Appendix D3 – GEOTECHNICAL REPORT

REPORT

ON THE

ENGINEERING GEOLOGICAL INVESTIGATION OF

THE PROPOSED DEVELOPMENT ON

ERF 2614, JABULANI EXTENSION 1 (PARCEL K)

C H BADENHORST: GEOTECHNICAL INVESTIGATOR

PO BOX 16738

DOWERGLEN 1612

TEL (011 453-6282

FAX (011) 453-6282

CELL: 082 441 7309

FEBRUARY 2010

CLIENT: CALGRO M3 LAND (Pty) LTD

INDEX

CONTENTS

		Page
1.	INTRODUCTION	1
2.	AVAILABLE INFORMATION	1
3.	LOCALITY AND SITE DESCRIPTION	1
4.	TOPOGRAPHY AND DRAINAGE	2
5.	METHOD OF INVESTIGATION	2
6.	GEOLOGY AND SOIL PROFILE	2
7.	GEOHYDROLOGY	2
8.	LABORATORY TEST RESULTS	3
9.	ENGINEERING GEOLOGICAL ZONING	5
10.	GEOTECHNICAL CONSIDERATIONS	6
11.	ZONING FOR TOWNSHIP ESTABLISHMENT	6
12.	CONCLUSIONS AND RECOMMENDATIONS	7

Figure 1:	Site location plan
Figure 2:	Site development plan
Figure 3:	Geology plan of area
Figure 4:	Test pit positions
Annexure A:	Soil profiles
Annexure B:	Laboratory test results

REPORT ON THE ENGINEERING GEOLOGICAL INVESTIGATION OF THE PROPOSED DEVELOPMENT ON ERF 2614, JABULANI EXTENSION 1 (PARCEL K)

1. INTRODUCTION:

C H Badenhorst was appointed by Calgro M3 Land (Pty) Ltd to do a basic GFSH 2 - Phase 1 engineering geological investigation report on the above mentioned property for a proposed development. The investigation was undertaken according to the normal requirements for township proclamation to assess the suitability of the site for housing development (Guidelines for Urban Engineering Geological Investigation 1997) and GFSH-2 (Greenfield Subsidy Housing-2) document.

The following aspects are addressed in this report:

1.1 Geology and soil profiles
1.2 Geohydrology
1.3 Foundation conditions and recommendations

2. AVAILABLE INFORMATION

The following information was available: Site location plan (Figure 1), site development plan (Figure 2), geology plan from the Council for Geosciences (Figure 3), and test pit positions (Figure 4).

3. LOCALITY AND SITE DESCRIPTION

See the attached figure 1.

4. TOPOGRAPHY AND DRAINAGE

The site drains well by means of sheet wash in a south westerly direction. No water tables were found during the investigation. The gradient is flat.

5. METHOD OF INVESTIGATION

The area of the township is 12,9335 Ha. Twelve (12) test pits were randomly dug with a TLB, and the soil profiles were described according to the standard method proposed by Jennings, Brink and Williams (1973). The test pit positions are marked on Figure 4.

Disturbed samples of the most prominent soil horizons were taken and submitted for foundation indicator, and CBR tests.

All test results are attached as Annexure B.

6. GEOLOGY AND SOIL PROFILE

The East Rand 1:250000 Geological Series Map and a map obtained from the Council for Geosciences (Figure 3), shows that the site is underlain by basaltic lava, agglomerate, tuff, and feldspar porphyry of the Alberton formation, part of the Klipriviersberg Group, and the Ventersdorp Supergroup.

Ferricrete, shale, quartzitic sandstone, and some andesite was found in the twelve test pits, and was recorded in the attached soil profiles included as Annexure A.

7. GEOHYDROLOGY

No ground or surface water was encountered during the investigation. The test pits all remained dry.

8. LABORATORY TEST RESULTS

The laboratory test results are attached as Annexure B, and are summarized as follows:

8.1 Indicator test results:

MATERIAL	PI	% Clay	% Silt	% Sand	% Gravel
Red orange, silty, sandy gravel	22	4	15	24	57
Yellow orange, silty, sandy gravel	17	2	14	15	57
Red orange, gravely, sandy silt	20	8	47	26	19
Red orange, silty, sandy gravel	26	9	17	24	50
Red orange, silty, sandy gravel	18	7	16	22	55
Red brown, clayey, sandy silt	23	18	54	23	5
Red brown, sandy, silty gravel	27	7	36	12	45
Dark brown, clayey, sandy, silty gravel	28	15	33	19	33
Yellow orange, silty gravel	16	2	18	9	71
Dusky red, clayey, silty, sandy gravel	21	11	14	28	47
Dusky red, silty, clayey, gravely sand	14	20	20	36	24
Red brown, sandy, gravely silt	21	6	49	19	26

8.2 Potential expansiveness

The potential expansiveness of the materials encountered on the site was calculated according to the method proposed by Van der Merwe (1964). The following material characteristics are considered when applying this method:

- Clay content of more than 12%.
- Plasticity index of more than 12.
- Liquid limit of more than 30%.
- Linear shrinkage of more than 8%.

The method of Van der Merwe (1964) was used to determine the potential heave of soil samples. In addition to Van der Merwe's method, the plasticity index and linear shrinkage of soil samples were used to indicate the soils potential expansiveness.

From the laboratory test results the potential expansiveness of the soils on the site is **considered as low to medium**.

8.3 Excavatability of ground

Excavatability is defined as the ease with which the ground can be dug to a depth of 1,5m. This is of importance for urban development as increased costs are associated with installing services or foundations in areas where difficulty is experienced with excavation. According to the test pits dug no real excavatibility constraints are expected on the site if excavation should exceed one meter. The TLB did refuse in 3 test pits at a depth of 1.2 and 1.4m.

8.4 Collapse potential

Collapsible soils are soils, which can withstand relatively large imposed stresses with small settlements at low in situ moisture content but will decrease in volume causing relatively larger settlements when wetting occurs under a load. This volume change is associated with a change in the structure of the soil and can occur in any open structured silty sandy soils with a high void ratio. Collegial soils situated on straight slopes, plains and residual soil are well drained and exhibit a low collapsibility.

8.5 Erodibility

The erosion of soils is a function of the resistance of slope materials to entrainment and transport, and the potential of slope processes that promotes erosion. The resistance of soil to erosion is also related to the mechanical strength, cohesion and particle size of the material self. There was no erosion on site.

8.6 Dispersivity

A dispersive soil is prone to the desegregation or separation of clay particles from the soil mass on contact with water. These soils can be identified in the field by the presence of erosion gullies, piping and areas of stunted growth. The Emerson Crumb test can be used to identify the dispersivity of soil samples by determining the tendency of soil particles to deflocculate and go into suspension. There was no visual evidence of dispersivity on this site.

8.7 Ground slope instability

This refers to an area comprising unstable geological materials that can move either gradually (creep) or suddenly as a slump or a slide. The risk of movement is determined by factors such as the nature of the slope (solid rock, colluvial material), gradient of slope, role of water, type and nature of vegetation cover, seismicity and impact of human activities such as undermining of a slope. No such characteristics were observed on the site and the gradient of slope is gentle and flat.

8.8 California Bearing Ratio Tests (CBR)

Six (6) CBR tests were done and the results varied between 4 & 20% @ 95% Mod AASHTO, reflecting ***very low to medium bearing capacities of 40 to 200 Kpa.***

The material graded from as G.7 to G.10, which means that ***all the material for upper selected road layer materials will have to be imported.***

9. ENGINEERING GEOLOGICAL ZONING

Due to the high Plasticity Indexes, the NHBRC site zoning is:

Site Classes C/C1 and H1 (See soil profiles)

10. GEOTECHNICAL CONSIDERATIONS

The following geotechnical considerations that could influence the proposed development were identified:

10.1 Founding of structures – ***Site Class C: Normal strip footings is considered suitable for small single storey foundations. Foundations for larger single storey and/or double storey structures will have to be reinforced according to the type of structure to be constructed, and has to be determined by the Structural Engineer. Site Classes C1 and H1: Strip footings with reinforcement according to type of building, and as instructed by the Structural Engineer.***

10.1 Excavatability: Reasonably easy to excavate. The TLB did refuse in three test pits - See the soil profiles attached. Excavations for bulk services should not be difficult, and ***no blasting operations are foreseen.***

10.2 Soil classification: The materials classified as sandy loam, & sandy clay loam.

10.3 Groundwater: No ground water was encountered in any of the test pits.

10.4 Stability of slopes and excavations: No instability occurred.

10.5 An exact flood-line should be determined, but in this report it is suggested that 1:50 year flood-line is adopted.

11. ZONING FOR TOWNSHIP ESTABLISHMENT

The site was zoned according to the National Home Builders Registration Council's Standards and Guidelines. Based on the NHBRC standards and guidelines and the geotechnical considerations the site is zoned as follows: ***NHBRC Site Classes C/C1, and H1. See the soil profiles attached.***

12. CONCLUSIONS AND RECOMMENDATIONS

It is important to note that the recommendations are based primarily on the profiling of test pits and the interpolation of information between test pits. It is therefore possible that variations from the expected conditions can occur.

12.1 Foundations – **Site Class** ***C: Normal strip footed foundations are recommended to be applied for small single storey structures, but for any larger or double storey structures reinforced footings will be required according to the requirements, and has to be determined by the Structural Engineer. Site classes C1 and H1: Reinforcement necessary as instructed by the Structural Engineer.*** The bottoms of all excavations should be well compacted, and possible over – excavations (depending on the Engineer's decision) must be back-filled with suitable material, compacted in 100 mm layers to at least 95 % of Mod AASHTO density at -1% to +2% of optimum moisture content.

12.2 Excavatability: No problems are foreseen - See attached soil profiles.

12.3 Geohydrology: Excavations are to be provided with adequate drainage.

12.4 Construction material: The decomposed and soft weathered rock found on this site ***is suitable as fill for floor slabs, as well as for lower selected road layers.*** Provision must be made to over excavate and backfill the layers where excessive roots and vegetation may occur.

