

**Geotechnical Site Investigation
Portion 54&56 Groenfontein Annex No 716
Klapmuts**

Prepared by: J C Engelbrecht (Pr Eng)

On behalf of:
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7551

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Geotechnical Site Investigation

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1. PROFILING

A visit to the site was conducted on Wednesday May 22nd 2019. Seven test holes were dug to a depth of about 2 meters, as shown on the site plan. The whole area is underlain by a firm to stiff weathered shale. Profiling of the holes were done with the following results.

TH 1

Depth (mm)	Description
0 - 400	Topsoil consisting of moist light brown to dark brown medium dense silty sand and gravel with roots
400 - 2000	In situ moist dark yellow to light yellowish orange and light reddish orange to light grey and white mottled firm to stiff clayey silty sand (weathered shale).

No Water table encountered

TH 2

Depth (mm)	Description
0 - 200	Topsoil consisting of moist dark grey to dark brown medium dense silty sand and gravel
200 - 1800	In situ moist light grey and white mottled with spots of dark yellow firm to stiff clayey silty sand (weathered shale).

No Water table encountered

TH 3

Depth (mm)	Description
0 - 250	Topsoil consisting of moist dark grey to dark brown and light grey medium dense silty sand and gravel
250 - 600	In situ moist light grey and white mottled firm to stiff clayey silty sand (weathered shale).
600 - 1900	In situ moist dark yellow to light yellowish orange and light reddish orange to light grey and white mottled firm to stiff clayey silty sand (weathered shale).

No Water table encountered

TH 4**Depth**
(mm)**Description**

0 - 250 Topsoil consisting of moist dark grey to black medium dense silty sand and gravel

250 - 2000 In situ moist light red to dark reddish orange and light reddish orange and light grey to white mottled firm to stiff clayey silt (weathered shale)

No Water table encountered

TH 5**Depth**
(mm)**Description**

0 - 250 Topsoil consisting of moist dark grey to black medium dense silty sand and gravel (ferricrete)

250 - 2000 In situ moist light red to dark reddish orange and light reddish orange and light grey to white mottled firm to stiff clayey silt (weathered shale)

No Water table encountered

TH 6**Depth**
(mm)**Description**

0 - 100 Topsoil consisting of moist light grey to dark grey medium dense silty sand and gravel (ferricrete)

100 - 2000 In situ moist light red to light yellowish orange and light reddish orange and light grey mottled firm to stiff clayey silt (weathered shale)

No Water table encountered

TH 7**Depth**
(mm)**Description**

0 – 600 Fill of waste material consisting of rags plastic bags with sand and crushed stone gravel

600 - 900 Topsoil consisting of moist light yellowish orange to dark yellowish orange medium dense silty sand and gravel with grass roots

900 - 1700 In situ moist light red to light yellowish orange and light reddish orange to light grey mottled firm to stiff clayey silt (weathered shale)

1700- 2100 in situ moist light yellowish orange to dark yellowish orange gravelly silty sand

No Water table encountered

2. FOUNDATION INDICATOR TESTS

The results of indicator tests on four samples are attached .

The clayey gravelly sand sample from TH 1 was obtained at a depth of about 200 mm. The fines in the sample can be classified as a clayey silt with no plasticity (NP) and no linear shrinkage. According to the unified soil classification it can be classified as a silty sand (SM)

The clayey sandy silt sample from TH 2 was obtained at a depth of about 600 mm The fines in the sample can be classified as a clayey silt with high plasticity (PI = 21.6) and high linear shrinkage of 10.2%. It falls on the A line of the plasticity chart, with classification of **CL-ML** The activity of the clay is medium

The clayey sandy silt sample from TH 5 was obtained at a depth of about 900 mm The fines in the sample can be classified as a clayey silt with medium to low plasticity (PI = 9.8) and low linear shrinkage of 3.3%. It falls on the A line of the plasticity chart, with classification of **CL-ML** The activity of the clay is low

The silty gravelly sand sample from TH 7 was obtained at a depth of about 1.7 m The fines in the sample can be classified as a clayey silt with medium to low plasticity (PI = 7.4) and low linear shrinkage of 3.1%. It falls just above the A line of the plasticity chart, with classification of **CL**. The activity of the clay is low

3. PERMEABILITY TESTS

The permeability tests results on three samples from the test holes are attached. According to the results the permeability of all the samples are very low. All the samples were tested at Proctor density which represents the in situ density. A mixture of the topsoil at TH 1 and TH 2 were also tested. A summary of the test results are as follows

Sample	Depth (mm)	Proctor Density kg/m ³	Moisture Content %	Permeability m/s
TH1&2	200	1993	8.5	7.665E ⁻¹⁰
TH 2	500	1773	11.6	3.346E ⁻⁹
TH 7	1200	1834	14.2	3.492E ⁻¹⁰

4. GROUNDWATER AND DRAINAGE

No water table was encountered, in any of the test holes. Drainage must be provided for surface runoff.

