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GEOTECHNICAL INVESTIGATION REPORT OF PORTION 1 OF THE FARM MADIERA 274-IQ, ROODEPOORT

Prepared for: HUNTER THERON TOWN PLANNERS

Report No.: 1806
Date: March 2006

CONTENTS

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GEOTECHNICAL INVESTIGATION REPORT of PORTION 1 OF THE FARM MADIERA 274-IQ, ROODEPOORT.

1. INTRODUCTION

1.1 Preamble

On 1st February 2006, Ms. N. Conradie of Hunter Theron Town Planners invited Africa Exposed Consulting Engineering Geologists to submit a proposal for the completion of a geotechnical investigation of a site situated on Portion 1 of the farm Madiera 274-IQ in Roodepoort. On the same day faxed confirmation was received from Hunter Theron, instructing Africa Exposed to proceed with the investigation.

1.2 Database

The following information was supplied by Hunter Theron.

- A locality plan was provided.
- The site is to be rezoned for township development.

1.3 Objectives

The objectives of the investigation were:

- to identify the soil and rock conditions below the site to a depth of 3.0m or refusal.
- to recommend suitable foundation systems, and founding depths for the proposed structures.
- to comment on any perceived geotechnical problems which may affect either the design or construction of the project.
- to classify the site in terms of the National Home Builders Registration Council (NHBRC) of 1999.

2. FACTUAL REPORT

2.1 Programme of Work

2.1.1 *Literary Review*

A literary review was conducted in order to obtain data from previous investigations carried out in the area. The 1: 250 000 geological map, No 2626 West Rand and "Soil Engineering Maps" produced by Transvaal Provincial Administration Roads Department (1977) were consulted to determine the regional geology in the vicinity of the site.

A geological map of the Johannesburg-Pretoria Dome , published by C.R. Annhaeusser (1971), together with the accompanying paper "The Geology and Geochemistry of the Archaean Granites and Gneisses of the Johannesburg-Pretoria Dome was used to identify the geological structures present in the immediate vicinity of the site.

2.1.2 *Field Work*

On 16th February 2006, six test pits were excavated by hand at positions that were determined on site. The layout of the test pits are shown on the Site Plan in Appendix 1. Each hole was profiled by an engineering geologist according to the Jennings, Brink and Williams system, sampled as necessary and backfilled. The detailed profile logs are shown in Appendix 2.

2.1.3 *Office and Laboratory Work*

From the soil samples recovered, four were selected for Foundation Indicator Tests and two undisturbed samples were recovered to determine the collapse potential and consolidation characteristics of the soils. All the individual test results are included in Appendix 3 of this report.

2.2 Site Description

Portion 1 of the farm Madeira covers a surface area of approximately 12.2ha and is located on the northwestern side of Christian De Wet Road in Strubensvalley, Roodepoort. The site is irregularly shaped and is currently bound by Christian De Wet Road to the south east, while the existing suburbs of Strubens Valley Ext 16 and 18 form the eastern and western boundaries. The proposed PWV 10 road reserve runs along the western boundary of the property, with the proposed extension of Elsie road bisecting the northern portions of the property.

The site, which slopes at an approximate gradient of some 3 to 5% down towards the southwest, and is not developed with no structures present on the site. The vegetation which covers the site consists primarily of grassland, with occasional shrubs and some well established exotic trees.

2.3 Site Geology

From the available literature as well as the observations during the site investigation, it is evident that the site is underlain by granitic rocks of the Basement Complex, as exposed in the Johannesburg-Pretoria Dome. Typically, these Archaean intrusive igneous rocks

are cross cut by diabase dykes of various ages, and may contain a prominent structural fabric. The presence of a north east to south west striking diabase dyke has been identified in the northern portion of the site. (see figure 2)

By experience it is known that the depth of weathering in granitic rocks is highly variable, with the possibility of corestone remnants. Patches of highly collapsable and kaolinised residual soils are common, particularly in the elevated areas above 1 600 mamsl.

2.4 Hydrology

The average annual rainfall in this area is approximately 750mm, most of which occurs as heavy, isolated thunder showers between October and March. Storm water runoff is primarily in the form of sheetwash towards the southern and south western portion of the site where a small wetland occurs, which forms the headwaters of the Wilgespruit. The position of the 1:50 year flood line must be determined on this drainage course

Strong groundwater seepage was recorded in test pits No.1,2 and 3 at an average depth of 1.6m, while large areas of standing surface water was recorded in the south eastern corner of the site.

2.5 Observations

The test pits were excavated to an average depth of 2.7m and no refusal was encountered by the TLB. A description of the soils that blanket the site is summarised below.

2.5.1 *Transported Soils*

The entire site is covered by a layer of transported soil that is on average 0.6m thick, consisting of silty sand and gravels, of colluvial (hillwash) origin. The soil is generally of loose to medium dense consistency, and is rich in organic matter. In isolated places the transported soils could be seen to be slightly ferruginised.

2.5.2 *Pebble Marker*

The pebble marker is a horizon consisting of sub-rounded and angular quartz gravels, in a matrix of light greyish brown or reddish brown sand, which demarcates the base of the transported soils. The consistency of the horizon is generally loose to medium dense and it is on average 0.2m thick.

2.5.3 *Residual Granite*

The residual granite soil which originates from the in-situ weathering of the granite parent rock underlies the entire site. The soil is of medium dense to dense consistency, showing the typical relic joints often seen in granitic soils, and consists of silty coarse sand, with scattered angular quartz gravels.

2.5.4. *Residual Diabase*

In the northern portions of the site, the presence of a diabase dyke was exposed in TP 1 and 4. The soil is generally described as dark grey and olive grey, silty and sandy clay with gravels and occasional spheroidal boulders. The consistency of the material was generally described as being firm to stiff.

2.5.5 ***Granite Bedrock***

No outcrop of granite was recorded on the site.

2.6 Laboratory and Field Test Results

2.6.1 ***Indicator testing***

For more accurate identification and classification purposes, Particle Size Distribution and Atterberg Limits Tests were carried out on representative samples of the various soil horizons present within the site. The results are shown in Appendix 3 of this report and are summarised in Table 1 below.

TABLE 1. Summary of Indicator test results

TP No.	Depth (m)	Material	PI	PI (ws)	LS (%)	Activity
1	0.8-1.0	Silty sand and scattered gravels. Res. Granite	13	9	6	low
1	2.0-2.1	Silty clayey sand. Res. Diabase	25	19	11	medium
2	1.5-1.6	Silty sandy clay. Rew. Res. Granite	14	8	6	low
4	1.1-1.2	Sandy clayey silt. Res. Diabase	24	18	10	medium
6	1.9-2.0	Silty clayey sand and gravels. Res. Granite.	19	7	6	low

2.6.2 ***Collapse Potential Testing***

In order to establish the consolidation characteristics and collapse potential of the residual granite and residual diabase, undisturbed samples were retrieved from TP 1 and TP 6 and were subjected to Consolidation Tests. The results are summarised in table 2 below.

TABLE 2. Consolidation Test Results

TP No	Depth (m)	Material	Dry Density (kg/m^3)	Moisture Content (%)	Initial Void Ratio	Collapse Potential (%)
1	2.0-2.1	Silty clayey sand. Res. Diabase	1384	15.9	0.90	nd
6	1.9-2.0	Silty clayey sand and gravels. Res. Granite.	1911	9.3	0.40	0.85

3. INTERPRETIVE REPORT

3.1 Discussion of Results

The Collapse Potential test completed on the residual granite indicated that these soils are not collapsable. The magnitudes of the anticipated settlements are shown in table 3 below. These values have been calculated by assuming that 700mm wide strip footings will be placed at an average depth of 0.8m below natural ground surface and the foundations would apply a bearing pressure of 100kPa.

TABLE 3. Calculated Total Settlements (These estimates are only applicable for the footing geometry assumed above)			
Position	**Collapse Settlement (mm)**	**Consolidation Settlement (mm)**	**Total Settlement (mm)**
TP 1	0	10 to 150	10 to 15
TP 2	0	5 to 10	5 to 10
TP 3	0	5 to 10	5 to 10
TP 4	0	10 to 15	10 to 15
TP 5	0	10 to 15	10 to 15
TP 6	0	10 to 15	10 to 15

3.2 Classification of Site.

In order to classify the geotechnical characteristics of the underlying soils, the geotechnical classification method proposed in the National Home Builders Registration Council (NHBRC) of 1999. has been applied to this site. Table 4 shown below indicates the various geotechnical characteristics and the criteria used to evaluate the soils.

TABLE 4. Residential Site Class Designations National Home Builders Registration Council (NHBRC) of 1999.				
Typical Founding Material	**Character of Founding Material**	**Expected Range of Total Soil Movements (mm)**	**Assumed Differential Movement (%of Total)**	**Site Class**
Fine grained soils (clayey silts and clayey sands of low plasticity), sands, sandy and gravelly soils	COMPRESSIBLE SOIL	<10 10-20 >20	50% 50% 50%	S S1 S2
Fine grained soils with moderate to very high plasticity (clays, silty clays, clayey silts and sandy clays)	EXPANSIVE SOILS	<7,5 7,5-15 15-30 >30	50% 50% 50% 50%	H H1 H2 H3

In terms of the National Home Builders Registration Council (NHBRC) of 1999 site classification system, the site has been classified as shown below.