12.5 Stability of excavations: Excavations will be stable.

C H Badenhorst Pr. Tech. (Eng.) (Civil)

Reg nr 9170001

jabulaniparcelK

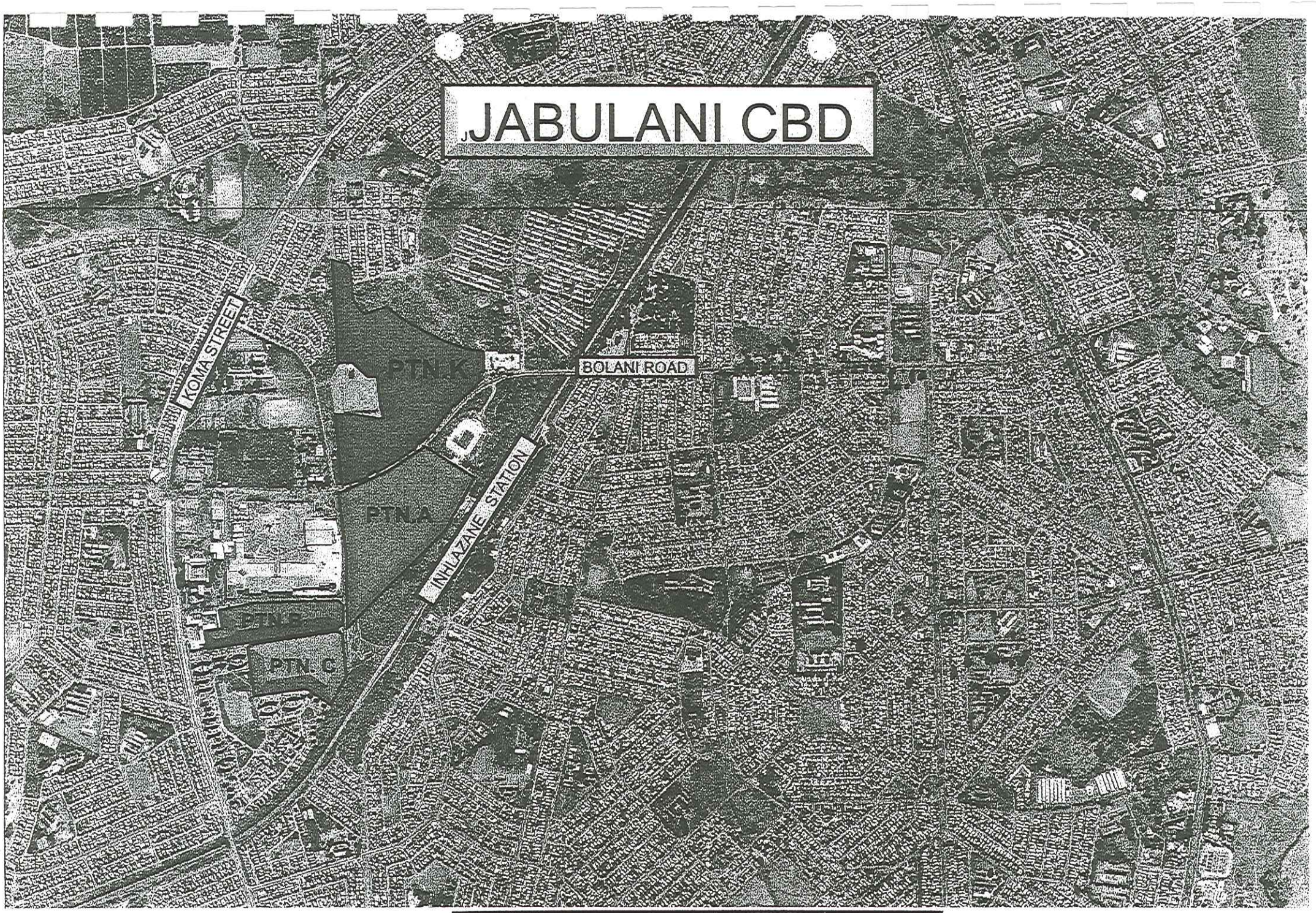


FIGURE 1 - SITE LOCATION PLAN

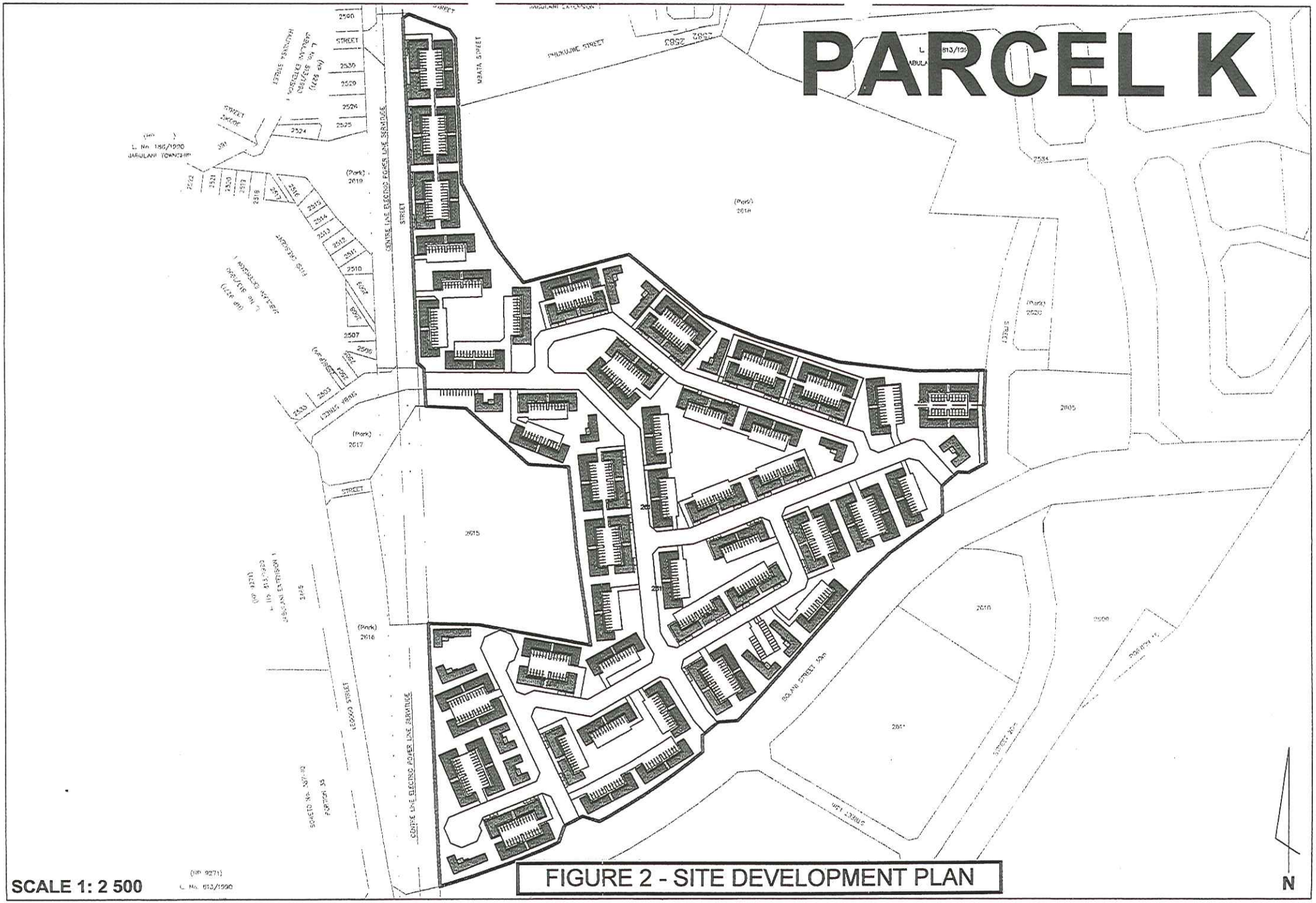


FIGURE 2 - SITE DEVELOPMENT PLAN

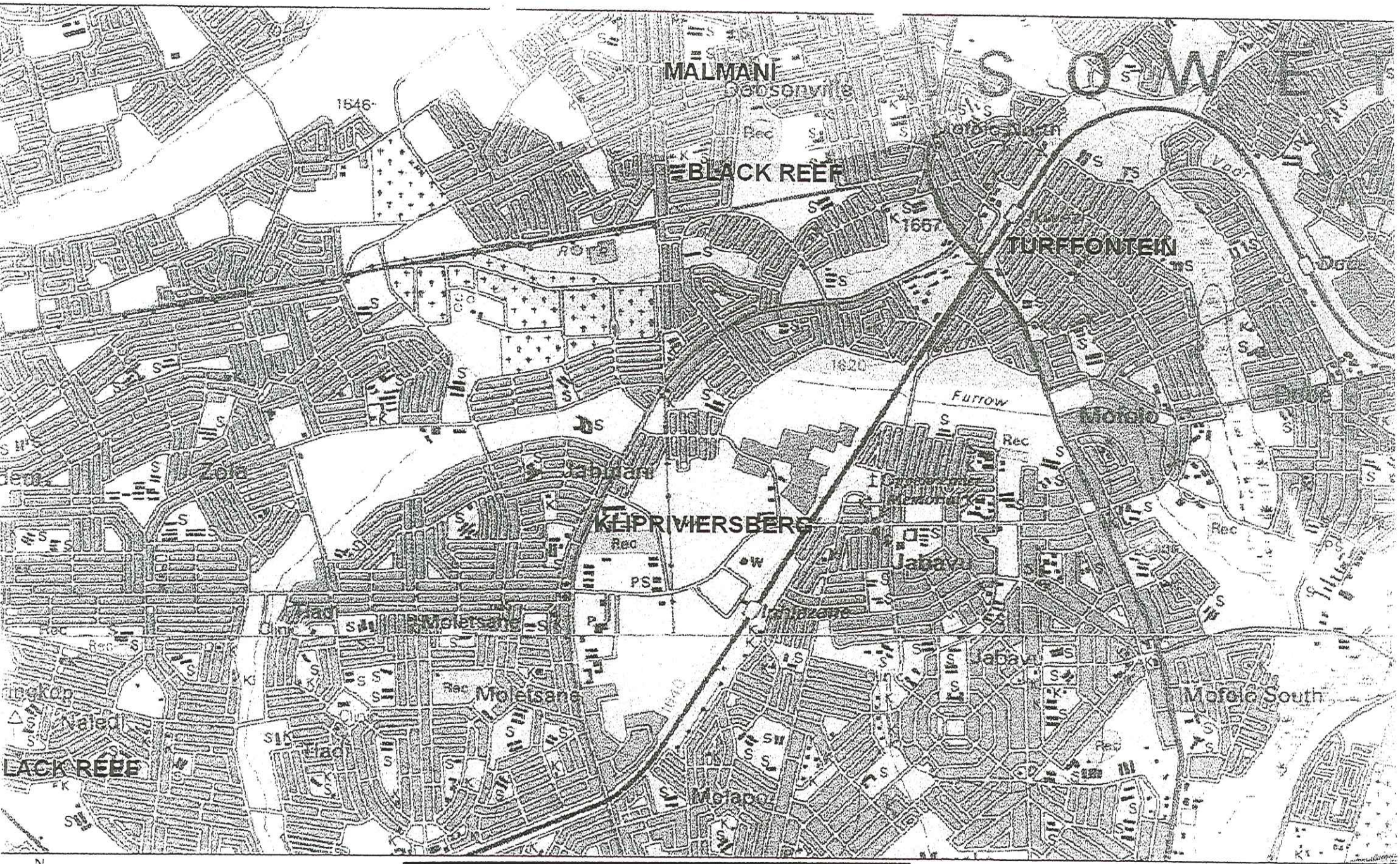


FIGURE 3 - GEOLOGY PLAN OF AREA

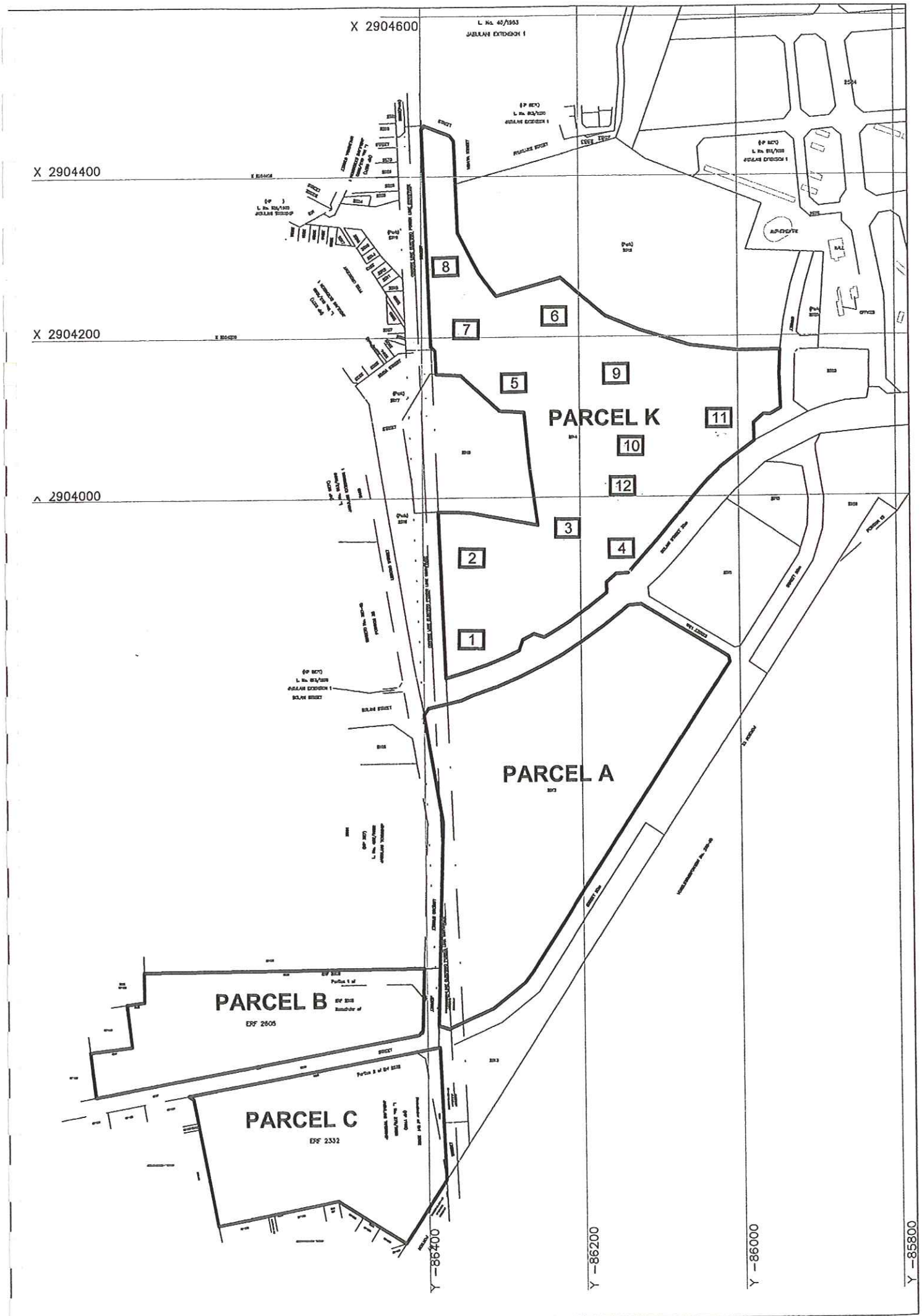


FIGURE 4 - TEST PIT POSITIONS

Annexure A

SOIL PROFILING

PROJECT:	Jabulani Precinct Development	DATE PROFILED :	23/11/2009
SITE:	Parcel K	LOGGED BY:	Julian
		MACHINE:	TLB
TEST PIT:	1	CO-ORDINATES:	X-2904592 Y-085891

Sample No.	Depth (mm)	Description of Sample
	0	
	50	Slightly Moist, Dark Brown, Loose, Intact, Transported, Silty, Gravely Sand with Grass Roots
	100	
	150	
	200	
	250	Moist, Dark Brown, Blotched Dark Orange to Red, Loose, Intact, Transported, Silty, Gravely Sand
	300	with Fine Roots & Small to Large Angular Cobbles
	350	
	400	
	450	
	500	
	550	
	600	
	650	
	700	
4018	750	Moist, Dark Yellow Brown, Blotched Dark Red, Speckled Black, Loose, Intact, Reworked Residual
	800	Silty, Sandy Gravel (Ferricrete)
	850	**CBR = 16% @ 95% Mod - G.8 / Site Class = C.1**
	900	
	950	
	1000	
4019	1050	Slightly Moist, Pale Light Yellow Brown, Blotched Light Orange to Red, Speckled Black, Soft, Fissured
	1100	Residual, Silty, Sandy Gravel (Soft Weathered Shale)
	1150	**Site Class = C**
	1200	
	1250	
	1300	
	1350	
	1400	
	1450	
	1500	
	1550	
	1600	
	1650	
	1700	
	1750	
	1800	
	1850	
	1900	
	1950	
	2000	
	2050	
	2100	
	2150	Refusal @ Depth of 1200mm on Very Dense Shale
	2200	Sidewalls Stable
	2250	No Watertable

C.H.Badenhorst (Geotechnical Investigator) P.O.Box 16738, DOWERGLEN P/f 011 453-6282

