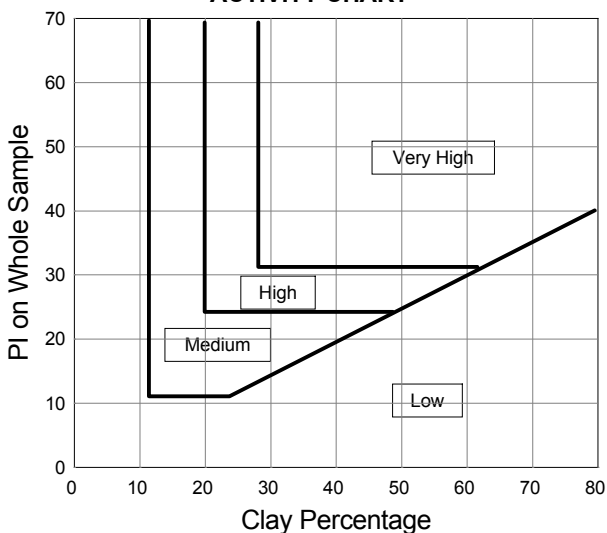
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0959	47.64
0.0708	36.52
0.0527	22.23
0.0378	17.47
0.0050	7.94
0.0015	3.18

ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	0.68
Moisture Content	4.14
PI on Whole Sample	Non Plastic

ACTIVITY CHART



**GEOPRACTICA**SOILS & MATERIALS TESTING
P.O.BOX 227, MARAISBURG, 1700TEL: (011) 674 1325
FAX: (011) 674 4513
e mail: lab@geopractica.co.za**COLLAPSE POTENTIAL at 200 kPa**

Client	SIVEST		
Location	KALPLAAS SUB-STATION , VRYBURG.		KAL 2 TP 3 @ 2,25 - 2,40m
Date	19 SEPTEMBER 2012	Test No	2153
Job No	10162/2	Checked By	EB

Sample Height (mm)	20	Sample Diameter (mm)	64	Sample Specific Gravity	2.655
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Sample Preparation	NMC
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Effective Stress (kPa)	Time (mins)	Consolidation Reading	Voids Ratio	Strain (%)
10	10	678	0.853	0.00
10	70	679	0.852	0.05
33	130	694	0.838	0.80
65	250	712	0.821	1.70
127	340	741	0.794	3.15
200	490	764	0.773	4.30
200	1930	847	0.696	8.45
498	2170	909	0.639	11.55
993	2410	952	0.599	13.70
1868	3850	987	0.566	15.45
743	3970	979	0.574	15.05
118	4090	971	0.581	14.65
10	4210	960	0.591	14.10

Moisture Content Calculations

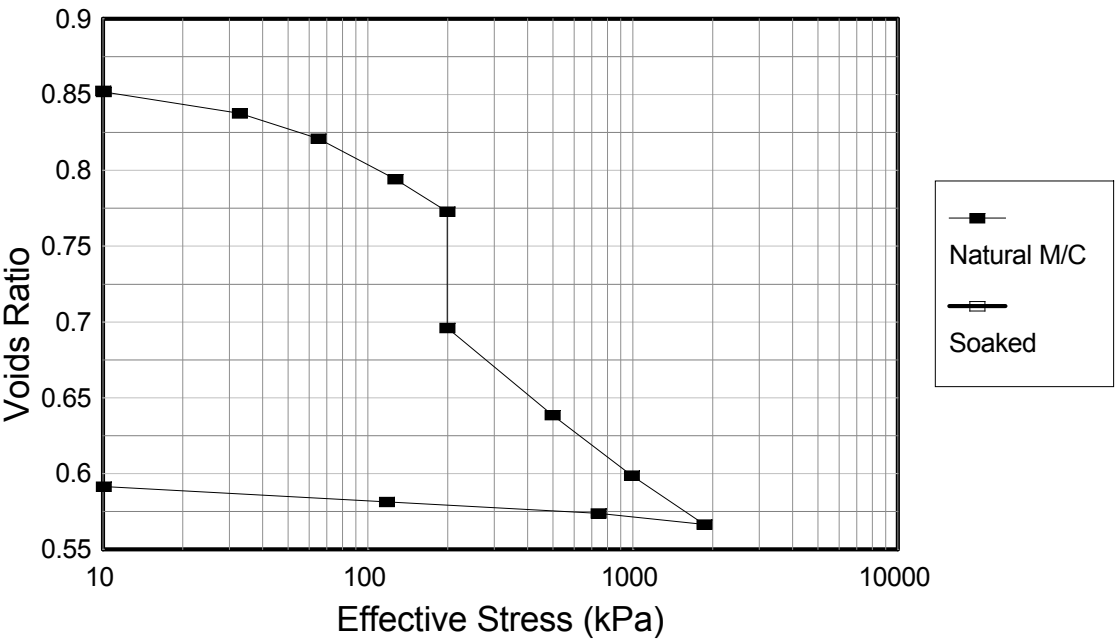
Mass wet sample plus ring before test (gms)	315.80
Mass wet sample plus ring after test (gms)	325.20
Mass dry sample plus ring (gms)	311.00
Mass ring (gms)	218.80
Moisture content before test (%)	5.21
Moisture content after test (%)	15.40