S Less than 10mm consolidation settlement anticipated
S1 10 to 20mm consolidation settlement anticipated.
H Less than 7.5mm of heave movement predicted

No construction of residential units may take place below the 1 in 50 year flood line.

3.3 Design Solutions

3.3.1 *Structures*

3.3.1.1 *Zones Classified as S1*
(10 to 20mm consolidation settlement anticipated)

Potential founding solutions for all of the houses to be constructed within this zone on the site will require special foundation precautions. Approximately 60% of the site has been classified as a **S1** site and the potential founding solutions for all units to be constructed within this zone are presented below.

i. *Stiffened Strip Footings.*
It is recommended that the external and internal walls of the units are founded on reinforced strip footings placed at an average depth of 0.8m below current ground level. The foundations must be reinforced and construction may proceed with brick force included between each course in the plinth wall for a minimum of 6 courses. Articulation joints must be included at all external and internal doors and openings.

Particular attention must be placed on drainage precautions as well as ensuring the competence of all water bearing services.
For the surface bed preparation, the in-situ soils must be removed to a depth of 450mm, and replaced in 150mm thick layers with inert material, compacted to a minimum density of 93% of Mod AASHTO at -1 to +2% OMC.

The maximum allowable bearing pressures must not exceed 50kPa.

ii. *Soil raft.*
Remove in situ materials to 1.0m beyond perimeter of building (ie. the foot print of the structure) to a depth of 1.5 times the widest foundation, measured from the underside of the footings. Replace with the excavated material in compacted 150mm thick layers to 93% Mod AASHTO density at -1% to +2% of OMC. Bearing capacity of the soil raft will be in the order of 100kPa. Foundations must be placed at a depth of 600mm below the top of the mattress and normal construction may proceed with brick force included between each course in the plinth wall for a minimum of 6 courses. The surface bed may be constructed directly on the soil raft.

iii. *Compaction of soils below individual footing.*
Remove the in-situ soils below the foundations (both internal and external walls) to a depth of 1.5 times the foundation width or to a competent horizon. Replace with the excavated material compacted to 93% Mod AASHTO density at -1% to +2% of optimum moisture content, in layers not exceeding 150mm thick. **Particular attention must be paid to the compaction at the edges of the trenches and at corners**. Nominally reinforced foundations must be placed at a depth of 600mm below the top of the mattress and construction may proceed with brick force included between each course in the plinth wall for a

minimum of 6 courses. The maximum allowable bearing pressures must not exceed 100kPa.

For the surface bed the in-situ soils must be removed to a depth of 450mm, and replaced in 150mm thick layers with the same excavated material, compacted to a minimum density of 93% of Mod AASHTO at -1 to +2% OMC.

Due to the risk of settlement occurring in the natural soils it is imperative that good site drainage is provided around individual structures, and excess moisture should not be allowed to accumulate adjacent to foundations.

3.3.1.2 *Zones Classified as S*
(Less than 10mm consolidation settlement anticipated.)

The portions of the site that have been classified as **S** are typically characterised by a thick surface horizon of transported soils which are within 0.5m to 1.0m of the surface.

Negligible consolidation settlement is anticipated under assumed applied pressures of less than 100kPa and total consolidation settlements of less than 10mm have been determined, using the assumptions presented in section 3.1.

It is therefore recommended that structures built within this zone are founded using normal strip footings placed on the medium dense to dense residual granite soils at an average depth of 0.6m. The maximum allowable bearing pressure of the soils at this depth is 100kPa. It must be stressed that the foundations must be placed on uniform materials and should be founded completely on residual soils. Should the footings straddle between differing ground conditions, it is strongly recommended that the entire structure is placed on soil mattress in order to prevent differential settlement occurring. The rock should be removed to a minimum depth of 1.0m below the proposed founding level. A suitable G7 to G8 quality fill material should be placed in layers of 150mm, compacted to 93% Mod AASHTO at -1% to +2% OMC. The final two layers below the foundations should be compacted to 95% Mod AASHTO. The structures may be placed on conventional strip footings, applying a maximum load of 100kPa.

It is good practice to adopt sound stormwater drainage around the proposed structures, and excess moisture should not be allowed to accumulate adjacent to foundations (see section. 3.3.4).

3.3.1.3 *Zones Classified as H*
(Less than 7.5mm heave movement anticipated)

Portions of the site has been classified as an **H** site and is characterised by a thin surface horizon of transported soils which is underlain by residual diabase within 1.0m of the surface.

Some foundation movement (heave and shrinkage) is anticipated under assumed applied pressures of less than 100kPa and differential movements of less than 7.5mm have been determined, using the assumptions presented in section 3.1.It is recommended that structures built within this zone should be founded using nominally reinforced strip footings placed on medium dense to

dense residual diabase at an average depth of 0.8m. The maximum allowable bearing capacity of the residual diabase is in the order of 100kPa, and it must be stressed that the foundations must be placed on uniform materials.

3.3.2 ***Roads and Terraces***

The results of the Foundation Indicator Tests have been used to classify the material and to determine the suitability of soil for the construction of terraces and pavement layers. The results of the tests are presented in Appendix 3, and have shown that the residual soils are classified as a G10 to G8 materials and may therefore be used in the construction of the terraces and as in-situ sub-grade of pavement layers. Suitable materials for use in the selected layers, sub-base and base course layers must be imported from a commercial source.

3.3.3 ***Excavation Classification***

Excavation class will be "soft" possible according to SABS 1200 D: Earthworks, up to a depth of 1.5m. It must be anticipated that boulders may also be encountered throughout the site.

In areas where the diabase dyke has been identified it must be anticipated that extensive occurrences of spheroidal boulders will be encountered.

3.3.4 ***Stormwater Management***

It is always good practice to manage stormwater in the vicinity of structures, particularly within zone **H** and **S1** and therefore the following recommendations should be considered to limit the amount of moisture reaching the foundation and thereby reducing the risk of settlement occurring.

i. All water bearing services must be provided with flexible couplings where pipes enter the buildings.
ii. A 1200mm wide apron paving must be provided around the perimeter of the structures. Joints between the paved areas and the walls of the buildings should be sealed with a flexible sealant to prevent moisture reaching the foundations.
iii. Storm water management around the structures must facilitate the efficient disposal of excess water from the site.
iv. No flower beds, garden taps, trees or down pipe discharge must be allowed adjacent to the structures, and must be placed as far away as possible.

3.4 General

3.4.1 ***Ground Water***

Groundwater seepage was encountered in TP 1, 2 and 3 at 1.6m and it must be anticipated that shallow ground water may occur throughout the site after periods of sustained rainfall. Appropriate precautions should therefore be implemented beneath all the structures and paved areas, as well as on any exposed excavated surfaces in the terraces .

3.4.2 ***Trees***

It is imperative that all large root systems are properly removed and any cavities are properly back filled with suitable material compacted to 90% Mod AASHTO density at +2% to - 1% of optimum moisture content.

Where possible it would be aesthetically and environmentally pleasing to preserve the well established indigenous trees that occur on the site.

3.5 Construction Problems

It must be anticipated that boulders may be encountered in the excavations.

Service trenches greater than 1.5m deep will required to be made safe for personnel working in these excavations, and extensive overbreak must be anticipated in all excavations.

3.6 Additional Investigations

The position of the 1 : 50 year flood line must be determined by an appropriately qualified hydrologist.

This investigation was completed for the purposes of township proclamation, and whilst the site has been zoned and generalised foundation recommendations have been presented for typical residential structures, the results contained in this report should not be used for site specific foundation design purposes. Additional detailed geotechnical investigations would be required for structures other than single and double storey residential units.

4. CONSTRUCTION MONITORING

4.1 Excavation Inspection

In order to identify any changes or variation to the soils that may not have been identified in the test pits, it is recommended that all foundation excavations be inspected by Africa Exposed prior to placing any concrete and/or commencing any backfilling.

4.2 Control Testing

Regular checks on the quality and compaction of the backfill to the terraces should be made.