Civil Engineering Materials Laboratory

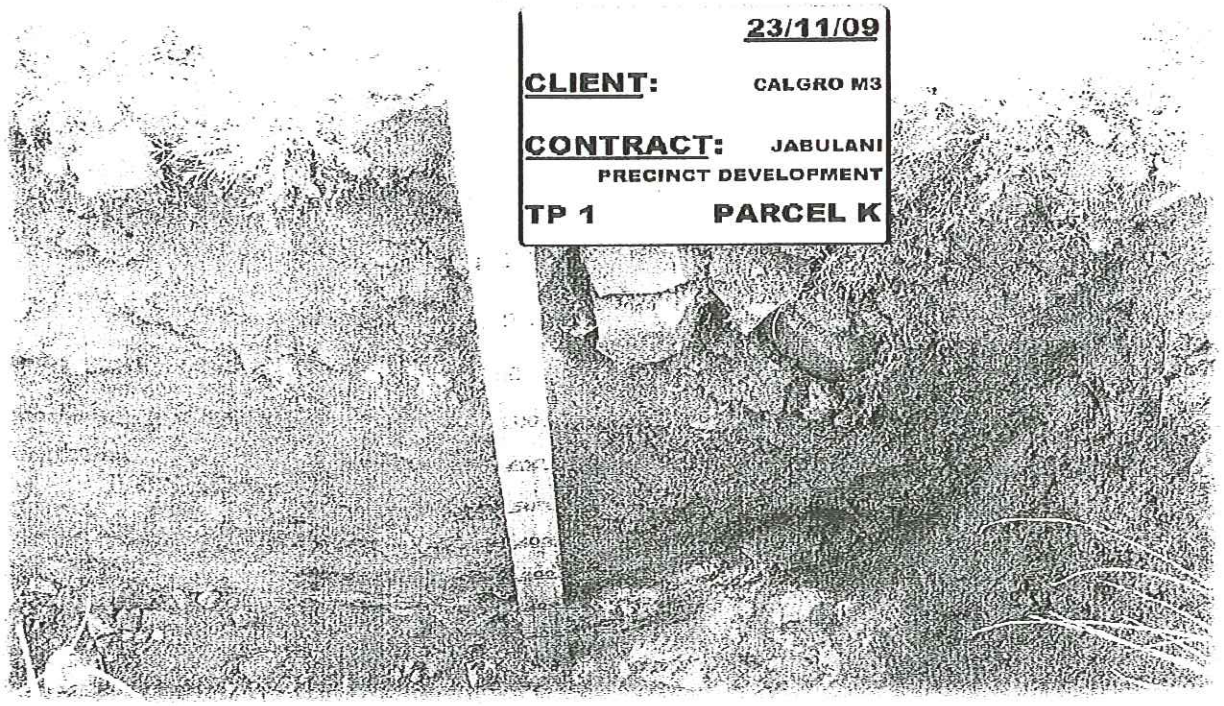
ROADLAB

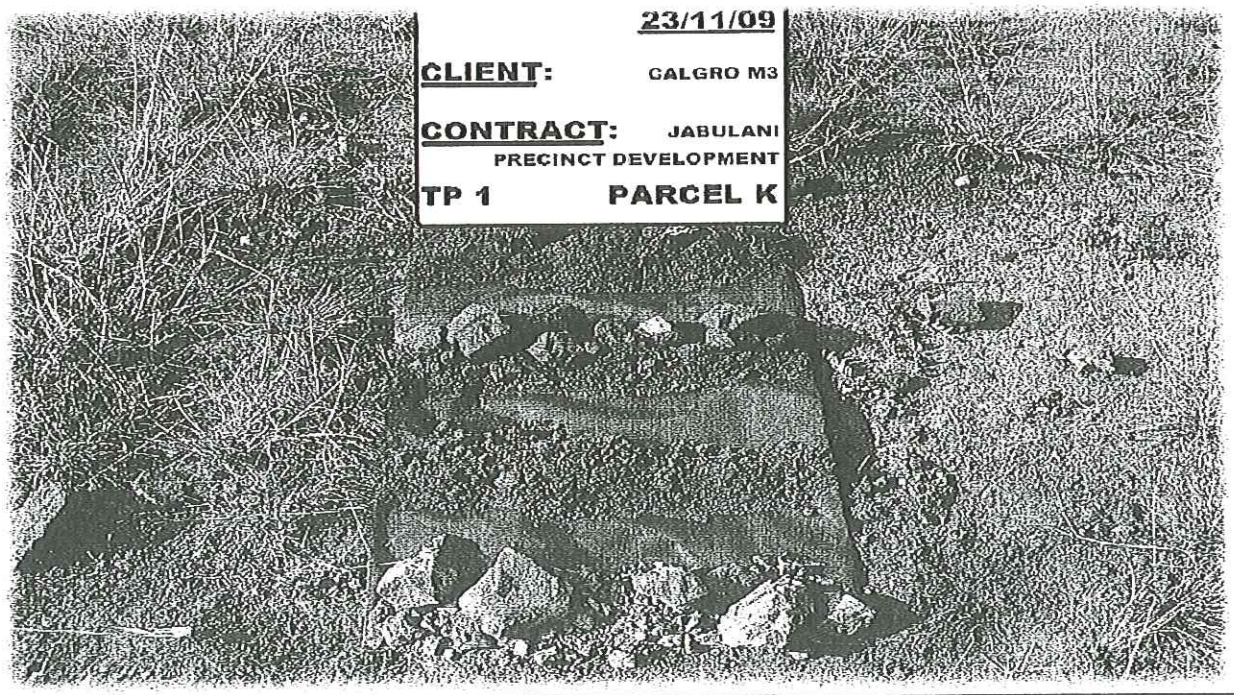
(PTY) LTD (EDMS) BPK Reg. No 65/08083/07
VAT No. 4790192266

HEAD OFFICE
168 RIETFONTEIN RD, PRIMROSE
P.O. BOX 1476, GERMISTON, 1400
TEL: 011 828 0279
FAX: 011 828 0273
www.roadlab.co.za
info@roadlab.co.za

41 YEARS. Est. 1965

CENTERLINE INVESTIGATION





Annexure A

SOIL PROFILING

PROJECT:	Jabulani Precinct Development	**DATE PROFILED :**	23/11/2009
SITE:	Parcel K	**LOGGED BY:**	Julian
		MACHINE:	TLB
TEST PIT:	2	**CO-ORDINATES:**	X-2904471 Y-085869

Sample No.	Depth (mm)	Description of Sample
	0	
	50	
	100	Slightly Moist, Dark Brown, Loose, Intact, Transported, Silty Sand with Grass Roots
	150	
	200	
	250	
	300	
	350	
	400	
	450	
	500	Moist, Dark Brown, Blotched Dark Orange to Red, Loose, Intact, Transported, Silty, Clayey, Gravely
	550	Sand, with Fine Roots & Small to Very Large Rock Angular Cobbles
	600	
	650	
	700	
	750	
	800	
	850	
	900	
	950	
	1000	
	1050	
	1100	
	1150	
	1200	
	1250	
	1300	
4020	1350	Slightly Moist, Light Red Brown, Loose, Intact, Residual, Gravely Sandy Silt, with Scattered Small
	1400	to Large Sub Rounded Hard Rock Cobbles (Ferricrete & Soft Wheathered Shale)
	1450	**CBR = 17% @ 95% Mod - G.8 / Site Class = C.1**
	1500	
	1550	
	1600	
	1650	
	1700	
	1750	
	1800	
	1850	
	1900	
	1950	
	2000	
	2050	
	2100	
	2150	No Refusal
	2200	Sidewalls Stable
	2250	No Watertable

C.H.Badenhorst (Geotechnical Investigator) P.O.Box 16738, DOWERGLEN P/f 011 453-6282

Civil Engineering Materials Laboratory

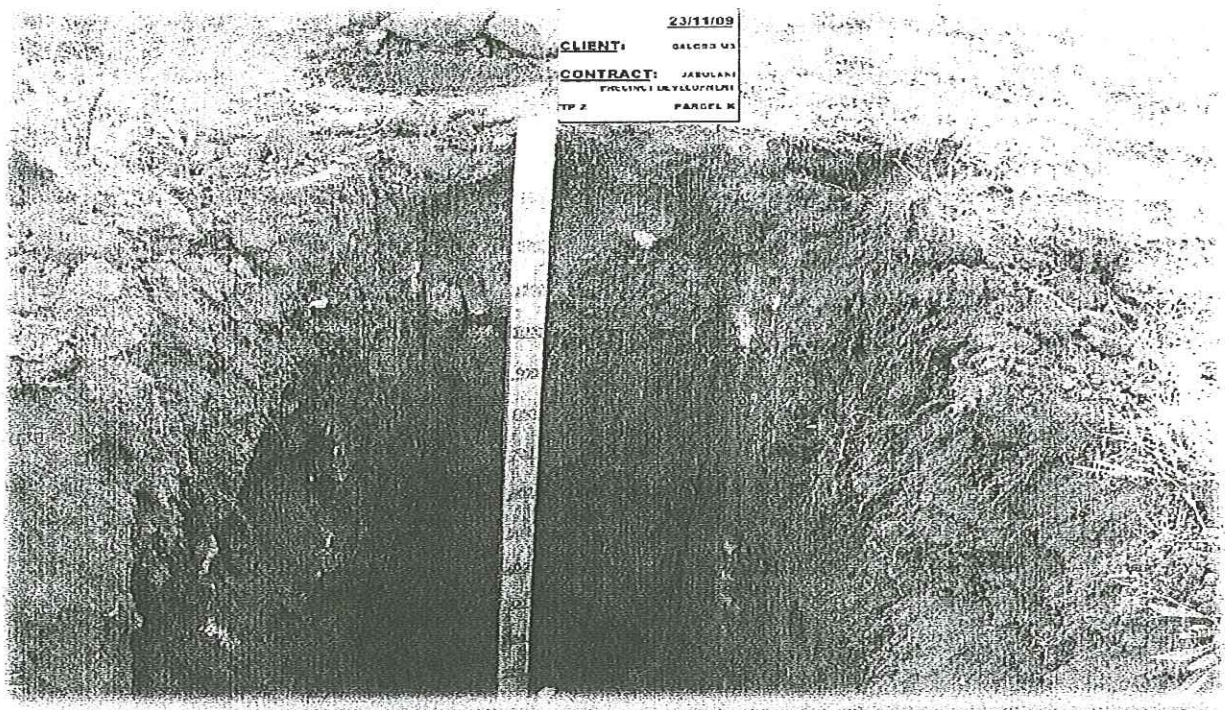
ROADLAB

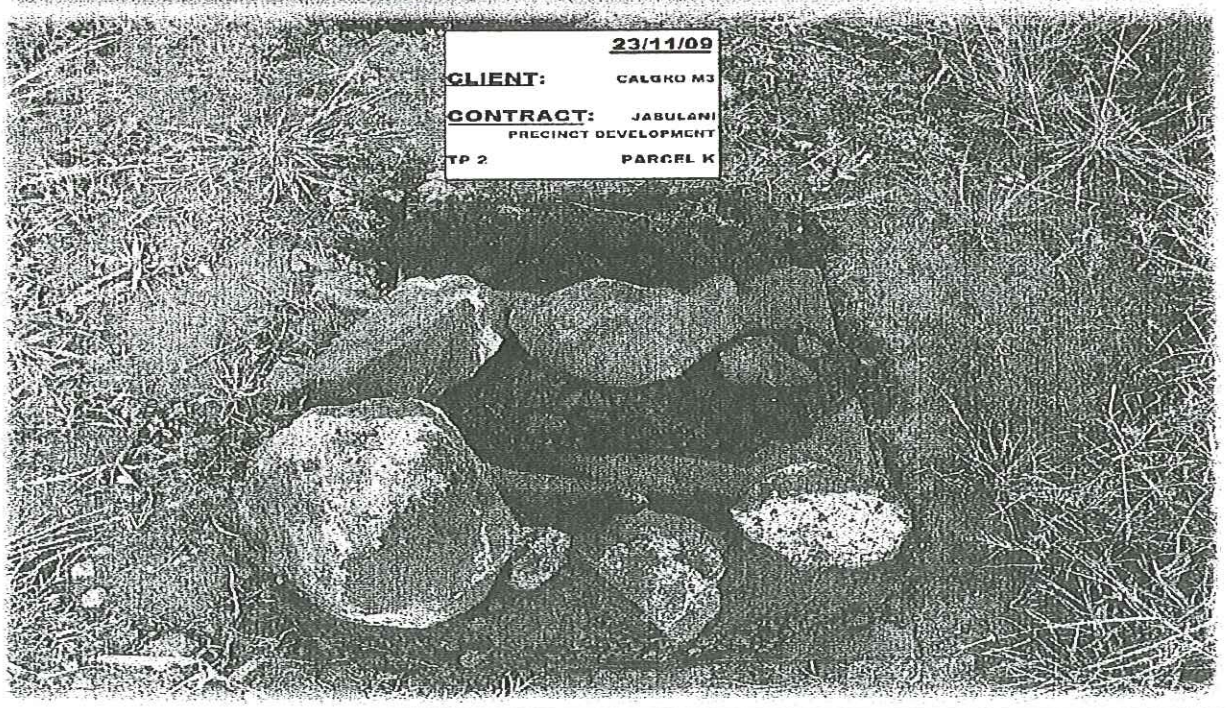
(PTY) LTD/(EDMS) BPK Reg. No. 65/08083/07
VAT No. 4790192266

HEAD OFFICE
168 RIETFONTEIN RD, PRIMROSE
P.O. BOX 1476, GERMISTON, 1400
TEL: 011 828 0279
FAX: 011 828 0273
www.roadlab.co.za
info@roadlab.co.za

41 YEARS. Est. 1965

CENTERLINE INVESTIGATION





Annexure A

SOIL PROFILING

PROJECT:	Jabulani Precinct Development	**DATE PROFILED :**	23/11/2009
SITE:	Parcel K	**LOGGED BY:**	Julian
		MACHINE:	TLB
TEST PIT:	3	**CO-ORDINATES:**	X-2904456 Y-086007