Other Data

Initial Dry Density (kg/m ³)	1433
Initial Void Ratio	0.85

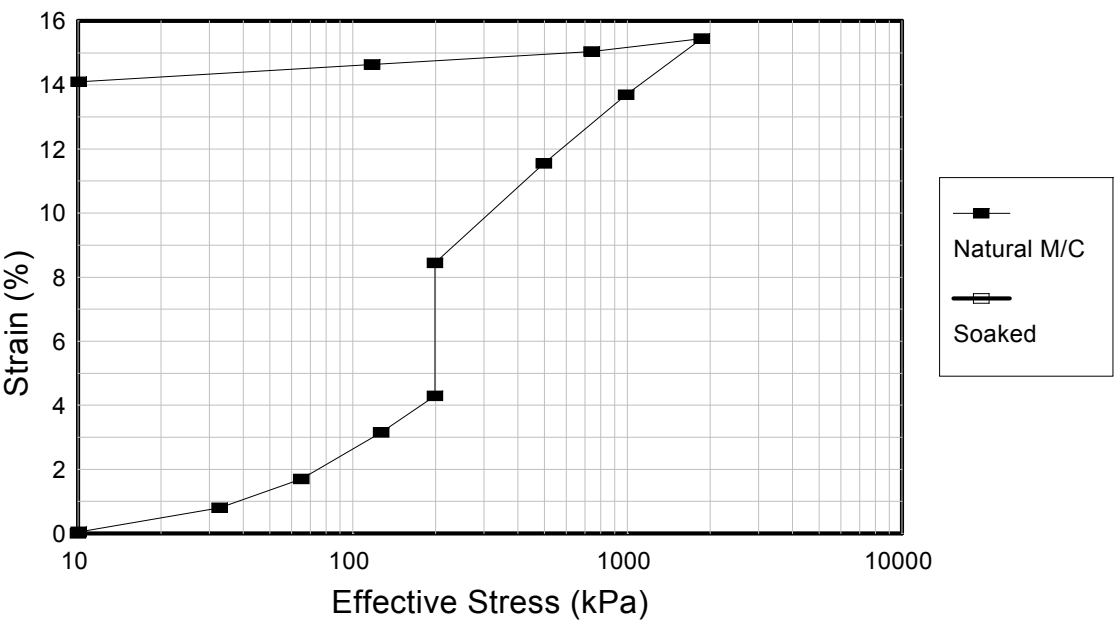
VOIDS RATIO v EFFECTIVE STRESS

Test No: 2153



STRAIN v EFFECTIVE STRESS

Test No: 2153



**FOUNDATION INDICATOR**

Client	SIVEST		
Location	KALPLAATS SUB-STATION , VRYBURG. KAL 2 TP 3 @ 2,6 - 2,9m		
Date	19 SEPTEMBER 2012	Test No	2145
Job No	10162/2	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	100.00
26.50	100.00
19.00	100.00
9.50	100.00
4.75	100.00
2.00	98.75
0.425	82.62

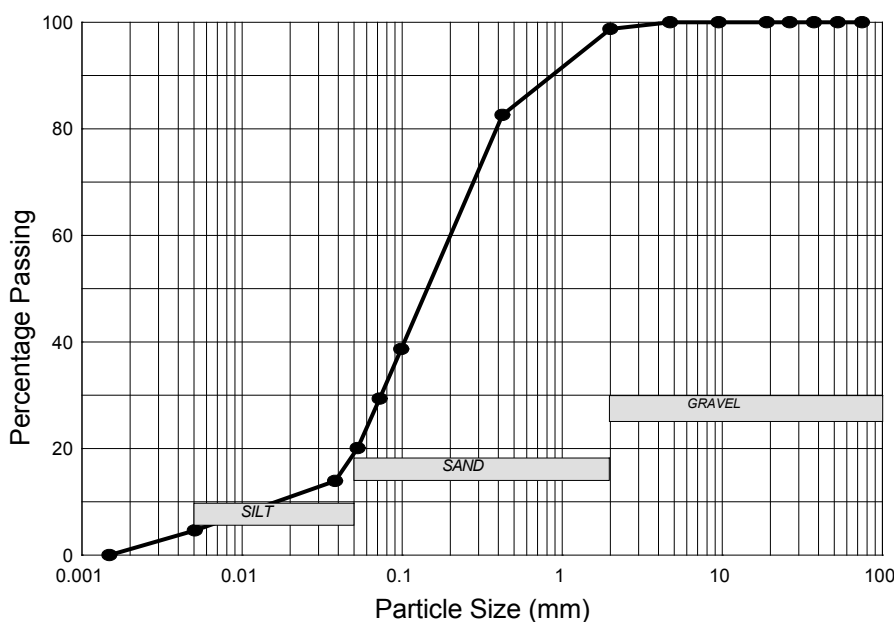
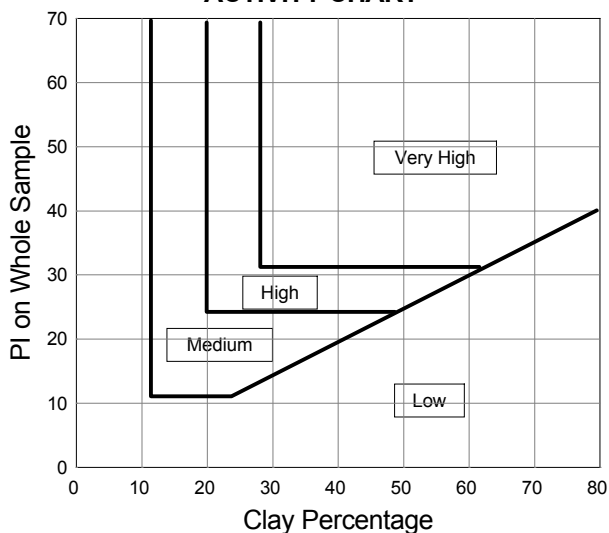
HYDROMETER ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0989	38.68
0.0725	29.40
0.0530	20.11
0.0382	13.93
0.0051	4.64
0.0015	0.00

ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	0.80
Moisture Content	7.41
PI on Whole Sample	Non Plastic

GRADING ANALYSIS**ACTIVITY CHART**



FOUNDATION INDICATOR

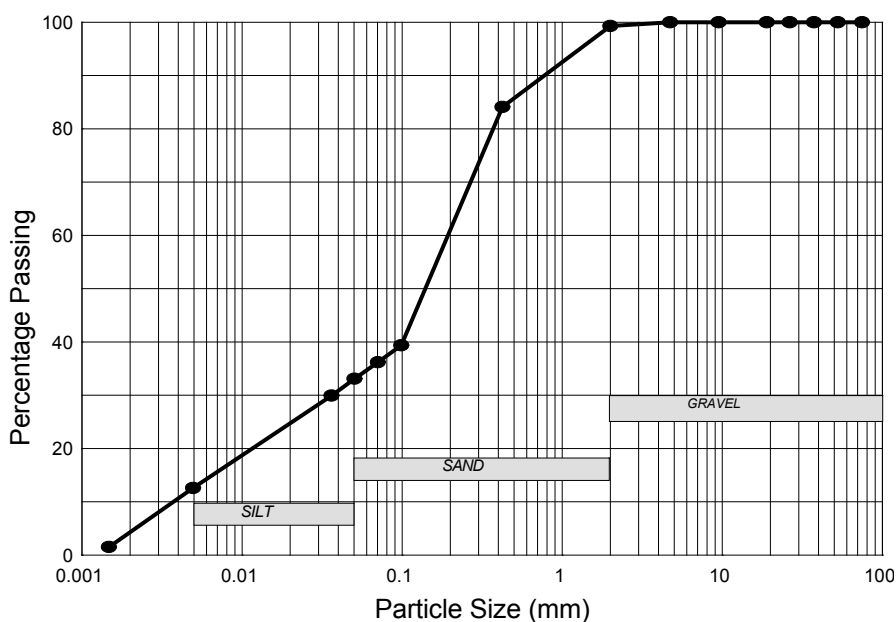
Client	SIVEST		
Location	KALPLAATS SUB-STATION , VRYBURG. KAL 2 TP 4 @ 0.2 - 1,5m		
Date	19 SEPTEMBER 2012	Test No	2152
Job No	10162/2	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	100.00
26.50	100.00
19.00	100.00
9.50	100.00
4.75	100.00
2.00	99.34
0.425	84.17

GRADING ANALYSIS



HYDROMETER ANALYSIS

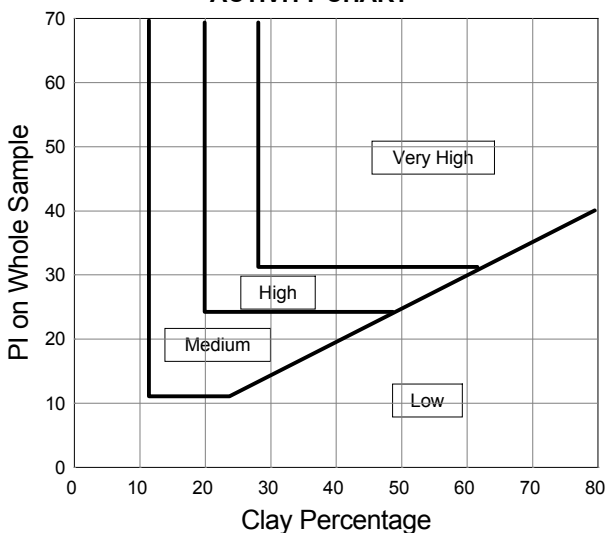
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0989	39.41
0.0708	36.25
0.0507	33.10
0.0362	29.95
0.0050	12.61
0.0015	1.58

ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	0.77
Moisture Content	8.86
PI on Whole Sample	Non Plastic

ACTIVITY CHART



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C.B.R. DETERMINATION

Client	SIVEST		
Location	KALPLAATS SUB - STATION , VRYBURG. KAL 2 TP 4 @ 0,2 - 1,5m		
Date	19 SEPTEMBER 2012	Test No	2182
Job No	10162/2	Checked By	EB
Calibration Date	21 April 2010	Calibration Certificate	2029

Direct Results from Test Procedure

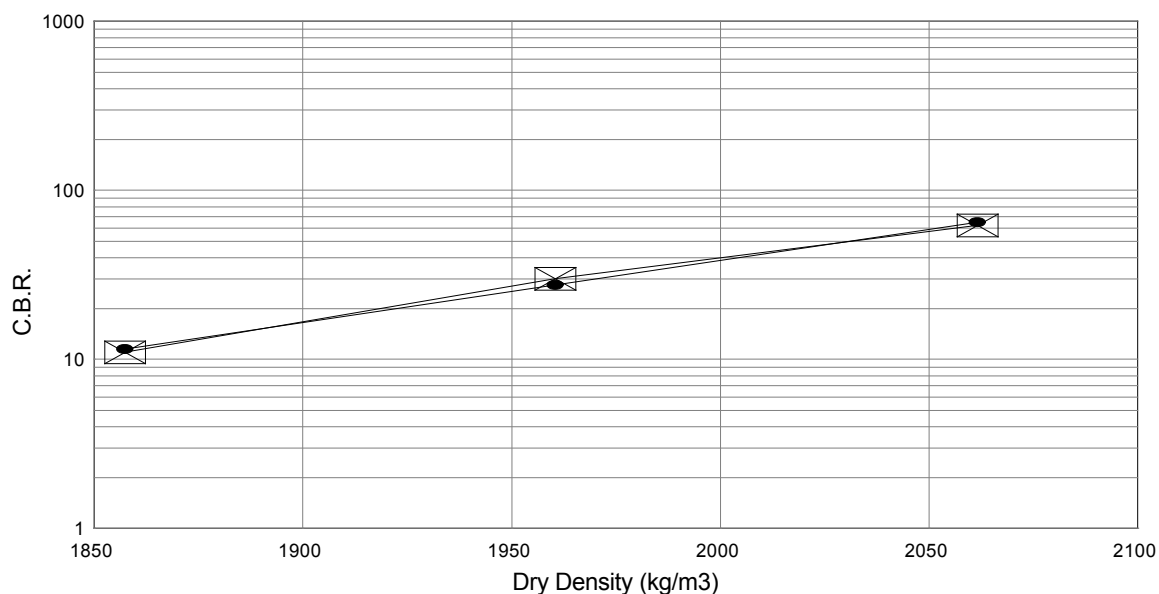
Maximum Dry Density (kg/m3)	2064
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Optimum Moisture Content (%)	6.6
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Percentage Mod AASHTO	99.9	95.0	90.0
CBR @ 2.54mm	62	30	11
CBR @ 5.08mm	57	27	12
CBR@ 7.62mm	56	27	13
Average Moisture Content (%)	6.8		
Percentage Swell	0.18	0.21	0.34

Interpolated Results

Percentage Mod AASHTO	90	93	95	98	100
CBR	11	19	28	46	66

Programed Data
Revision No 4 (1/5/2010)

**FOUNDATION INDICATOR**

Client	SIVEST		
Location	KALPLAATS SUB-STATION , VRYBURG. KAL 2 TP 4 @ 1,1 - 1,3m		
Date	19 SEPTEMBER 2012	Test No	2147
Job No	10162/2	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	100.00
26.50	100.00
19.00	100.00
9.50	100.00
4.75	100.00
2.00	98.87
0.425	81.60