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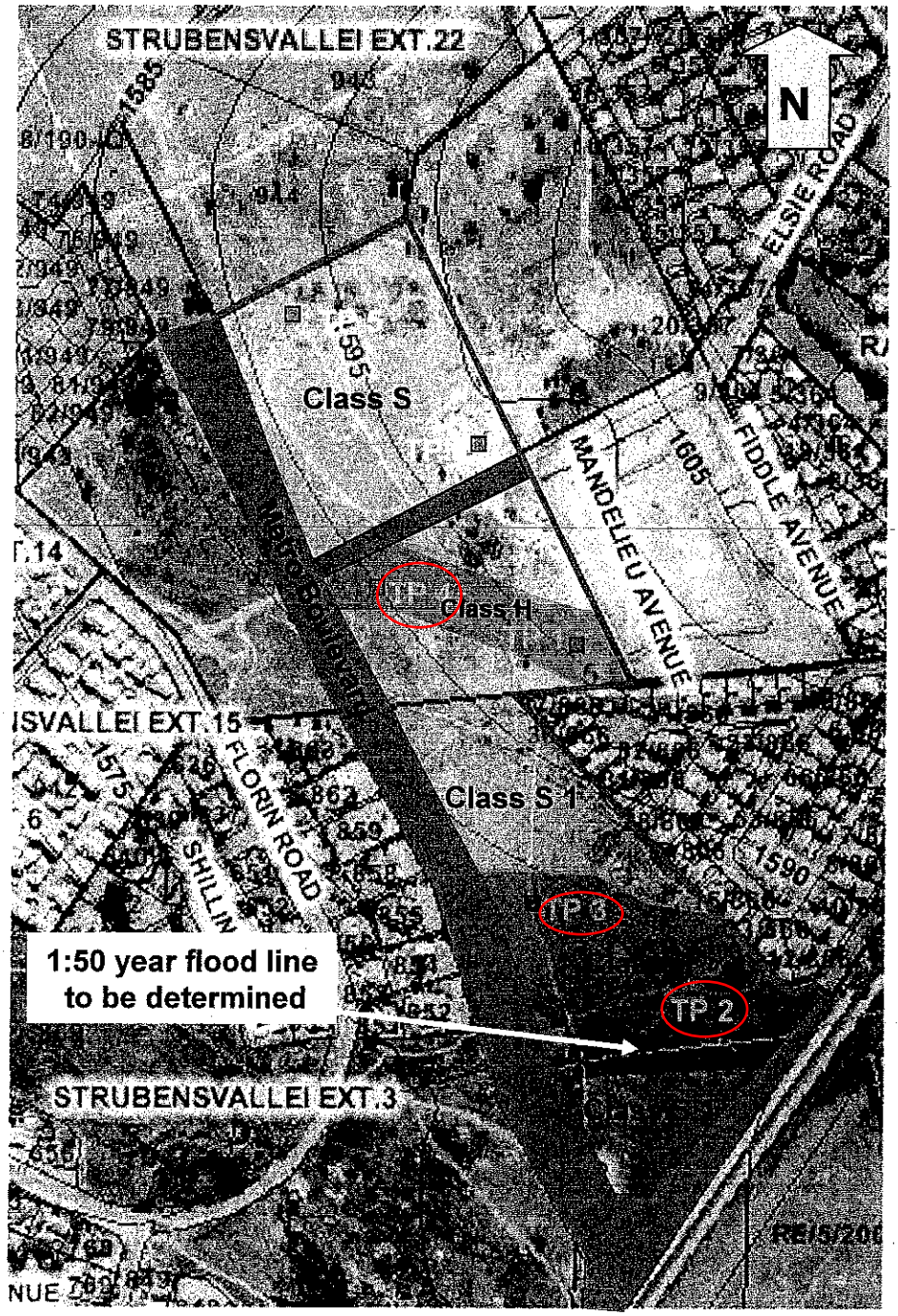
APPENDIX 1

SITE PLAN AND LOCALITY MAP



	Site Class S1	10 to 20mm consolidation settlement
	Site Class S	Less than10mm consolidation settlement
	Site Class H	Less than10mm heave movement

Not drawn to scale

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Consulting Engineering Geologists

HUNTER THERON TOWN PLANNER

PORTION 1 OF THE
FARM MADIERA 274-IQ,
ROODEPOORT

SITE PLAN

Job No: 1806

Date: MARCH 2006

Figure: 2

APPENDIX 2

TRIAL HOLE PROFILES

AFRICA EXPOSED
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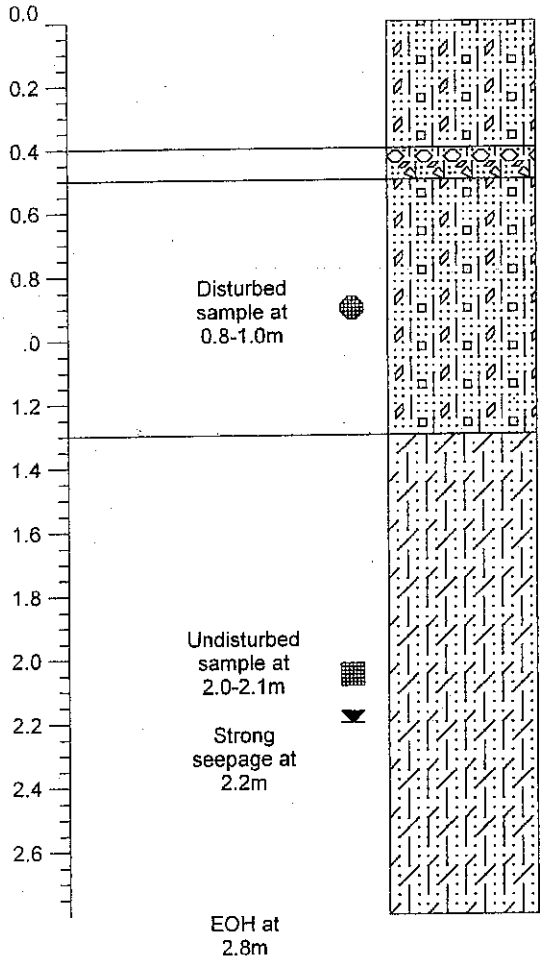
Fax: (086) 633-7332

CLIENT: Hunter Theron Town Planners
SITE: Holding 1, Madeira
HOLE No.: TP 1

DEPTH (m)	COMMENTS	LITHOLOGY	DESCRIPTIONS



SILTY SAND AND SCATTERED GRAVEL: Moist, dark greyish brown, LOOSE, intact silty sand, with scattered gravels and roots. Hillwash

GRAVEL AND SILTY SAND: Abundant, angular and sub rounded (2-50mm) quartz gravels in a matrix (± 40%) of moist, dark grey silty coarse sand. Pebble Marker. Overall consistency is MEDIUM DENSE

SILTY SAND AND SCATTERED GRAVEL: Moist to wet, light grey, mottled orange LOOSE TO MEDIUM DENSE, open textured silty and slightly clayey coarse sand, with occasional gravels. Reworked Residual Granite

SILTY CLAYEY SAND: Wet, dark orange and brown, mottled grey, SOFT TO FIRM, intact silty and sandy clay, with many well rounded spherical diabase gravels on boulders. Residual Diabase

NOTES

1. EOH refusal on boulders
2. Strong ground water seepage at 2.2m
3. Disturbed sample taken at 0.8 to 1.0m
4. Undisturbed sample taken at 2.0 to 2.1m

HOLE No.: TP 1

JOB No.:	1806	**MACHINE:**	Case 580G
DATE:	16 February 2006	**CONTRACTOR:**	Kosmos Plant Hire
PROFILED BY:	J.A	**DIAMETER:**	Trench

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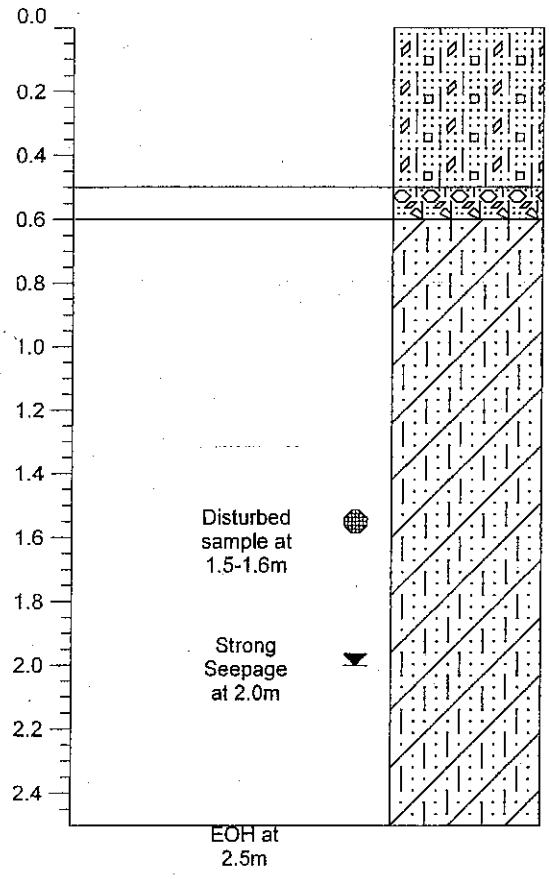
Fax: (086) 633-7332

CLIENT: Hunter Theron Town Planners
SITE: Holding 1, Madeira
HOLE No.: TP 2

DEPTH (m)	COMMENTS	LITHOLOGY	DESCRIPTIONS



SILTY SAND AND SCATTERED GRAVEL: Moist, dark greyish brown, LOOSE, intact silty sand, with scattered gravels and roots. Hillwash