Sample No.	Depth (mm)	Description of Sample
	0	
	50	
	100	
	150	
	200	
	250	Slightly Moist, Dark Brown, Loose, Intact, Transported, Silty, Gravely Sand with Grass Roots
	300	
	350	
	400	
	450	
	500	
	550	
	600	
	650	
	700	
	750	
	800	
4020	850	Moist, Dark Brown, Blotched Dark Orange, to Red, Loose, Intact, Reworked Residual, Silty, Sandy
	900	Gravel, with Fine Roots & Small to Very Small Cobbles (Soft Weathered Shale & Andesite)
	950	**CBR = 12% @ 95% Mod - G.8 / Site Class = C.1**
	1000	
	1050	
	1100	
	1150	
	1200	
	1250	
	1300	
	1350	
	1400	
4021	1450	Slightly Moist, Light Red Brown, Loose, Intact, Residual, Gravely, Sandy Silt, with Scattered Small
	1500	to Large Sub Rounded Hard Rock Cobbles (Ferricrete & Soft Weathered Shale)
	1550	**CBR = 17% @ 95% Mod - G.8 / Site Class = C.1**
	1600	
	1650	
	1700	
	1750	
	1800	
	1850	
	1900	
	1950	
	2000	
	2050	
	2100	
	2150	No Refusal
	2200	Sidewalls Stable
	2250	No Watertable

C.H.Badenhorst (Geotechnical Investigator) P.O.Box 16738, DOWERGLEN P/f 011 453-6282

Civil Engineering Materials Laboratory

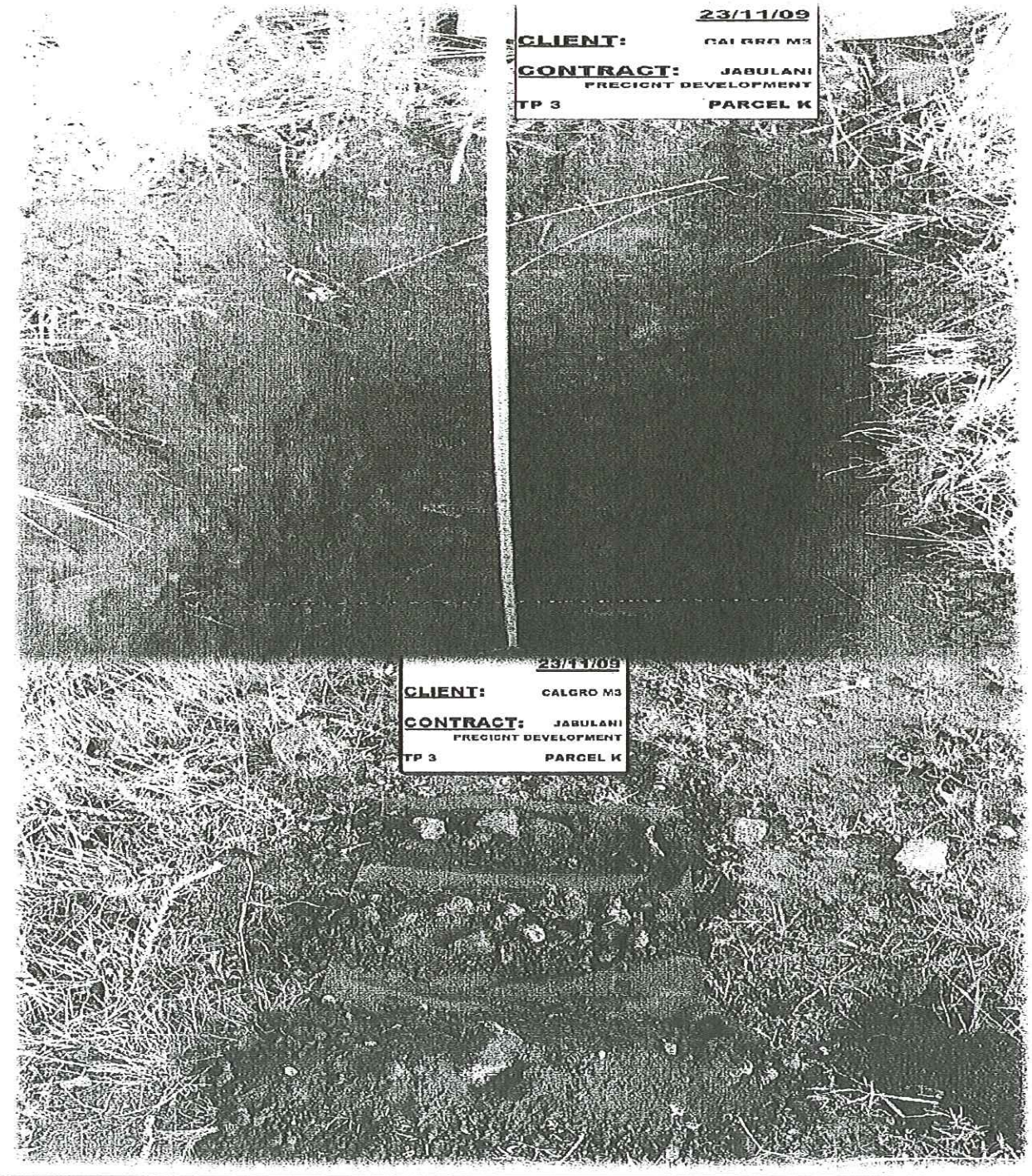
ROADLAB

(PTY) LTD/(EDMS) BPK Reg. No. 65/08083/07
VAT No 4790192266

HEAD OFFICE
168 RIETFONTEIN RD, PRIMROSE
P.O. BOX 1476, GERMISTON, 1400
TEL: 011 828 0279
FAX: 011 828 0273
www.roadlab.co.za
info@roadlab.co.za

41 YEARS. Est. 1965

CENTERLINE INVESTIGATION



Annexure A

SOIL PROFILING

PROJECT:	Jabulani Precinct Development	DATE PROFILED :	23/11/2009
SITE:	Parcel K	LOGGED BY:	Julian
		MACHINE:	TLB
TEST PIT:	4	CO-ORDINATES:	X-2904525 Y-086041

Sample No.	Depth (mm)	Description of Sample
	0	
	50	
	100	Slightly Moist, Dark Red Brown, Loose, Intact, Transported, Silty, Gravel sAnd with Grass Roots
	150	
	200	
	250	
	300	
	350	
	400	
	450	
	500	
	550	
	600	
	650	
	700	
	750	
	800	
	850	
	900	
	950	
	1000	Slightly Moist, Dark Red Brown, Blotched Light Yellow Black & Grey, Medium Dense, Intact, Residual
4022	1050	Silty, Sandy Gravel with Abundant Soft to Hard Small to Very Large Angular Cobbles
	1100	(Soft Weathered Shale)
	1150	**Site Class = C.1**
	1200	
	1250	
	1300	
	1350	
	1400	
	1450	
	1500	
	1550	
	1600	
	1650	
	1700	
	1750	
	1800	
	1850	
	1900	
	1950	
	2000	
	2050	
	2100	
	2150	No Refusal
	2200	Sidewalls Stable
	2250	No Watertable

C.H.Badenhorst (Geotechnical Investigator) P.O.Box 16738, DOWERGLEN P/f 011 453-6282