5. CONCLUSIONS

From an inspection of the proposed site, some of the topsoil and most of the vegetation has already been removed, and in the largest part of the site the gravelly sand on top varies from about 100 mm to 400 mm thickness. The area is fairly homogeneous with the firm to stiff weathered shale (sandy clayey silt) below the topsoil. The shale has a very low permeability as seen from the test results. There is a layer of fill material present in the vicinity of TH 7 as well as some stockpiled material.

Client: JC Engelbrecht
Project: Groenfontein
Attention: JC Engelbrecht
Address: Rupert Laan 35, Somerset West, 7129, Cape Town
Contact No.: 082 332 9978
Your Ref. No: SWL05364
Date Reported: 27 May 2019

TEST REPORT REFERENCE NUMBER / JOB NUMBER :

SWG00023

Dear Sir / Madam

Herewith please find the original reports pertaining to the above mentioned project.

Test Requested

3 x *Falling Head Permeability*

Site Sampling and Materials Information

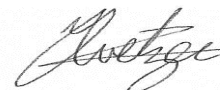
Sampling Method As per Client
Environmental Conditions As per Client

FINAL REPORT

We would like to take this opportunity to thank you for your valued support. Should you have any further enquiries please don't hesitate to contact me.

Yours Faithfully

Steyn Wilson Geotechnical



Frank Coetzee
Technical Signatory

Remarks:

- Information contained herein is confidential to Steyn Wilson Geotechnical and the addressee
- Opinions & Interpretations are not included in our schedule of Accreditation.
- The results reported relate only to the sample tested, Further use of the attached information is not the responsibility or liability of Steyn Wilson Geotechnical
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- Measuring equipment is traceable to national standards (Where applicable).
- Should there be any deviation from the prescribed test method comments will be made thereof, pertaining to the test on the relevant materials report.



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FALLING HEAD PERMEABILITY TEST REPORT - TEST METHOD: ASTM D2434 & KH HEAD

CLIENT: JC ENGELBRECHT
 DATE: 27/05/2019

JOB NO.: SWG00023
 PROJECT: GROENFONTEIN

Sample Details		Remould Details (Proctor)					Tests				
Sample no.	Depth(m)	Specified		Actual			Test:	Time			Permeability (cm/s)
		Dry Density: kg/m ³	%	OMC:	Dry density: kg/m ³	%		Moisture Content:	h	m	
65	0	2067	100	8.5	1993	96.4	1	6	20	56	1.6415E-07
							2	5	21	50	3.0452E-08
							3	3	17	20	3.5336E-08
Average:											7.6647E-08

Sample no.		Specified			Actual			Test:	Time			Permeability (cm/s)
Depth(m)	Dry Density: kg/m ³	%	OMC:	Dry density: kg/m ³	%	Moisture Content:	h		m	s		
66	0	1847	100	11.6	1773	96.0	1	15	59	30	3.1834E-07	
							2	5	23	6	3.7030E-07	
							3	3	15	11	3.1523E-07	
Average:											3.3463E-07	

Sample no.		Specified			Actual			Test:	Time			Permeability (cm/s)
Depth(m)	Dry Density: kg/m ³	%	OMC:	Dry density: kg/m ³	%	Moisture Content:	h		m	s		
67	0	1888	100	14.2	1834	97.1	1	6	20	38	1.1239E-08	
							2	15	39	38	6.3295E-08	
							3	5	21	57	3.0230E-08	
Average:											3.4921E-08	



CIVIL ENGINEERING TESTING LABORATORIES



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Client: **J.C.Engelbrecht**
 Project: Groenfontein - Klapmuts
 Attention: Mr JC Engelbrecht
 Your Ref. No: -
 Date Reported 30.05.19

TEST REPORT REFERENCE NUMBER / JOB NUMBER :

SWL05364

Dear Sir / Madam

Herewith please find the original reports pertaining to the above mentioned project.

Test Requested

4x FOUNDATION INDICATOR

Site Sampling and Materials Information

Sampling Method

Specimens delivered to Steyn Wilson Laboratory.