GRAVEL AND SILTY SAND: Abundant, angular and sub rounded (2-50mm) quartz gravels in a matrix (± 40%) of moist, dark grey silty coarse sand. Pebble Marker. Overall consistency is MEDIUM DENSE

SILTY SANDY CLAY: Moist, becomes wet below 2.0m, dark orange grey, mottled light grey, STIFF, shattered, silty and sandy clay. Reworked Residual Granite

NOTES

1. EOH moderately hard dig
2. Strong ground water seepage at 2.0m.
3. Disturbed sample taken at 1.5-1.6m

HOLE No.: TP 2

JOB No.:	1806	**MACHINE:**	Case 580 G
DATE:	16 February 2006	**CONTRACTOR:**	Kosmos Plant Hire
PROFILED BY:	J.A	**DIAMETER:**	Trench

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CLIENT: Hunter Theron Town Planners
SITE: Holding 1, Madeira
HOLE No.: TP 4

DEPTH (m)	COMMENTS	LITHOLOGY	DESCRIPTIONS
0.0 – 0.2			SILTY SAND AND SCATTERED GRAVEL: Moist, dark red, LOOSE, intact silty sand, with scattered gravels and roots. Hillwash
0.2 – 0.4			GRAVEL AND SILTY SAND: Abundant, angular to well rounded (2-100mm) quartz gravels in a matrix (± 30%) of moist, dark red, clayey silty sand. Colluvium. Overall consistency is MEDIUM DENSE
0.4 – 1.8	Disturbed sample at 1.1-1.2m		SANDY CLAYEY SILT: Moist, dark red, FIRM, intact and relic jointed sandy clayey silt. Reworked Residual Diabase
1.8 – 2.5	EOH at 2.5m		SANDY CLAYEY SILT: Slightly moist, light orange and off white, mottled orange and speckled white streaked black, STIFF, intact and relic jointed sandy clayey silt. Residual Diabase

NOTES

1. EOH moderately hard dig
2. No ground water seepage
3. Disturbed sample taken at 1.1 to 1.2m

HOLE No.: TP 4

JOB No.:	1806	**MACHINE:**	Case 580G
DATE:	16 February 2006	**CONTRACTOR:**	Kosmos Plant Hire
PROFILED BY:	J.A	**DIAMETER:**	Trench

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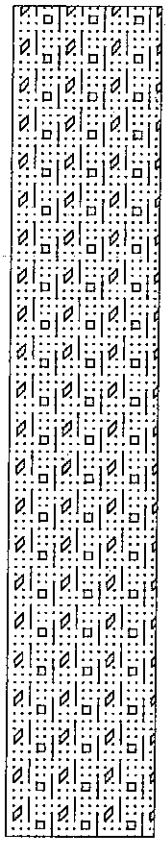
CLIENT: Hunter Theron Town Planners
SITE: Holding 1, Madeira
HOLE No.: TP 5

DEPTH (m)	COMMENTS	LITHOLOGY	DESCRIPTIONS
0.0 – 2.6	EOH at 2.6m		SILTY SAND AND SCATTERED GRAVEL: Moist, light orange mottled red and light orange, MEDIUM DENSE, relic jointed, silty coarse sand with scattered quartz and granite gravels. Reworked Residual Granite

0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
2.2
2.4

NOTES

1. EOH easy dig
2. No ground water seepage
3. No samples taken.
4. Upper transported soils removed by earthworks

HOLE No.: TP 5

JOB No.:	1806	**MACHINE:**	Case 580G
DATE:	16 February 2006	**CONTRACTOR:**	Kosmos Plant Hire
PROFILED BY:	J.A	**DIAMETER:**	Trench

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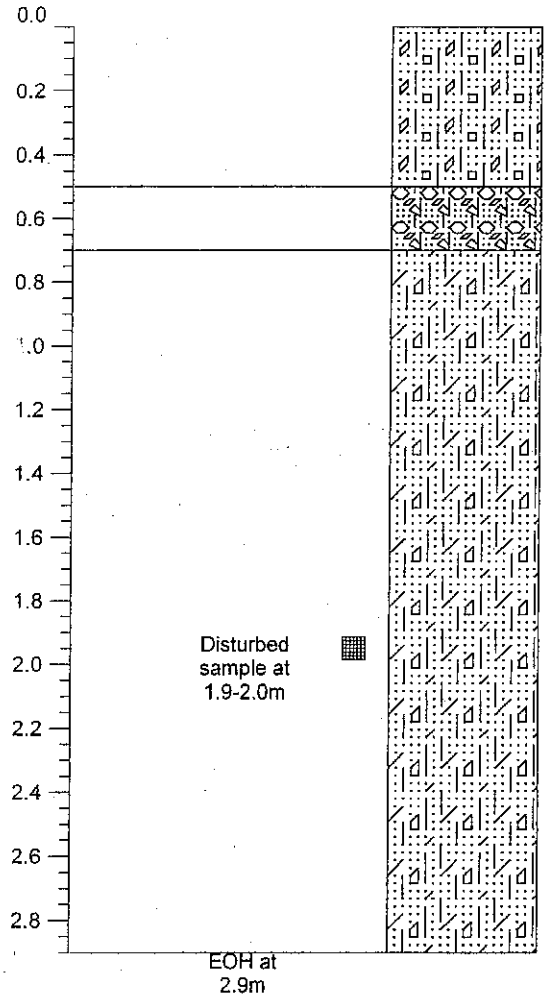
P.O. Box 68 Honeydew 2040
Tel: (083) 656-0900
Fax: (086) 633-7332

CLIENT: Hunter Theron Town Planners
SITE: Holding 1, Madeira
HOLE No.: TP 6

DEPTH (m)	COMMENTS	LITHOLOGY	DESCRIPTIONS



SILTY SAND AND SCATTERED GRAVEL: Moist, dark red, LOOSE, intact silty sand, with scattered gravels and roots. Hillwash

GRAVEL AND SILTY SAND: Abundant, angular to well rounded (2-100mm) quartz gravels in a matrix (± 30%) of moist, dark red, clayey silty sand. Colluvium. Overall consistency is MEDIUM DENSE

SILTY CLAYEY SAND WITH GRAVELS: Moist, dark red, mottled off white, LOOSE TO MEDIUM DENSE, intact and open textured silty clayey coarse sand with scattered gravels. Residual Granite

NOTES

1. EOH easy dig
2. No ground water seepage
3. Undisturbed sample taken at 1.9 to 2.0m

HOLE No.: TP 6

JOB No.:	1806	**MACHINE:**	Case 580G
DATE:	16 February 2006	**CONTRACTOR:**	Kosmos Plant Hire
PROFILED BY:	J.A	**DIAMETER:**	Trench

APPENDIX 3

LABORATORY TEST RESULTS

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COLLAPSE POTENTIAL at 100 kPa

Client	HUNTER THERUN TOWN PLANNERS		
Location	PORTION 1 MADEIRA ROODEPOORT		
Date	2006/03/07	Test No	TP 6 @ 1.9-2.0m
Job No	1806	Checked By	JA

Sample Height (mm)	19.04	Sample Diameter (mm)	75	Sample Specific Gravity	2.709

Sample Preparation	NMC

Effective Stress (kPa)	Consolidation Reading	Voids Ratio	Strain (%)
1	1000	0.417	0.000
10	9964	0.415	0.190
20	9904	0.410	0.500
50	9778	0.401	1.170
100	9636	0.390	1.910
100	9468	0.378	2.790
200	9210	0.359	4.150
400	8944	0.339	5.550
200	8966	0.340	5.430
100	8982	0.342	5.350
50	9002	0.343	5.240
20	9036	0.346	5.060
10	9056	0.347	4.960