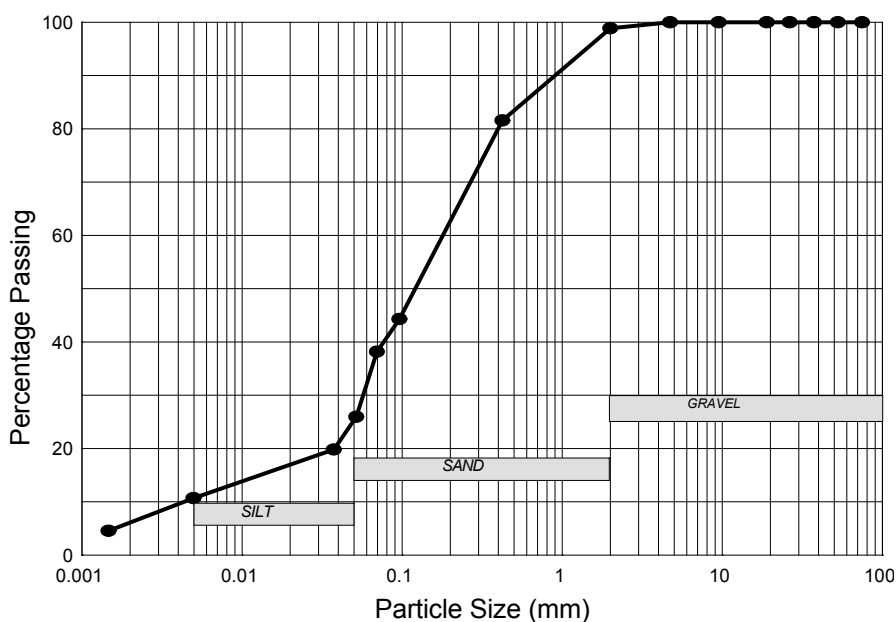
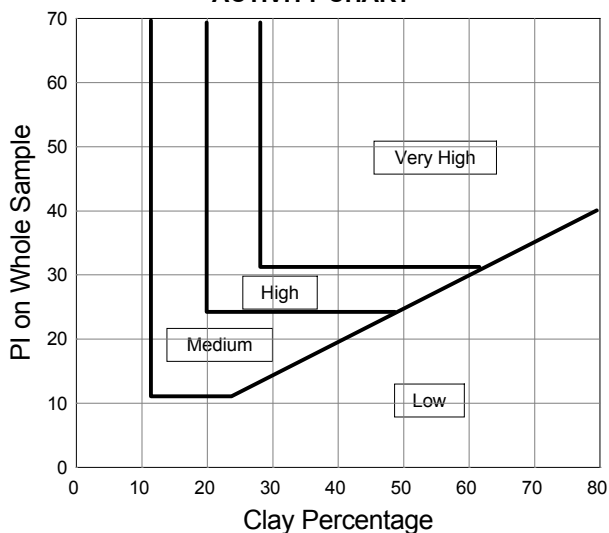
HYDROMETER ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0965	44.32
0.0700	38.20
0.0518	25.98
0.0374	19.87
0.0050	10.70
0.0015	4.58

ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	0.75
Moisture Content	5.99
PI on Whole Sample	Non Plastic

GRADING ANALYSIS**ACTIVITY CHART**

**GEOPRACTICA**SOILS & MATERIALS TESTING
P.O.BOX 227, MARAISBURG, 1700TEL: (011) 674 1325
FAX: (011) 674 4513
e mail: lab@geopractica.co.za**COLLAPSE POTENTIAL at 200 kPa**

Client	SIVEST		
Location	KALPLAAS SUB-STATION , VRYBURG.		KAL 2 TP 4 @ 1,1 - 1,3m
Date	19 SEPTEMBER 2012	Test No	2155
Job No	10162/2	Checked By	EB

Sample Height (mm)	20	Sample Diameter (mm)	64	Sample Specific Gravity	2.632
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Sample Preparation	NMC
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Effective Stress (kPa)	Time (mins)	Consolidation Reading	Voids Ratio	Strain (%)
10	10	938	1.006	0.00
10	70	939	1.005	0.05
33	130	952	0.992	0.70
65	250	974	0.970	1.80
127	340	1010	0.934	3.60
200	490	1037	0.907	4.95
200	1930	1070	0.874	6.60
498	2170	1131	0.813	9.65
993	2410	1163	0.781	11.25
1868	3850	1197	0.747	12.95
743	3970	1195	0.749	12.85
118	4090	1189	0.755	12.55
10	4210	1180	0.764	12.10

Moisture Content Calculations

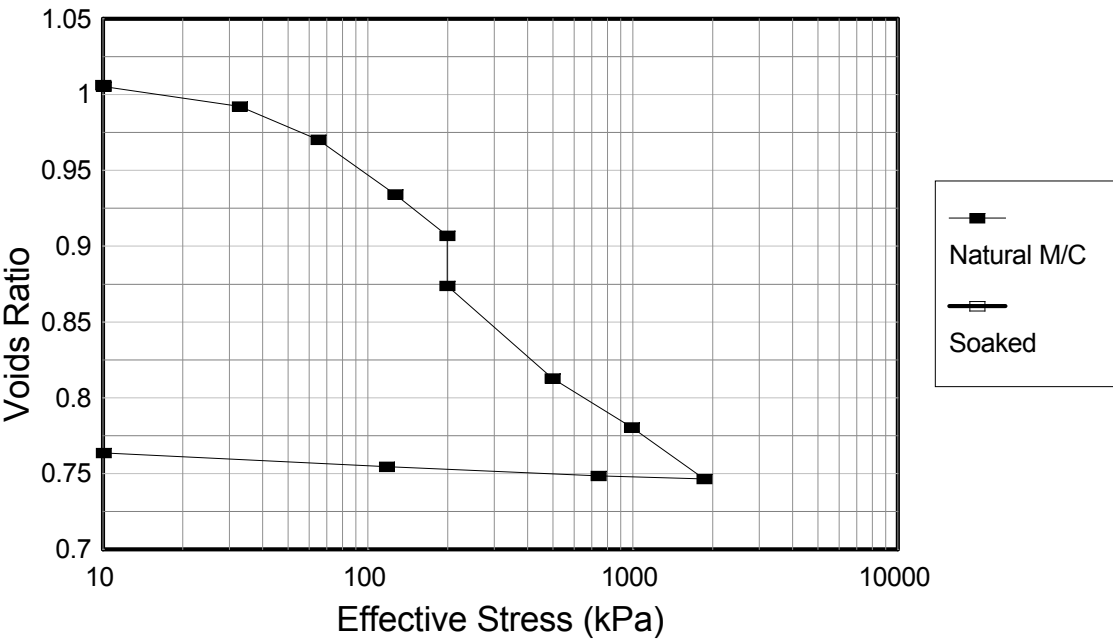
Mass wet sample plus ring before test (gms)	305.80
Mass wet sample plus ring after test (gms)	314.20
Mass dry sample plus ring (gms)	300.00
Mass ring (gms)	215.60
Moisture content before test (%)	6.87
Moisture content after test (%)	16.82