Environmental Condition

Cloudy

FINAL REPORT

We would like to take this opportunity to thank you for your valued support.
 Should you have any further enquiries please don't hesitate to contact me.

Yours Faithfully

STEYN-WILSON LABORATORIES (PTY) LTD

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- Information contained herein is confidential to STEYN-WILSON PTY LTD and the addressee
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- The results reported relate only to the sample tested, Further use of the attached information is not the responsibility or liability of STEYN-WILSON LABORATORIES (PTY) LTD.
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Mr. R. Wilson
Technical Signatory

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FINANCIAL MANAGER: Mr. D. Erasmus (SAICA Reg No: 200522562)

LABORATORY MANAGER: Mr. K. Booysen



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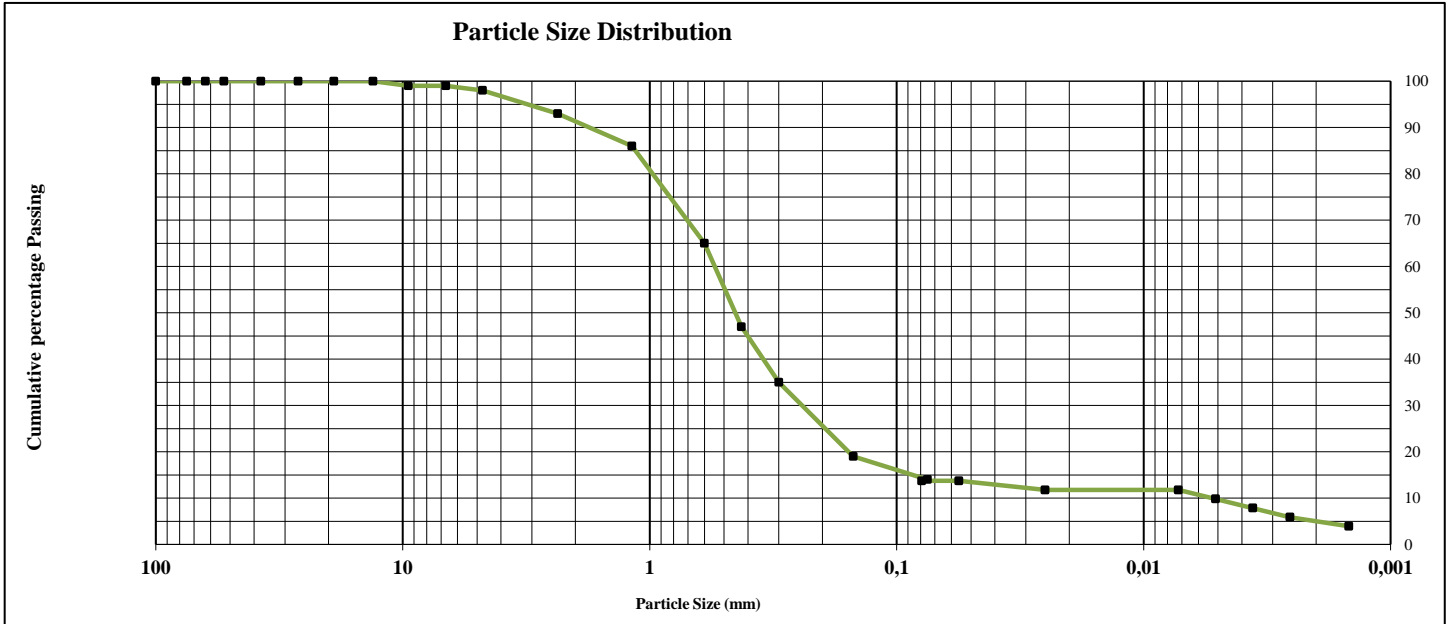
Project : Groenfontein - Klapmuts
 Date Received : 22.05.19
 Date Reported : 30.05.19
 Req. Number : -