Moisture Content Calculations

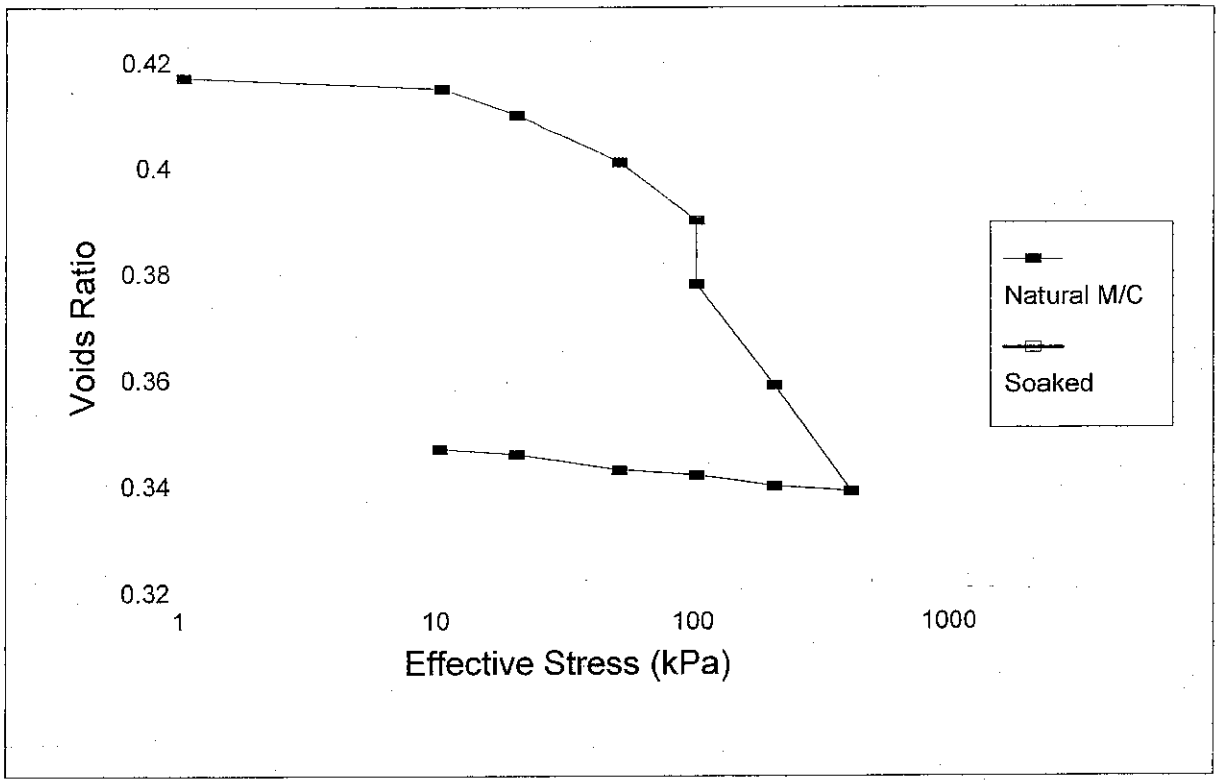
Mass wet sample plus ring before test (gms)	294.00
Mass wet sample plus ring after test (gms)	299.40
Mass dry sample plus ring (gms)	278.80
Mass ring (gms)	116.10
Moisture content before test (%)	**9.34**
Moisture content after test (%)	**12.66**

Other Data

Initial Dry Density (kg/m3)	**1911**
Initial Void Ratio	**0.40**

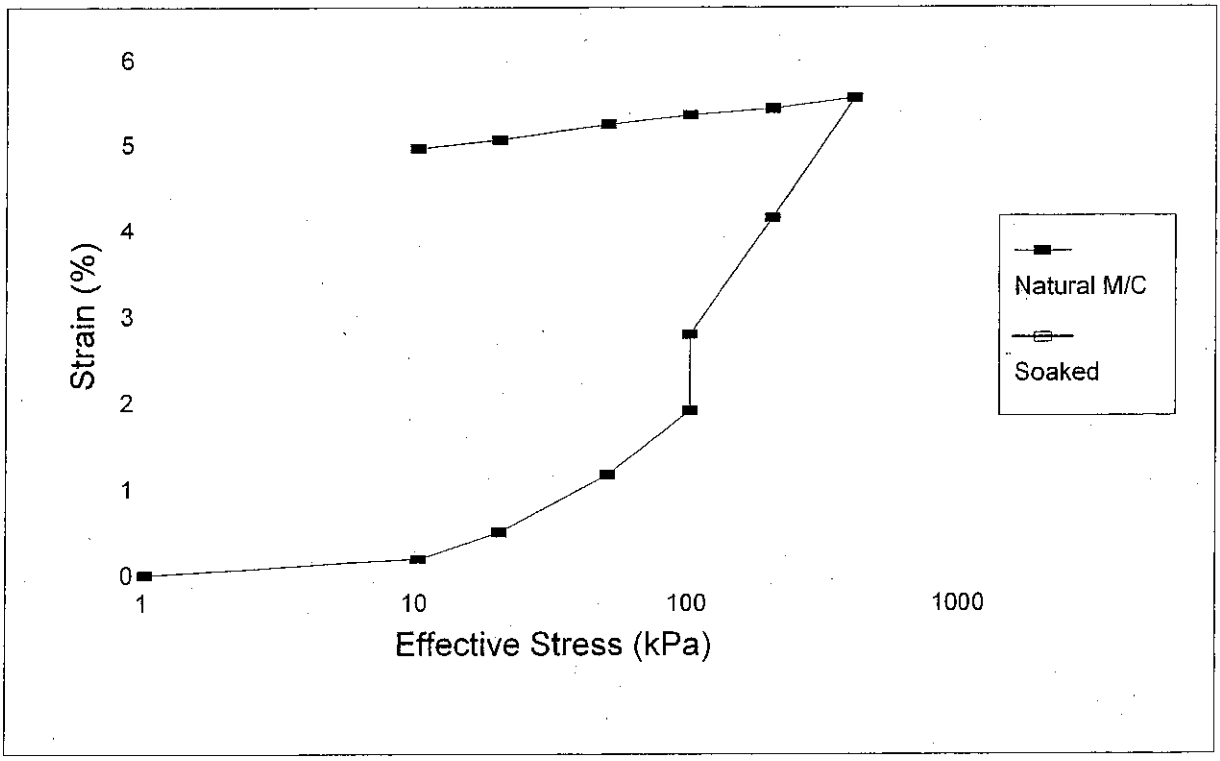
VOIDS RATIO v EFFECTIVE STRESS

Test No: TP 6 @ 1.9-2.0m



STRAIN v EFFECTIVE STRESS

Test No: TP 6 @ 1.9-2.0m



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FOUNDATION INDICATOR

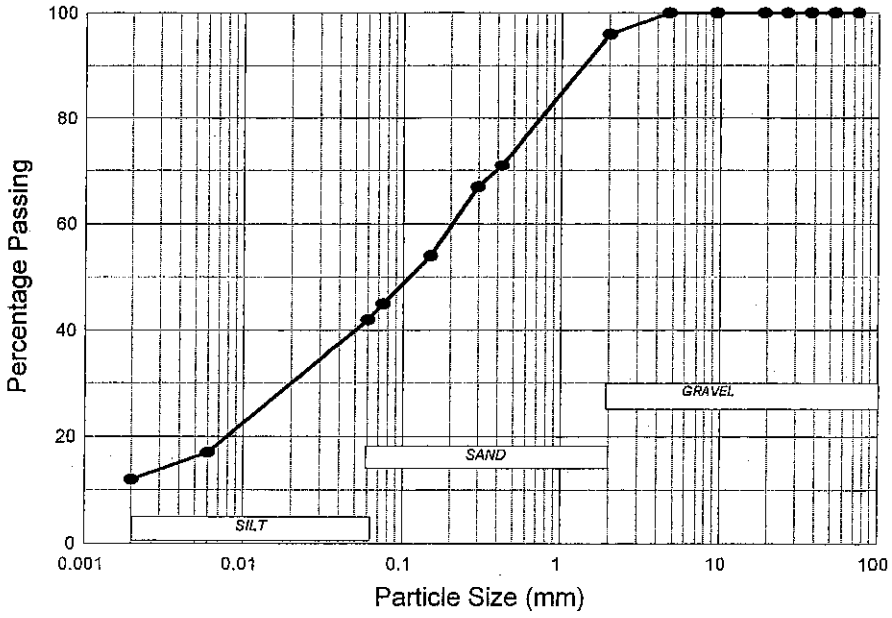
Client	HUNTER THERUN TOWN PLANNERS		
Location	PORTION 1 MADEIRA ROODEPOORT		
Date	2006/03/07	Test No	TP 1 @ 0.8-1.0m
Job No	1806	Checked By	JA

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	96.00
0.425	71.00

GRADING ANALYSIS



HYDROMETER ANALYSIS

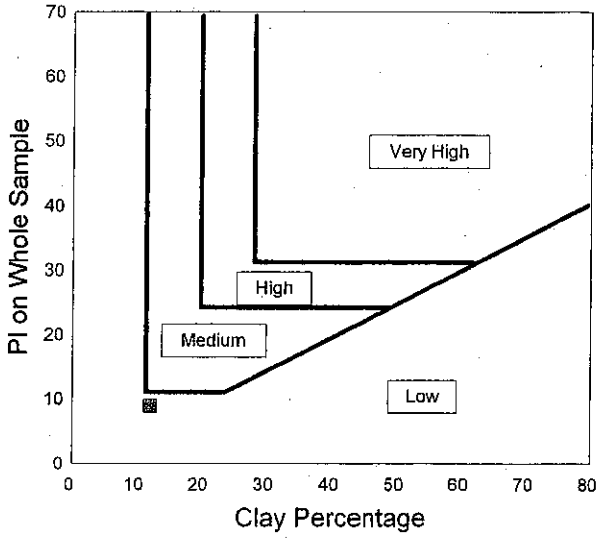
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.3000	67.00
0.1500	54.00
0.0750	45.00
0.0600	42.00
0.0060	17.00
0.0020	12.00

ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	26
Plastic Limit	13
Plastic Index	13
Linear Shrinkage	6
Grading Modulus	0.66
PI on Whole Sample	9