Other Data

Initial Dry Density (kg/m3)	1312
Initial Void Ratio	1.01

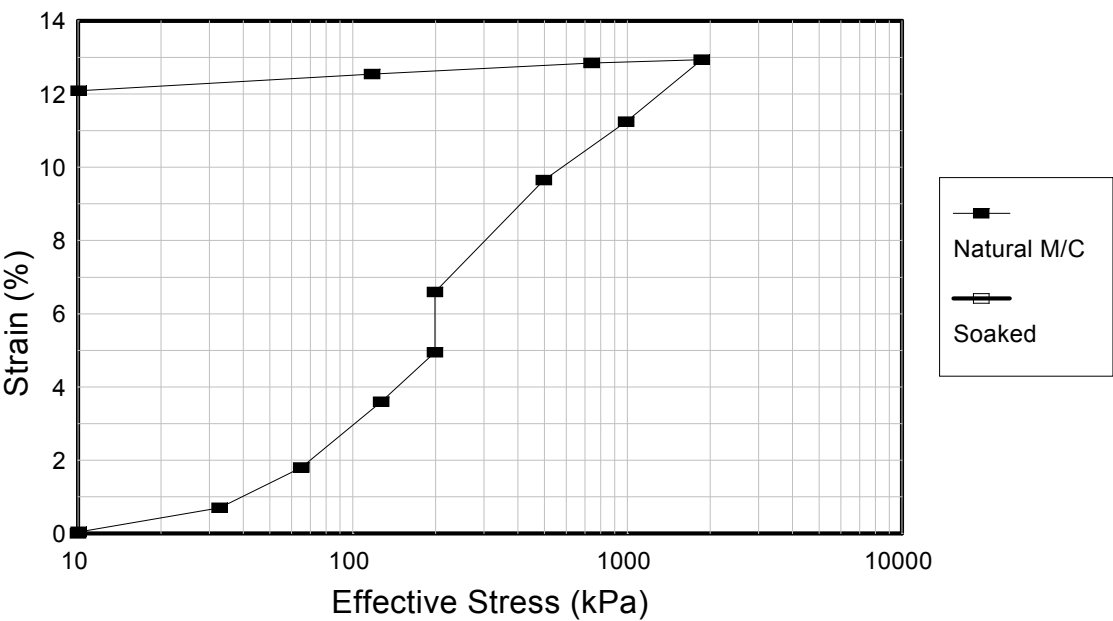
VOIDS RATIO v EFFECTIVE STRESS

Test No: 2155



STRAIN v EFFECTIVE STRESS

Test No: 2155





FOUNDATION INDICATOR

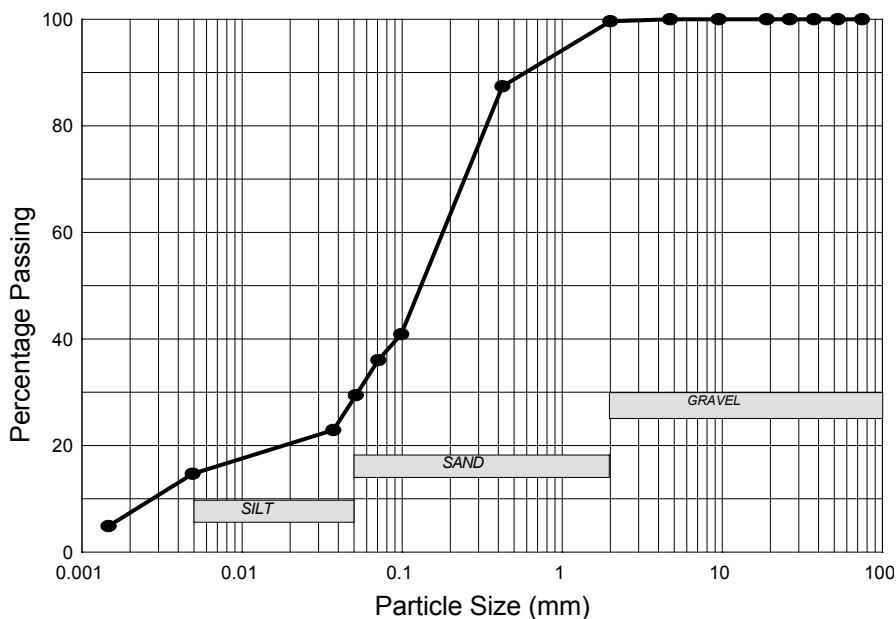
Client	SIVEST		
Location	KALPLAATS SUB-STATION , VRYBURG. KAL 2 TP 5 @ 2,1 - 2,3m		
Date	19 SEPTEMBER 2012	Test No	2150
Job No	10162/2	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	100.00
26.50	100.00
19.00	100.00
9.50	100.00
4.75	100.00
2.00	99.67
0.425	87.43