FOUNDATION INDICATOR ASTM D422

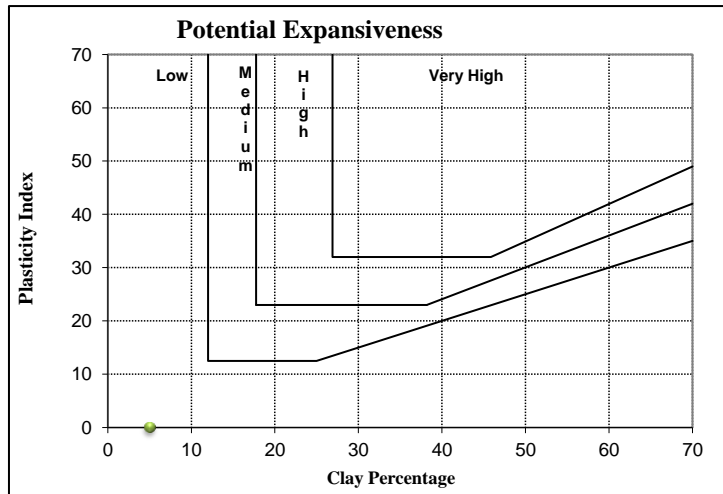
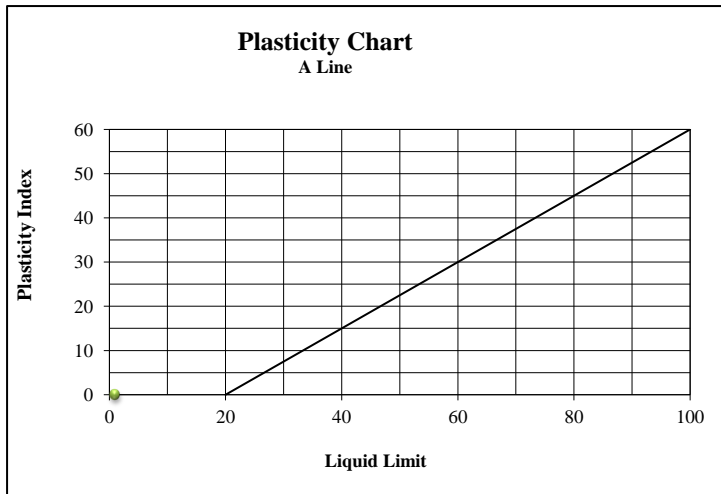
Material Description:	Light Brown Sand	Sample Number:	8022		
Position:	TG 1	Liquid Limit	NP	Linear Shrinkage	0
Depth:	-	Plasticity Index	NP	Insitu M/C%	4,9

PH (TMH1 A20)*	-	(TMH1 A21T)* Conductivity s.m ⁻¹	-	SG (TMH1 A12T)*	2739
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SIEVE ANALYSIS (TMH 1 A1a)*														HYDROMETER ASTM D422													
100	75	63	53	37,5	26,5	19,0	13,2	9,5	6,7	4,75	2,36	1,18	0,60	0,425	0,300	0,150	0,075	0,075	0,056	0,025	0,007	0,005	0,004	0,003	0,001		
100	100	100	100	100	100	100	100	99	99	98	93	86	65	47	35	19	14	13,72	13,72	11,76	11,76	9,8	7,84	5,88	3,92		
% Passing																											



% Gravel	9	% Sand	77	% Silt	9	% Clay	5
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NOTE: All tests marked with (*) means that those test methods are not accredited.