Civil Engineering Materials Laboratory

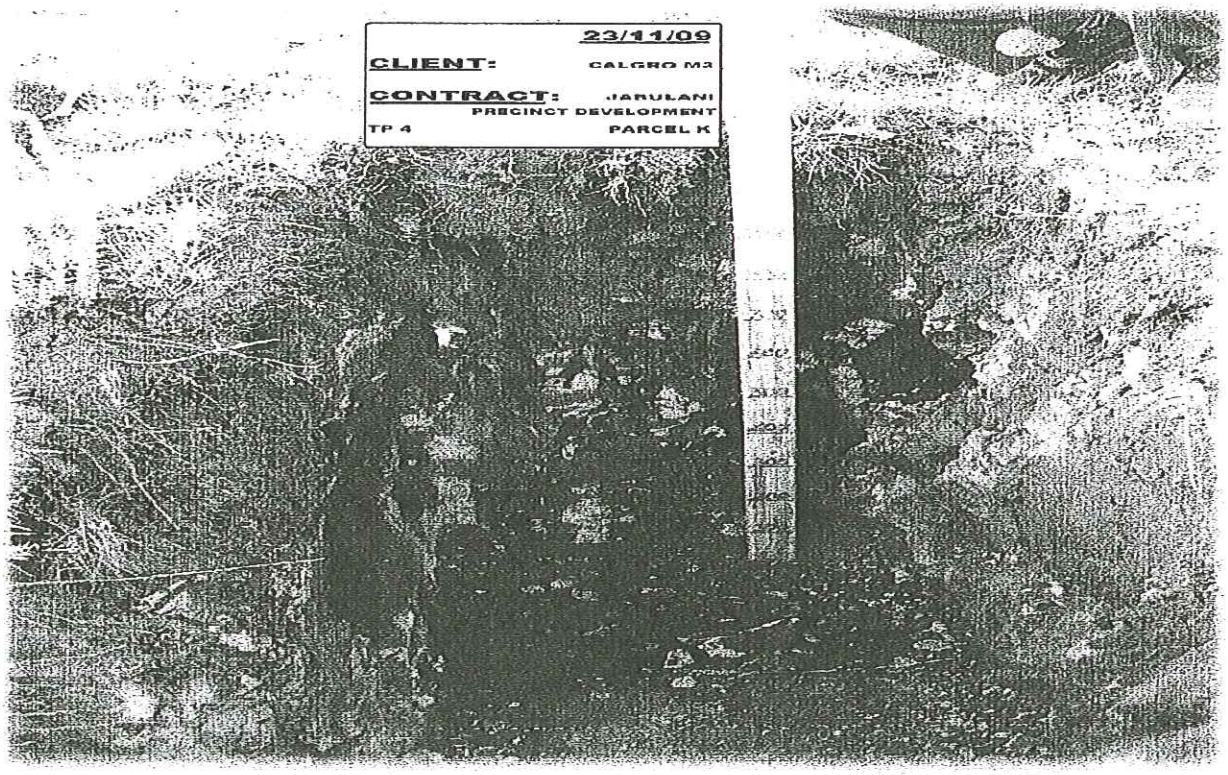
ROADLAB

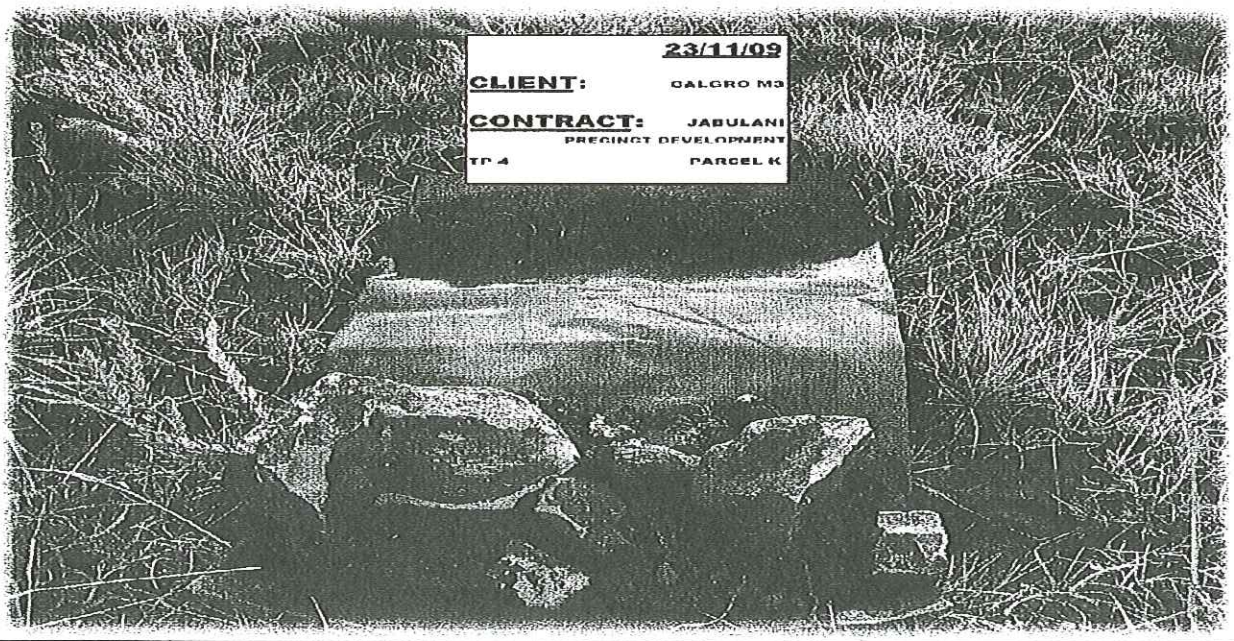
(PTY) LTD/(EDMS) BPK Reg. No. 65/08083/07
VAT No. 4790192266

HEAD OFFICE
168 RIETFONTEIN RD, PRIMROSE
P.O. BOX 1476, GERMISTON, 1400
TEL: 011 828 0279
FAX: 011 828 0273
www.roadlab.co.za
info@roadlab.co.za

41 YEARS. Est. 1965

CENTERLINE INVESTIGATION





Annexure A

SOIL PROFILING

PROJECT:	Jabulani Precinct Development	**DATE PROFILED :**	23/11/2009
SITE:	Parcel K	**LOGGED BY:**	Julian
		MACHINE:	TLB
TEST PIT:	5	**CO-ORDINATES:**	X-2904268 Y-085959

Sample No.	Depth (mm)	Description of Sample
	0	
	50	
	100	
	150	
	200	
	250	Slightly Moist, Dark Brown, Loose, Intact, Transported, Silty, Gravely, Sand with Grass Roots
	300	
	350	
	400	
	450	
	500	
	550	
4021	600	Slightly Moist, Light Red Brown, Loose,Intact, Transported, Silty, Clayey Gravely, Sand with Pebbles
	650	& Flat Angular Cobbles (Soft Weathered to Decomposed Shale)
	700	**Site Class = C.1**
	750	
	800	
	850	
	900	
	950	
	1000	
	1050	
	1100	
	1150	
	1200	
	1250	
	1300	
4023	1350	Slightly Moist, Light Red Brown, Blotched Light Yellow, Soft, Fissured, Residual, Clayey, Sandy Silt,
	1400	with Scattered Pebbles & Cobbles (Decomposed Quartzitic Sandstone & Ferricrete Nodules)
	1450	**Site Class = H.1**
	1500	
	1550	
	1600	
	1650	
	1700	
	1750	
	1800	
	1850	
	1900	
	1950	
	2000	
	2050	
	2100	
	2150	No Refusal
	2200	Sidewalls Stable
	2250	No Watertable

C.H.Badenhorst (Geotechnical Investigator) P.O.Box 16738, DOWERGLEN P/f 011 453-6282

Civil Engineering Materials Laboratory

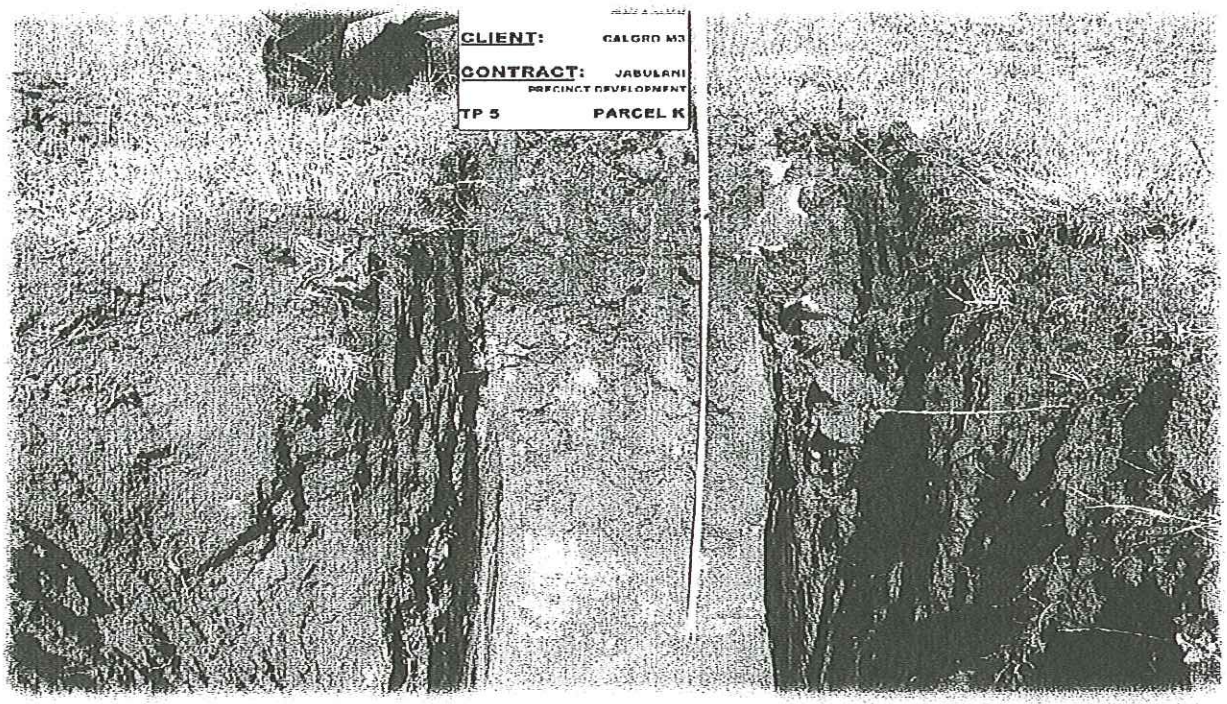
ROADLAB

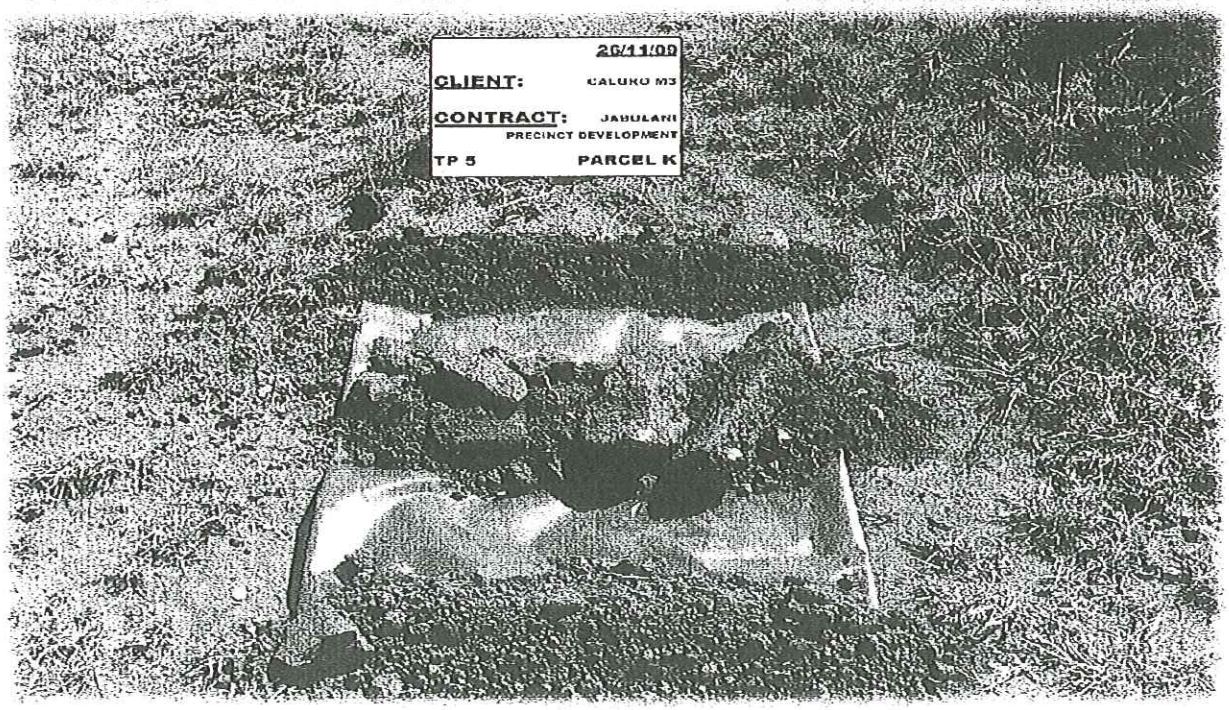
(PTY) LTD (EDMS) BPK Reg. No 65/08083/07
VAT No. 4790192266