GRADING ANALYSIS



HYDROMETER ANALYSIS

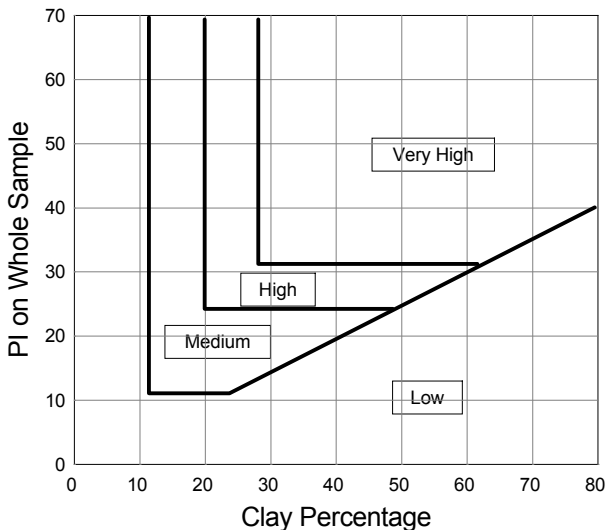
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0989	40.94
0.0712	36.02
0.0515	29.47
0.0372	22.92
0.0049	14.74
0.0015	4.91

ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	0.72
Moisture Content	5.34
PI on Whole Sample	Non Plastic

ACTIVITY CHART





FOUNDATION INDICATOR

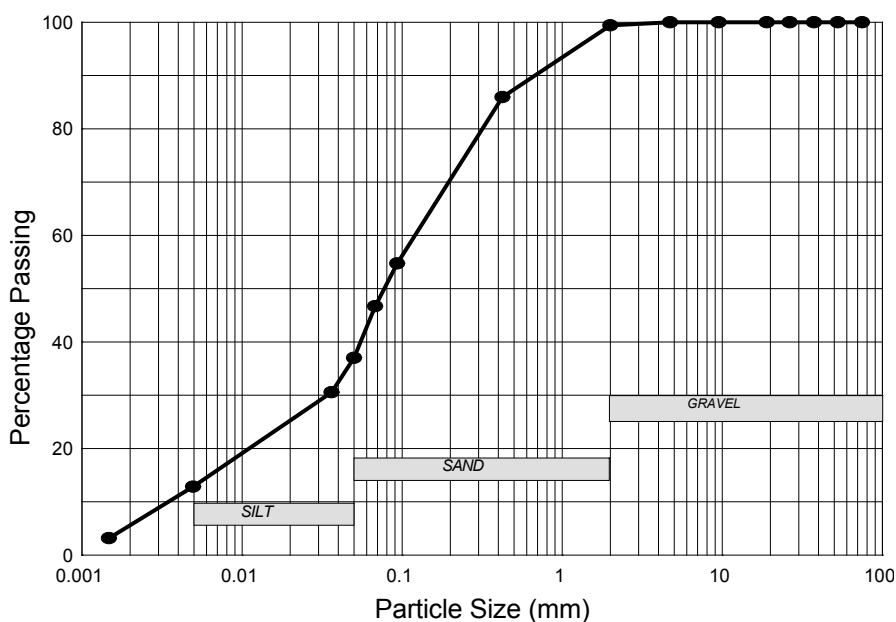
Client	SIVEST		
Location	KALPLAATS SUB-STATION , VRYBURG. KAL 2 TP 5 @ 2,6 - 2,8m		
Date	19 SEPTEMBER 2012	Test No	2149
Job No	10162/2	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	100.00
26.50	100.00
19.00	100.00
9.50	100.00
4.75	100.00
2.00	99.43
0.425	86.01