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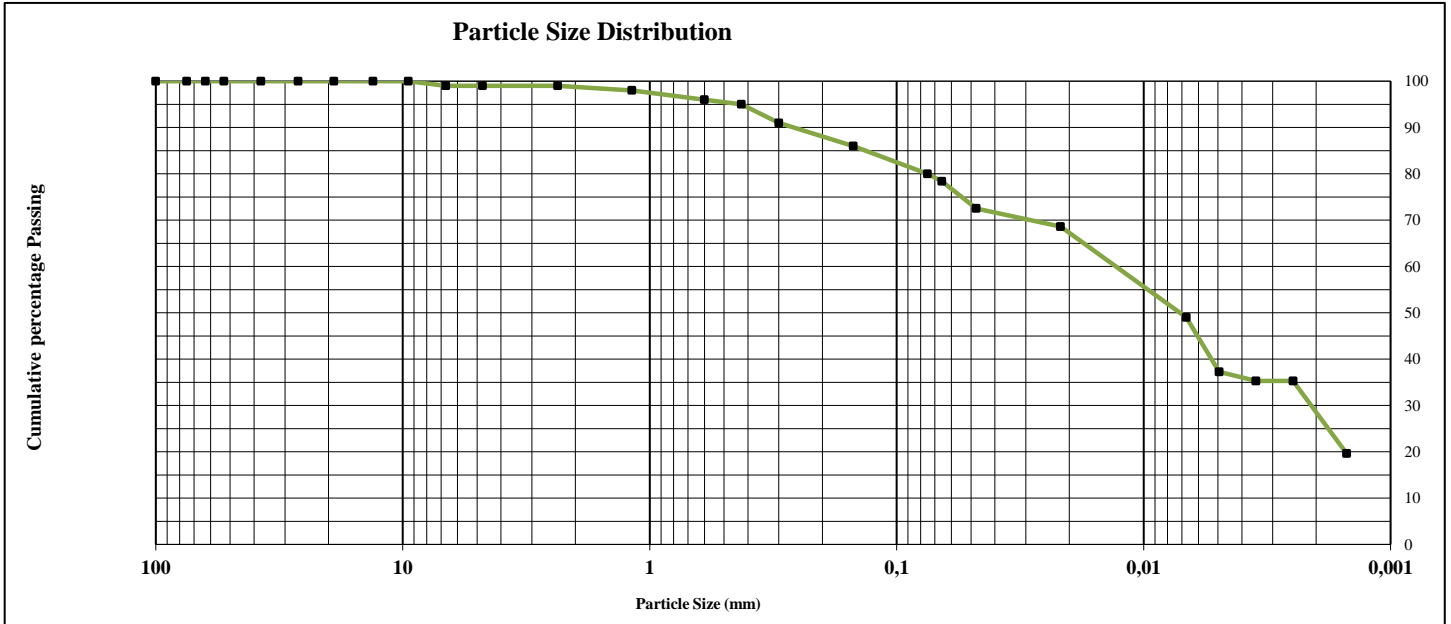
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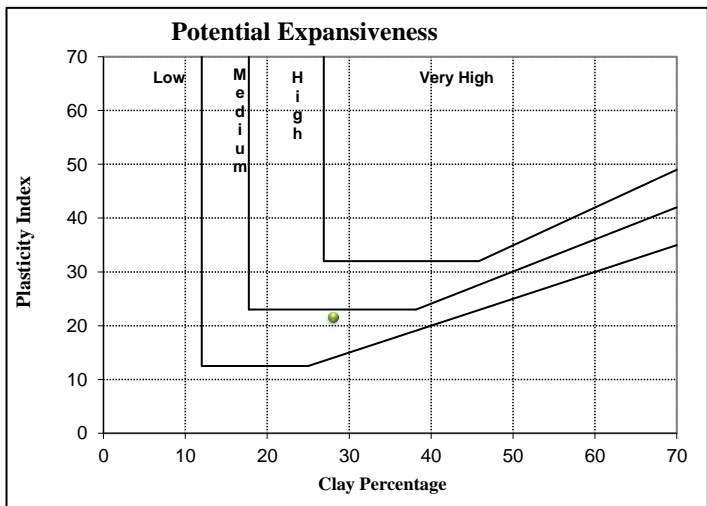
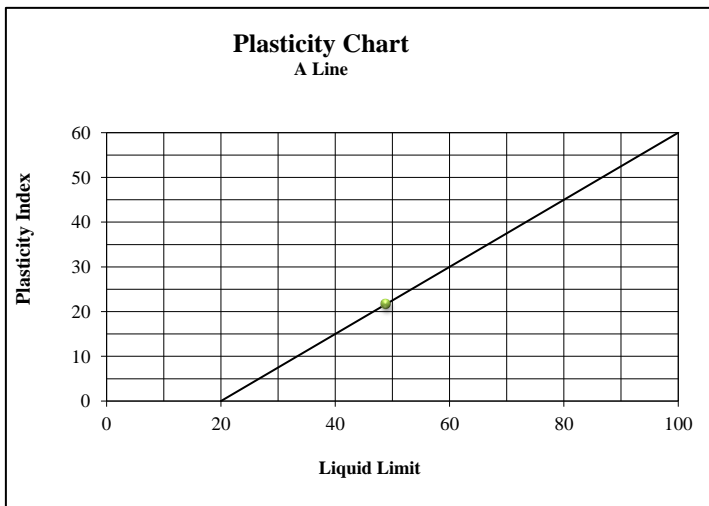
Material Description:	Light Olive Clayey Soil	Sample Number:	8023		
Position:	TG 2	Liquid Limit	49	Linear Shrinkage	10,2
Depth:	-	Plasticity Index	21,6	Insitu M/C%	11,5