ACTIVITY CHART



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FOUNDATION INDICATOR

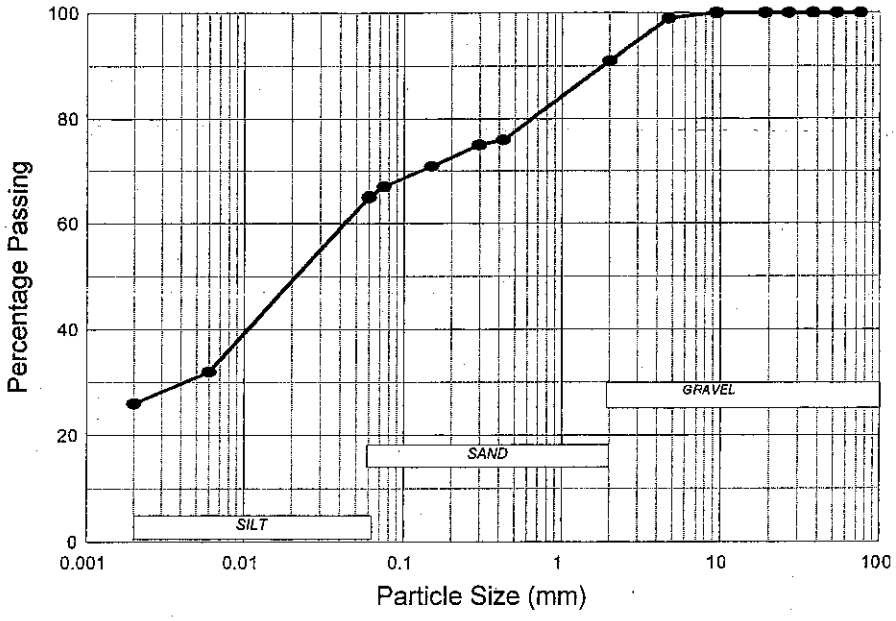
Client	HUNTER THERUN TOWN PLANNERS		
Location	PORTION 1 MADEIRA ROODEPOORT		
Date	2006/03/07	Test No	TP 1 @ 2.0 - 2.1m
Job No	1806	Checked By	JA

SIEVE ANALYSIS

Values are expressed as a percentage of total sa .

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	99.00
2.00	91.00
0.425	76.00

GRADING ANALYSIS



HYDROMETER ANALYSIS

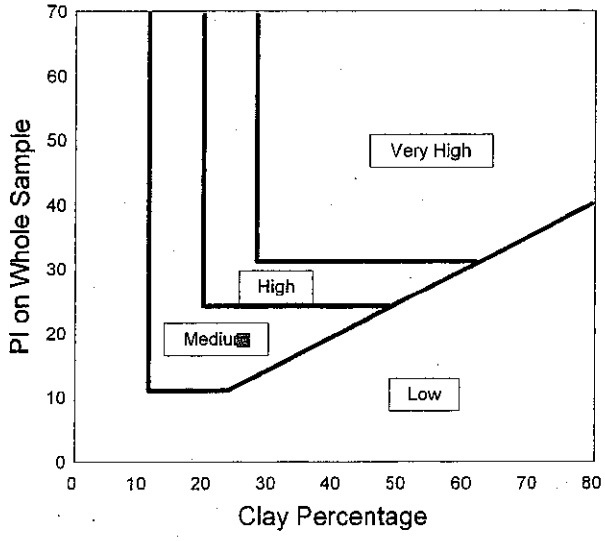
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.3000	75.00
0.1500	71.00
0.0750	67.00
0.0600	65.00
0.0060	32.00
0.0020	26.00

ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	46
Plastic Limit	21
Plastic Index	25
Linear Shrinkage	11
Grading Modulus	0.58
PI on Whole Sample	19

ACTIVITY CHART



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FOUNDATION INDICATOR

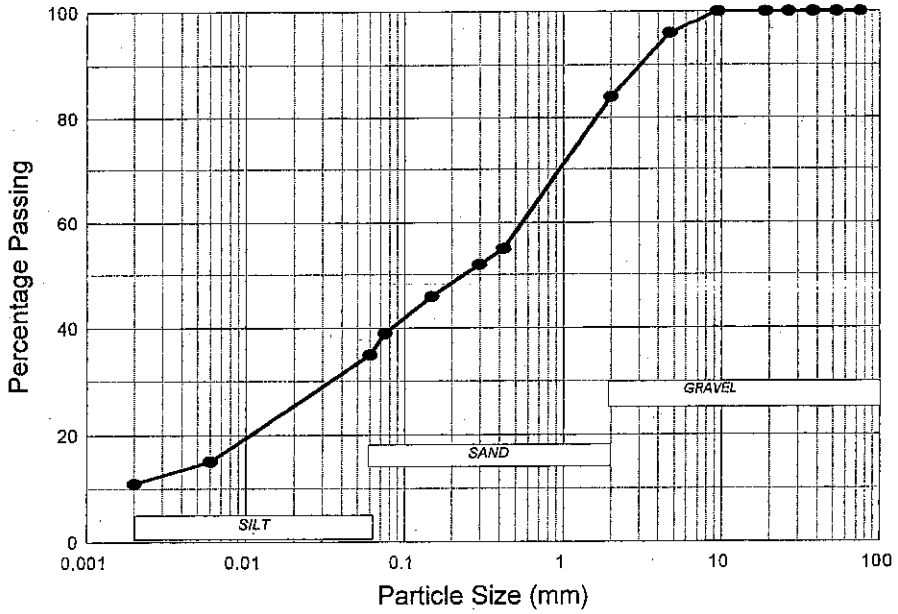
Client	HUNTER THERUN TOWN PLANNERS		
Location	PORTION 1 MADEIRA ROODEPOORT		
Date	2006/03/07	Test No	TP 2 @ 1.5-1.6m
Job No	1806	Checked By	JA

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	96.00
2.00	84.00
0.425	55.00

GRADING ANALYSIS

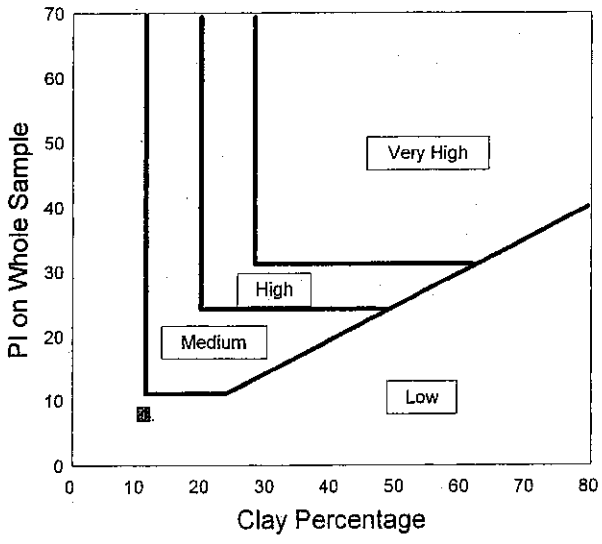


HYDROMETER ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.3000	52.00
0.1500	46.00
0.0750	39.00
0.0600	35.00
0.0060	15.00
0.0020	11.00

ACTIVITY CHART



ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	31
Plastic Limit	16
Plastic Index	14
Linear Shrinkage	6
Grading Modulus	1.09
PI on Whole Sample	8

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FOUNDATION INDICATOR

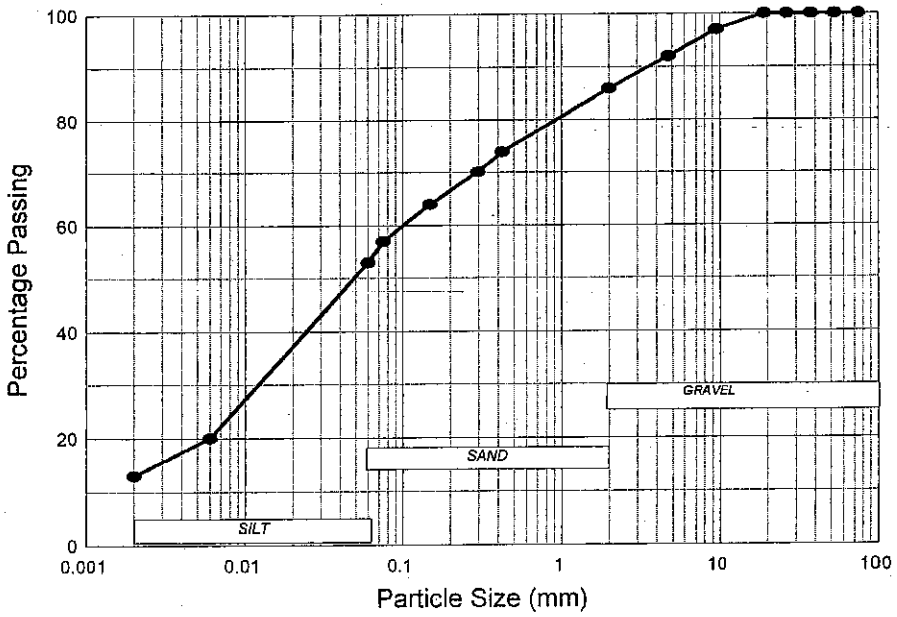
Client	HUNTER THERUN TOWN PLANNERS		
Location	PORTION 1 MADEIRA ROODEPOORT		
Date	2006/03/07	Test No	TP 4 @ 1.1-1.2m
Job No	1806	Checked By	JA