HEAD OFFICE
168 RIETFONTEIN RD, PRIMROSE
P.O. BOX 1476, GERMISTON, 1400
TEL: 011 828 0279
FAX: 011 828 0273
www.roadlab.co.za
info@roadlab.co.za

41 YEARS. Est. 1965

CENTERLINE INVESTIGATION





Annexure A

SOIL PROFILING

PROJECT:	Jabulani Precinct Development	**DATE PROFILED :**	23/11/2009
SITE:	Parcel K	**LOGGED BY:**	Julian
		MACHINE:	TLB
TEST PIT:	6	**CO-ORDINATES:**	X-2904127 Y-085923

Sample No.	Depth (mm)	Description of Sample
	0	
	50	
	100	Slightly Moist, Dark Brown, Loose, Intact, Transported, Silty Gravely Sand with Small to Very Large
	150	Cobbles & Grass Roots
	200	
	250	
4020	300	Slightly Moist, Dark Brown Blotched Dark Orange Red, Loose, Intact, Reworked Residual, Silty,
	350	Sandy Gravel with Pebbles & Small to Large Cobbles (Soft Weathered Shale & Andesite)
	400	**Site Class = C.1**
	450	
	500	
	550	
	600	
	650	
	700	
	750	
	800	
	850	
	900	
	950	
	1000	
	1050	
	1100	
	1150	
	1200	
	1250	
	1300	
	1350	
	1400	
4024	1450	Slightly Moist, Light Red Brown Blotched Light Yellow, Soft, Fissured, Residual, Sandy Silty Gravel
	1500	(Decomposed to Soft Weathered Shale)
	1550	**CBR = 9% @ 95% Mod - G.9 / Site Class = C.1**
	1600	
	1650	
	1700	
	1750	
	1800	
	1850	
	1900	
	1950	
	2000	
	2050	
	2100	
	2150	No Refusal
	2200	Sidewalls Stable
	2250	No Watertable

C.H.Badenhorst (Geotechnical Investigator) P.O.Box 16738, DOWERGLEN P/f 011 453-6282

Civil Engineering Materials Laboratory

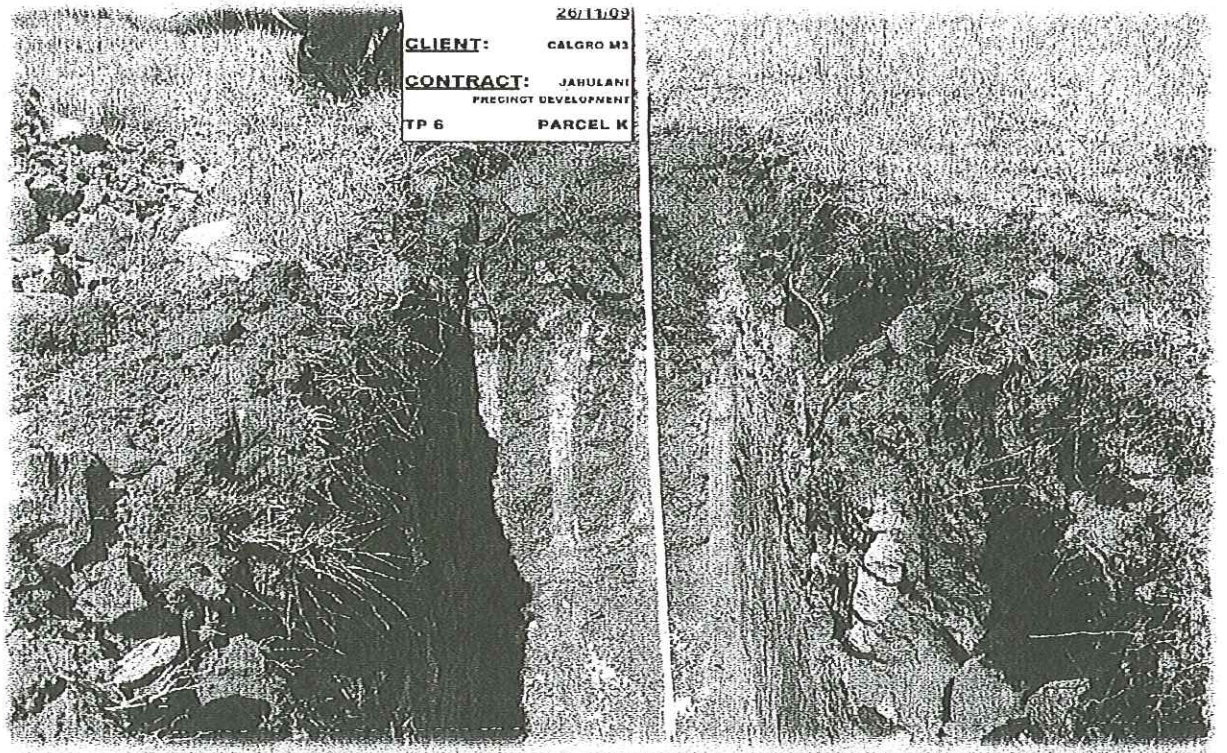
ROADLAB

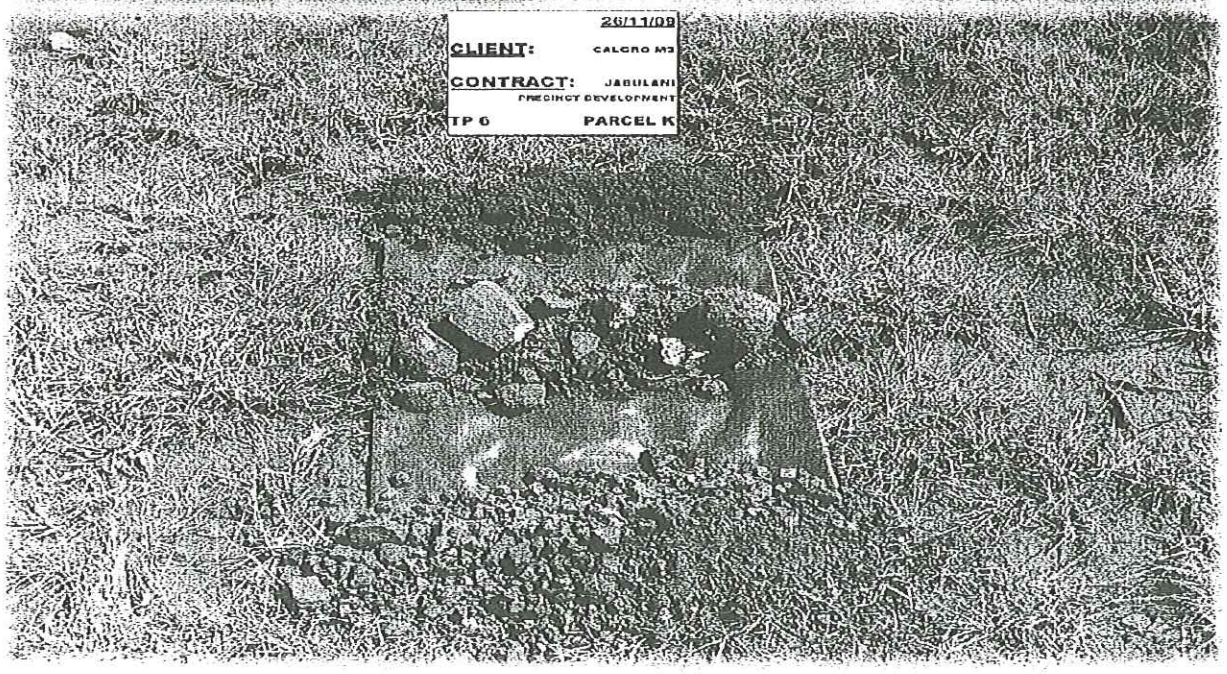
(PTY) LTD (EDMS) BPK Reg. No. 65/08083/07
VAT No. 4790192266

HEAD OFFICE
168 RIETFONTEIN RD, PRIMROSE
P.O. BOX 1476, GERMISTON, 1400
TEL: 011 828 0279
FAX: 011 828 0273
www.roadlab.co.za
info@roadlab.co.za

41 YEARS. Est. 1965

CENTERLINE INVESTIGATION





Annexure A

SOIL PROFILING

PROJECT:	Jabulani Precinct Development	**DATE PROFILED :**	23/11/2009
SITE:	Parcel K	**LOGGED BY:**	Julian
		MACHINE:	TLB
TEST PIT:	7	**CO-ORDINATES:**	X-2904091 Y-085845

Sample No.	Depth (mm)	Description of Sample
	0	
	50	
	100	
	150	
	200	
	250	
	300	
	350	
	400	Slightly Moist, Dark Brown, Loose, Intact, Transported, Silty, Gravely Sand, with Small Cobbles &
	450	Small Boulders with Grass Roots
	500	
	550	
	600	
	650	
	700	
	750	
	800	
4025	850	Slightly Moist, Dark Brown, Blotched Dark Orange Red, Loose, Intact, Reworked Residual, Clayey,
	900	Sandy, Silty Gravel (Decomposed Shale & Ferricrete Nodules)
	950	**Site Class = H.1**
	1000	
	1050	
	1100	
	1150	
	1200	
	1250	
	1300	
	1350	
	1400	
4023	1450	Slightly Moist, Light Red Brown, Blotched Light Yellow, Soft, Fissured, Residual, Gravely, Clayey,
	1500	Sandy Silt with Scattered Angular Cobbles. (Decomposed Quartzitic Sandstone & Ferricrete Nodules)
	1550	**Site Class = H.1**
	1600	
	1650	
	1700	
	1750	
	1800	
	1850	
	1900	
	1950	
	2000	
	2050	
	2100	
	2150	No Refusal
	2200	Sidewalls Stable
	2250	No Watertable

C.H.Badenhorst (Geotechnical Investigator) P.O.Box 16738, DOWERGLEN P/f 011 453-6282