PH (TMH1 A20)*	-	(TMH1 A21T)* Conductivity s.m ⁻¹	-	SG (TMH1 A12T)*	2780
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SIEVE ANALYSIS (TMH 1 A1a)*														HYDROMETER ASTM D422													
100	75	63	53	37,5	26,5	19,0	13,2	9,5	6,7	4,75	2,36	1,18	0,60	0,425	0,300	0,150	0,075	0,066	0,048	0,022	0,007	0,005	0,004	0,002	0,002		
100	100	100	100	100	100	100	100	100	99	99	99	98	96	95	91	86	80	78,4	72,52	68,6	49	37,24	35,28	35,28	19,6		
% Passing																											



% Gravel	1	% Sand	22	% Silt	49	% Clay	28
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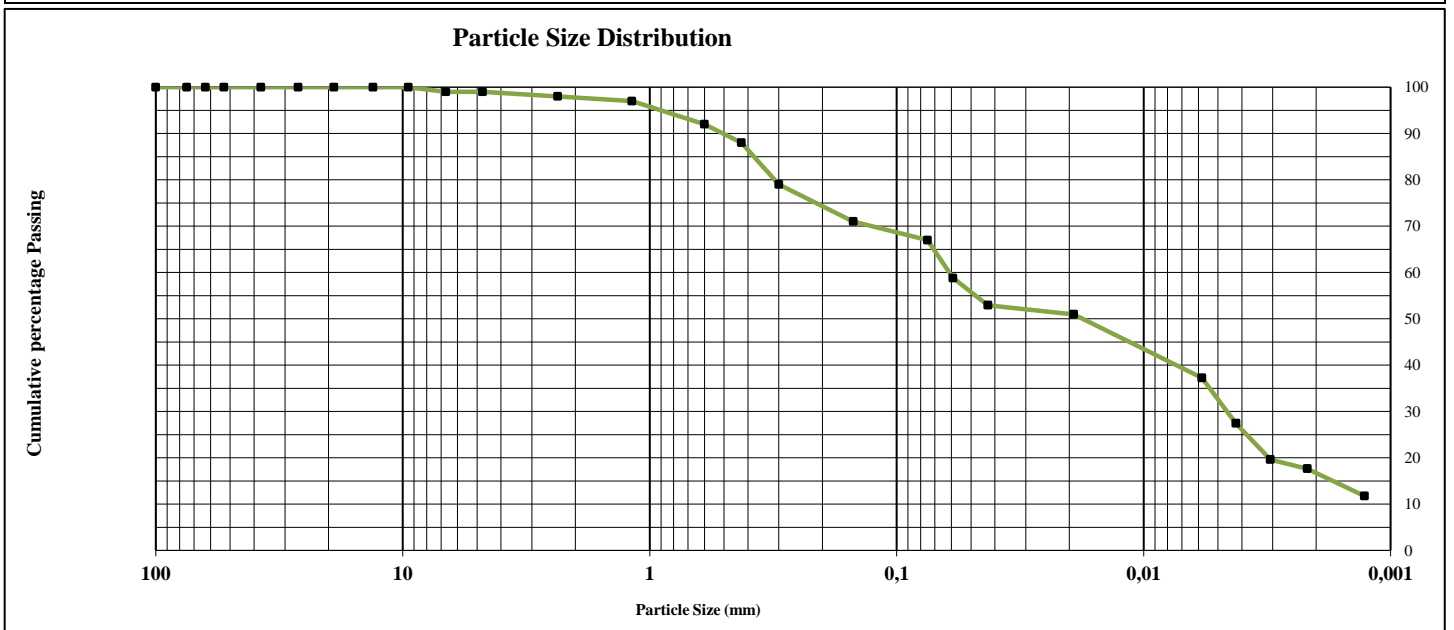
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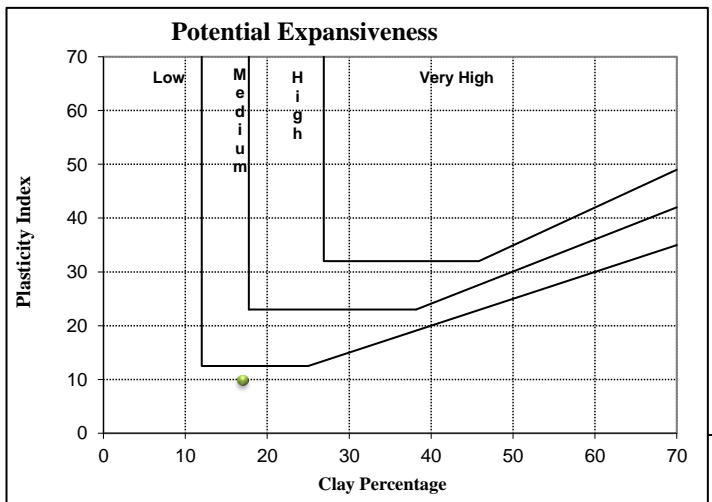
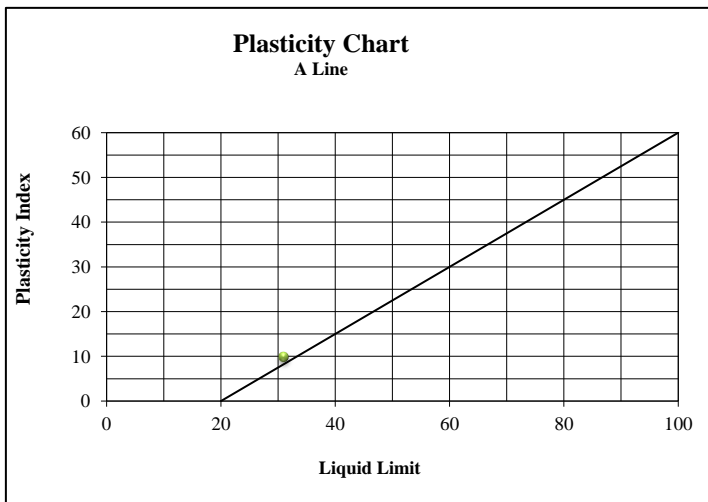
Material Description:	Light Orange Clayey Soil	Sample Number:	8024		
Position:	TG 5	Liquid Limit	31	Linear Shrinkage	3,3
Depth:	-	Plasticity Index	9,8	Insitu M/C%	12