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	97.00
4.75	92.00
2.00	86.00
0.425	74.00

GRADING ANALYSIS

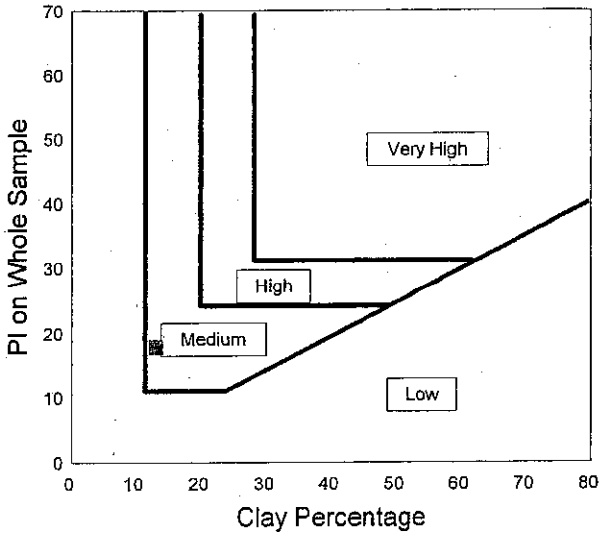


HYDROMETER ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.3000	70.00
0.1500	64.00
0.0750	57.00
0.0600	53.00
0.0060	20.00
0.0020	13.00

ACTIVITY CHART



ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	41
Plastic Limit	17
Plastic Index	24
Linear Shrinkage	10
Grading Modulus	0.70
PI on Whole Sample	18

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FOUNDATION INDICATOR

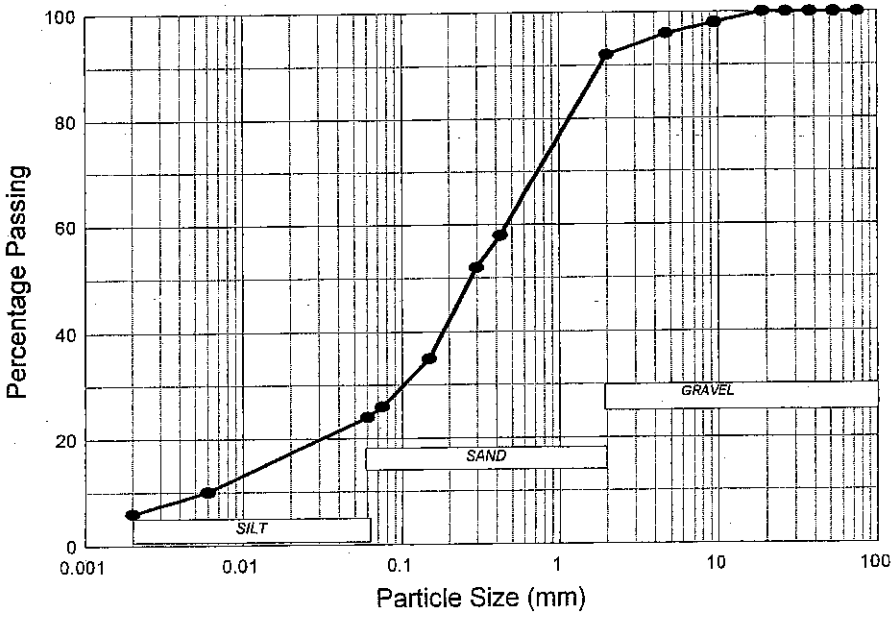
Client	HUNTER THERUN TOWN PLANNERS		
Location	PORTION 1 MADEIRA ROODEPOORT		
Date	2006/03/07	Test No	TP 6 @ 1.9 - 2.0m
Job No	1806	Checked By	JA

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	98.00
4.75	96.00
2.00	92.00
0.425	58.00

GRADING ANALYSIS



HYDROMETER ANALYSIS

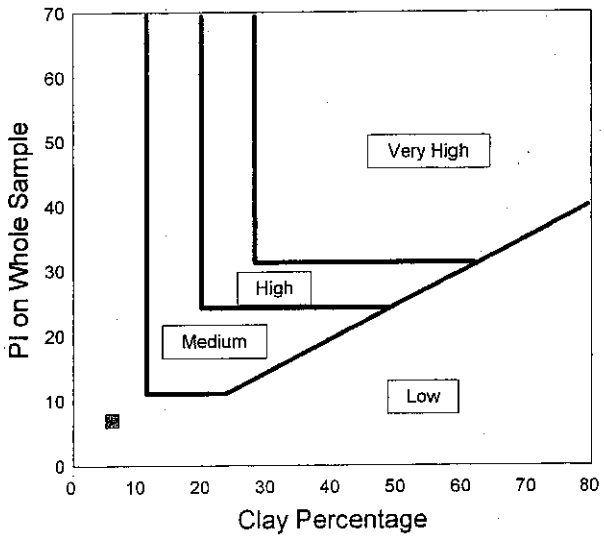
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.3000	52.00
0.1500	35.00
0.0750	26.00
0.0600	24.00
0.0060	10.00
0.0020	6.00

ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	31
Plastic Limit	12
Plastic Index	19
Linear Shrinkage	6
Grading Modulus	0.98
PI on Whole Sample	7

ACTIVITY CHART



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SINGLE OEDOMETER CONSOLIDATION - SOAKED AT 10kPa

Client	HUNTER THERUN TOWN PLANNERS		
Location	PORTION 1 MADEIRA ROODEPOORT		
Date	2006/03/07	Test No	TP 1 @ 2.0-2.1m
Job No	1806	Checked By	JA

Sample Height (mm)	19.04	Sample Diameter (mm)	75	Sample Specific Gravity	2.628

Sample Preparation	NMC

Effective Stress (kPa)	Consolidation Reading	Voids Ratio	Strain (%)
10	9924	0.896	0.400
10	1004	0.904	-0.020
20	9822	0.886	0.930
50	9384	0.842	3.420
100	8720	0.775	6.720
200	8046	0.708	10.260
400	7194	0.623	14.74
800	6058	0.509	20.700
1600	4764	0.380	27.500
800	4806	0.384	27.280
400	4854	0.389	27.030
200	4914	0.395	26.710
100	4942	0.398	26.570
50	4982	0.402	26.360
20	5018	0.405	26.17
10	5066	0.41	25.91

Moisture Content Calculations

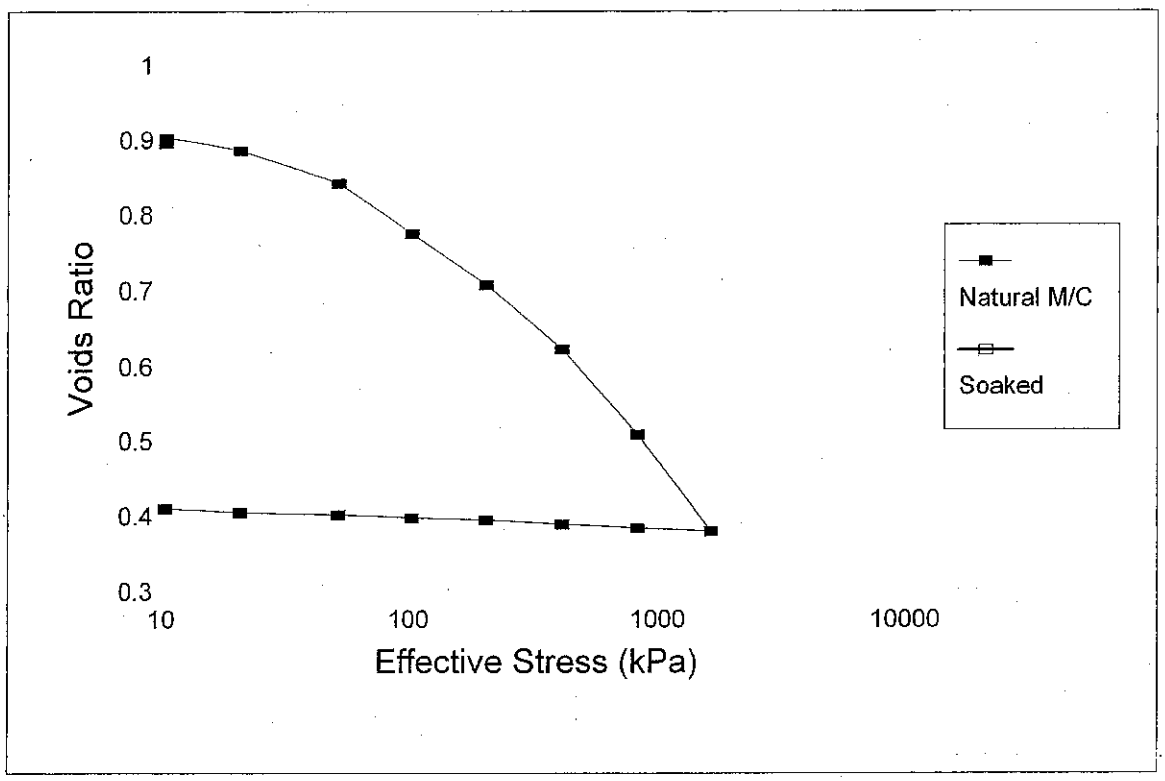
Mass wet sample plus ring before test (gms)	252.50
Mass wet sample plus ring after test (gms)	251.90
Mass dry sample plus ring (gms)	234.00
Mass ring (gms)	117.60
Moisture content before test (%)	**15.89**
Moisture content after test (%)	**15.38**