GRADING ANALYSIS



HYDROMETER ANALYSIS

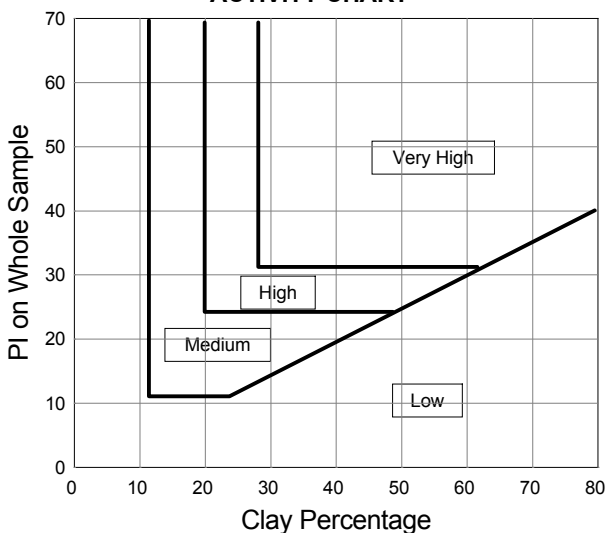
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0934	54.76
0.0682	46.71
0.0501	37.05
0.0362	30.60
0.0050	12.89
0.0015	3.22

ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	0.60
Moisture Content	8.14
PI on Whole Sample	Non Plastic

ACTIVITY CHART





FOUNDATION INDICATOR

Client	SIVEST		
Location	KALPLAATS SUB-STATION , VRYBURG. KAL 2 TP 5 @ 3,1 - 3,2m		
Date	19 SEPTEMBER 2012	Test No	2144
Job No	10162/2	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	100.00
26.50	100.00
19.00	100.00
9.50	100.00
4.75	100.00
2.00	98.86
0.425	84.78

HYDROMETER ANALYSIS

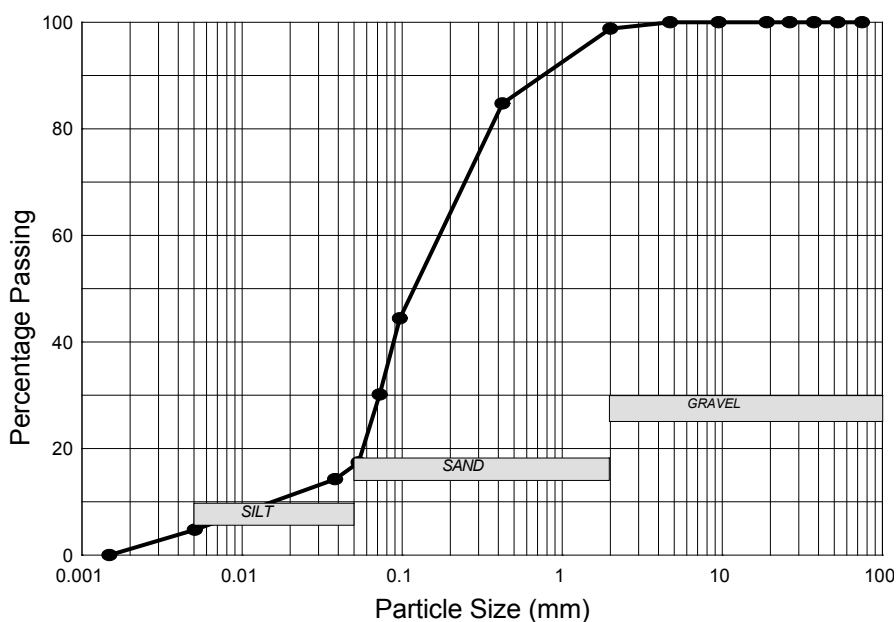
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0971	44.46
0.0725	30.17
0.0535	17.46
0.0382	14.29
0.0051	4.76
0.0015	0.00

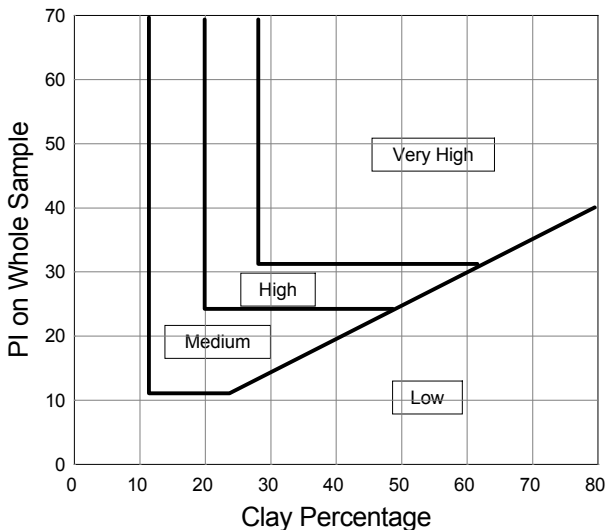
ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	0.72
Moisture Content	9.05
PI on Whole Sample	Non Plastic

GRADING ANALYSIS



ACTIVITY CHART



APPENDIX 10
PHOTOGRAPHS



Kalplaats Site



Thick Aeolian Sand Deposits