PH (TMH1 A20)*	-	(TMH1 A21T)* Conductivity s.m ⁻¹	-	SG (TMH1 A12T)*	2739
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SIEVE ANALYSIS (TMH 1 A1a)*															HYDROMETER ASTM D422												
100	75	63	53	37,5	26,5	19,0	13,2	9,5	6,7	4,75	2,36	1,18	0,60	0,425	0,300	0,150	0,075	0,059	0,043	0,019	0,006	0,004	0,003	0,002	0,001		
100	100	100	100	100	100	100	100	100	99	99	98	97	92	88	79	71	67	58,8	52,92	50,96	37,24	27,44	19,6	17,64	11,76		
% Passing																											



% Gravel	2	% Sand	39	% Silt	42	% Clay	17
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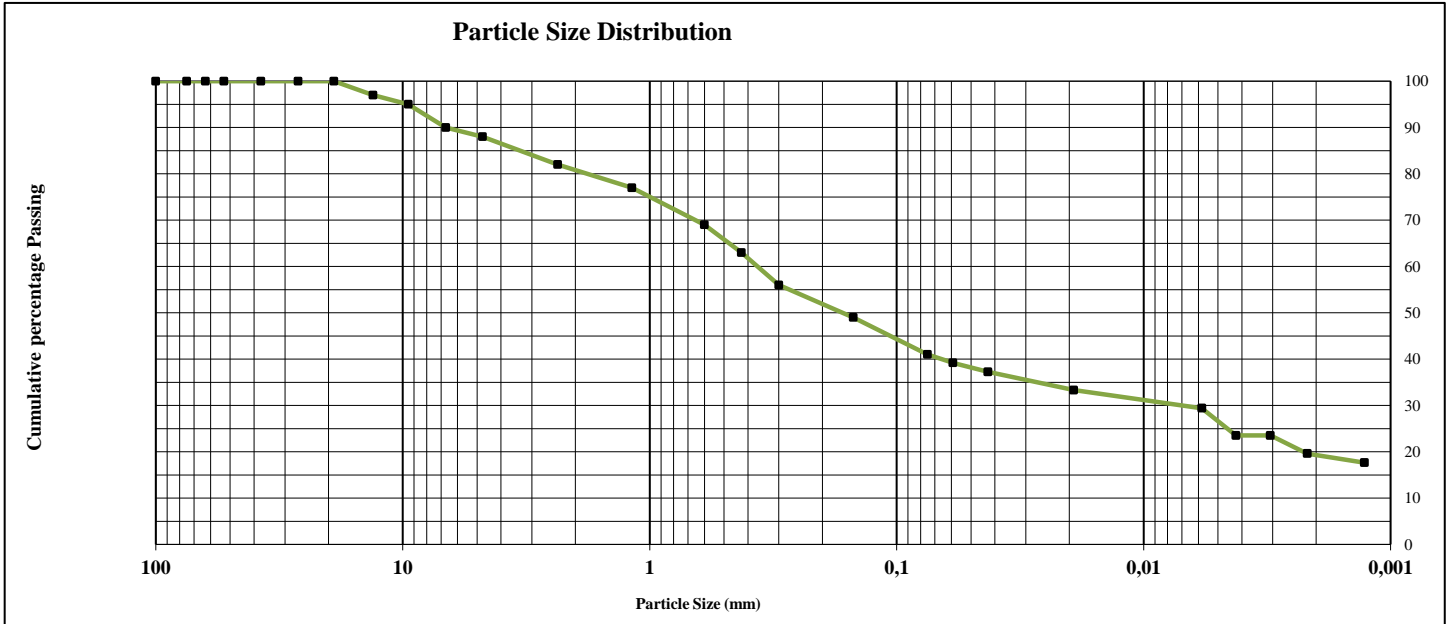
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FOUNDATION INDICATOR ASTM D422