Other Data

Initial Dry Density (kg/m3)	**1384**
Initial Void Ratio	**0.90**

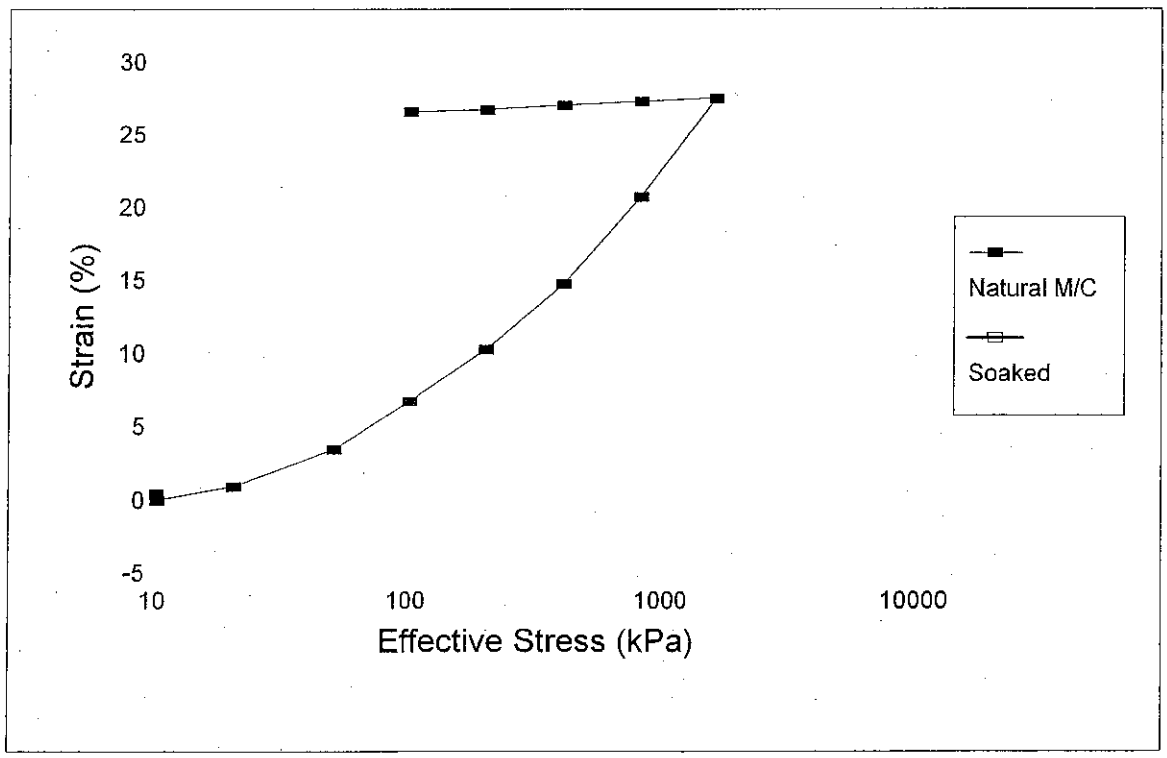
VOIDS RATIO v EFFECTIVE STRESS

Test No: TP 1 @ 2.0-2.1m



STRAIN v EFFECTIVE STRESS

Test No: TP 1 @ 2.0-2.1m



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COLLAPSE POTENTIAL at 100 kPa

Client	HUNTER THERUN TOWN PLANNERS		
Location	PORTION 1 MADEIRA ROODEPOORT		
Date	2006/03/07	Test No	TP 6 @ 1.9-2.0m
Job No	1806	Checked By	JA

Sample Height (mm)	19.04	Sample Diameter (mm)	75	Sample Specific Gravity	2.709

Sample Preparation	NMC

Effective Stress (kPa)	Consolidation Reading	Voids Ratio	Strain (%)
1	1000	0.417	0.000
10	9964	0.415	0.190
20	9904	0.410	0.500
50	9778	0.401	1.170
100	9636	0.390	1.910
100	9468	0.378	2.790
200	9210	0.359	4.150
400	8944	0.339	5.550
200	8966	0.340	5.430
100	8982	0.342	5.350
50	9002	0.343	5.240
20	9036	0.346	5.060
10	9056	0.347	4.960

Moisture Content Calculations

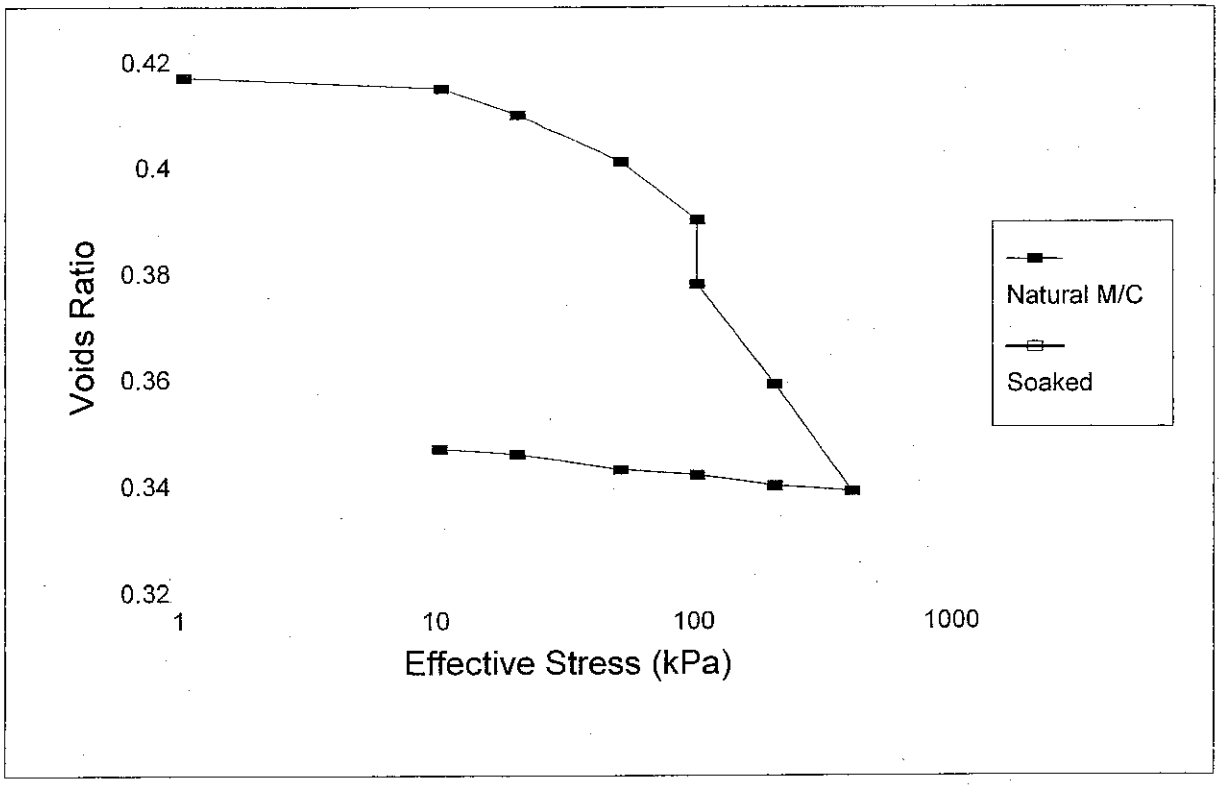
Mass wet sample plus ring before test (gms)	294.00
Mass wet sample plus ring after test (gms)	299.40
Mass dry sample plus ring (gms)	278.80
Mass ring (gms)	116.10
Moisture content before test (%)	**9.34**
Moisture content after test (%)	**12.66**

Other Data

Initial Dry Density (kg/m3)	**1911**
Initial Void Ratio	**0.40**

VOIDS RATIO v EFFECTIVE STRESS

Test No: TP 6 @ 1.9-2.0m



STRAIN v EFFECTIVE STRESS

Test No: TP 6 @ 1.9-2.0m