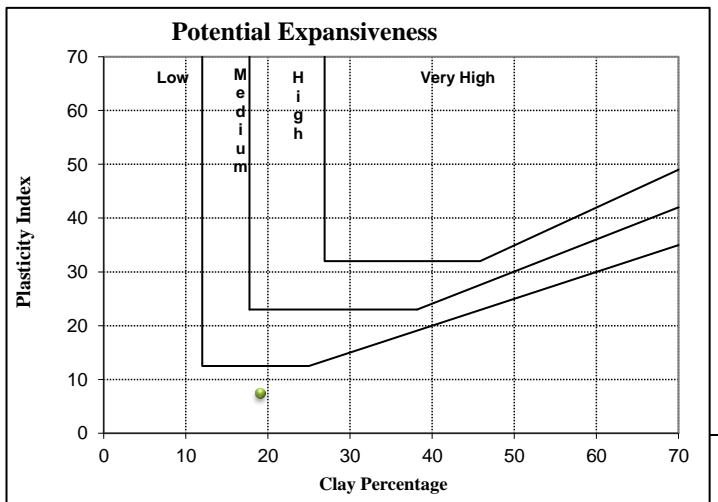
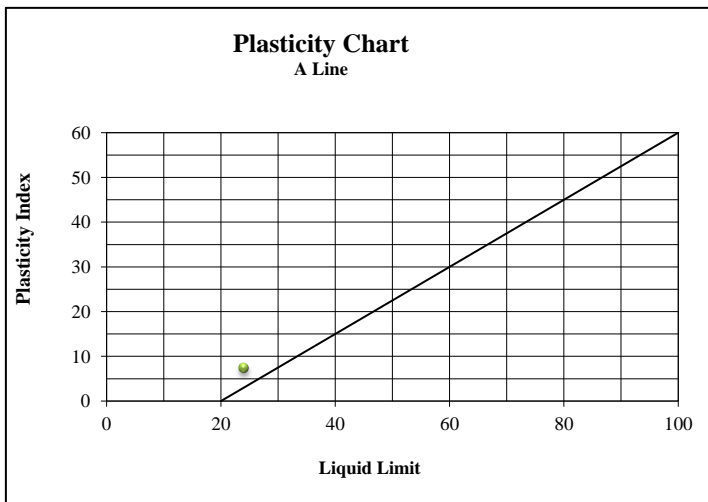
Material Description:	Light Orange Silty Soil with Calcrete	Sample Number:	8025		
Position:	TG 7	Liquid Limit	24	Linear Shrinkage	3,1
Depth:	-	Plasticity Index	7,4	Insitu M/C%	7

PH (TMH1 A20)*	-	(TMH1 A21T)* Conductivity s.m ⁻¹	-	SG (TMH1 A12T)*	2699
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SIEVE ANALYSIS (TMH 1 A1a)*															HYDROMETER ASTM D422												
100	75	63	53	37,5	26,5	19,0	13,2	9,5	6,7	4,75	2,36	1,18	0,60	0,425	0,300	0,150	0,075	0,059	0,043	0,019	0,006	0,004	0,003	0,002	0,001		
100	100	100	100	100	100	100	97	95	90	88	82	77	69	63	56	49	41	39,2	37,24	33,32	29,4	23,52	23,52	19,6	17,64		
% Passing																											



% Gravel	20	% Sand	41	% Silt	20	% Clay	19
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