Civil Engineering Materials Laboratory

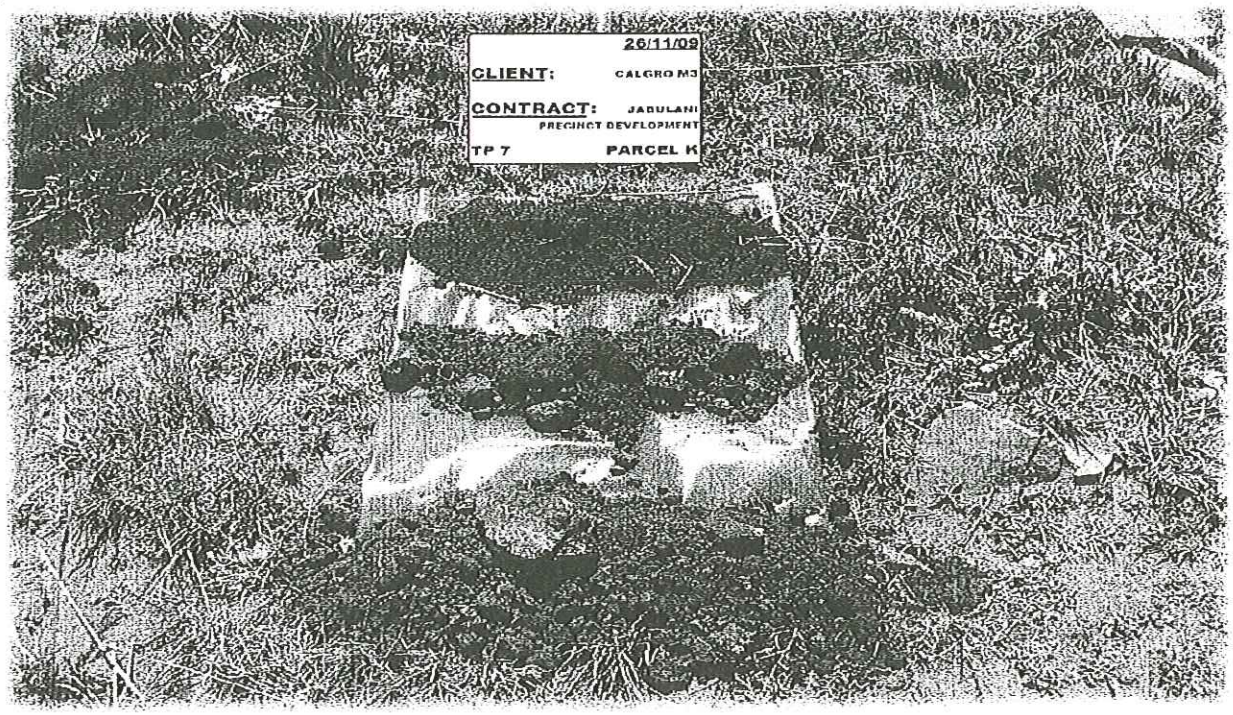
ROADLAB

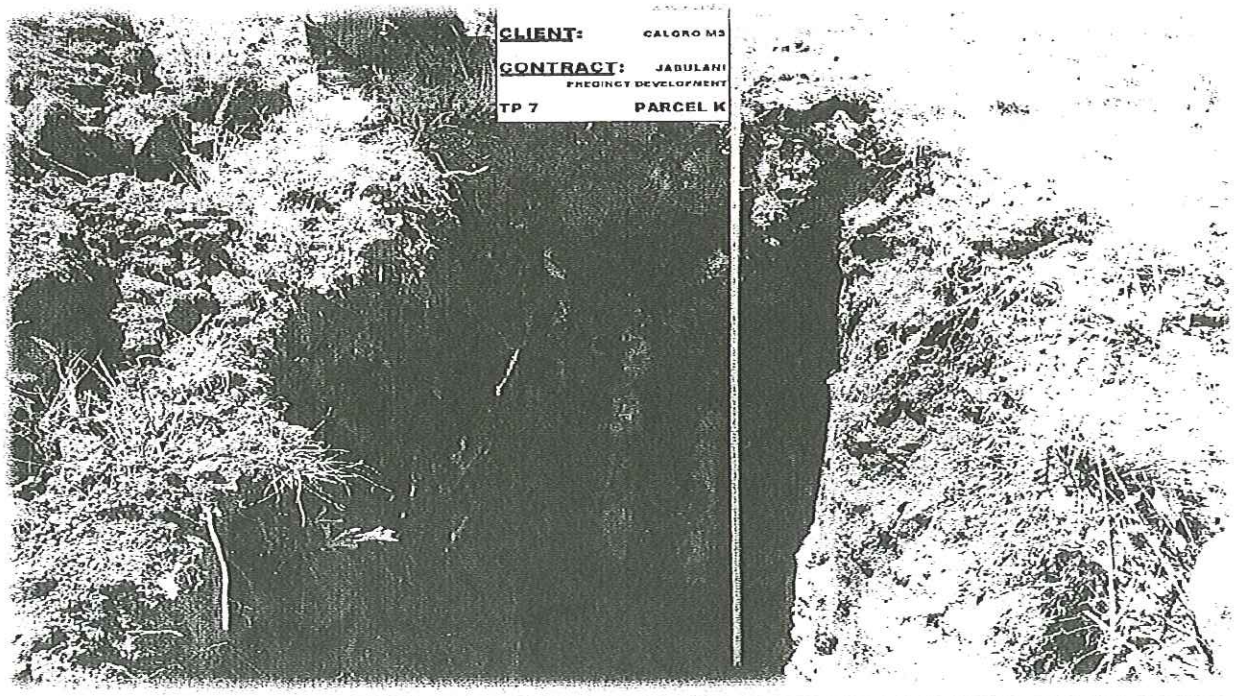
(PTY) LTD/(EDMS) BPK Reg. No 65/08083/07
VAT No. 4790192266

HEAD OFFICE
168 RIETFONTEIN RD, PRIMROSE
P.O. BOX 1476, GERMISTON, 1400
TEL: 011 828 0279
FAX: 011 828 0273
www.roadlab.co.za
info@roadlab.co.za

41 YEARS. Est. 1965

CENTERLINE INVESTIGATION





Annexure A

SOIL PROFILING

PROJECT:	Jabulani Precinct Development	**DATE PROFILED :**	23/11/2009
SITE:	Parcel K	**LOGGED BY:**	Julian
		MACHINE:	TLB
TEST PIT:	8	**CO-ORDINATES:**	X-2903976 Y-085849

Sample No.	Depth (mm)	Description of Sample
	0	
	50	
	100	
	150	
	200	Slightly Moist, Dark Brown, Loose, Intact, Transported, Silty, Gravely Sand, with Small to Very Large
	250	Hard Rock Cobbles.
	300	
	350	
	400	
	450	
	500	
4025	550	Slightly Moist, Dark Brown, Blotched Dark Orange Red, Loose, Intact, Reworked Residual, Silty, Sandy
	600	Gravel with Small to Very Large Hard Rock Cobbles (Soft Weathered Shale & Ferricrete)
	650	**Site Class = C.1**
	700	
	750	
	800	
	850	
	900	
	950	
	1000	
	1050	
	1100	
	1150	
	1200	
	1250	
	1300	
	1350	
	1400	
4026	1450	Slightly Moist, Light Red Brown, Blotched Light Yellow, Soft, Fissured, Residual, Silty Gravel.
	1500	(Soft Weathered Shale)
	1550	**CBR = 20% @ 95% Mod - G.7 / Site Class = C.1**
	1600	
	1650	
	1700	
	1750	
	1800	
	1850	
	1900	
	1950	
	2000	
	2050	
	2100	
	2150	No Refusal
	2200	Sidewalls Stable
	2250	No Watertable

C.H.Badenhorst (Geotechnical Investigator) P.O.Box 16738, DOWERGLEN P/f 011 453-6282

Civil Engineering Materials Laboratory

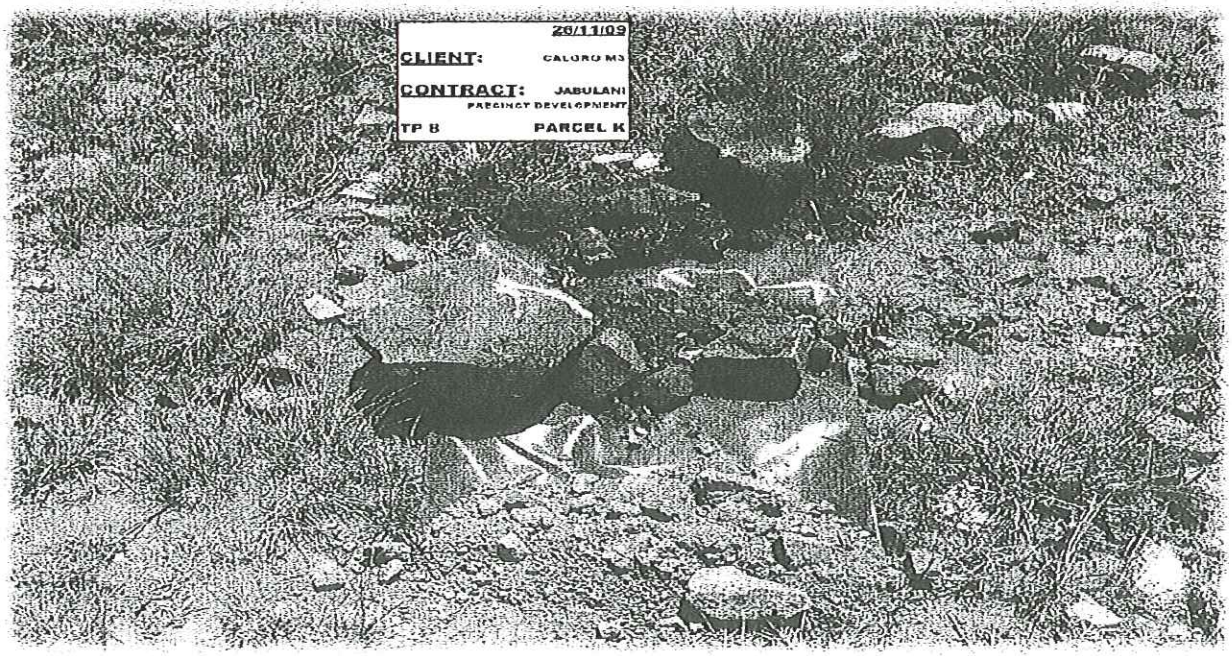
ROADLAB

(PTY) LTD/(EDMS) BPK Reg. No. 65/03083/07
VAT No 4790192265

HEAD OFFICE
168 RIETFONTEIN RD, PRIMROSE
P.O. BOX 1476, GERMISTON, 1400
TEL: 011 828 0279
FAX: 011 828 0273
www.roadlab.co.za
info@roadlab.co.za

41 YEARS. Est. 1965

CENTERLINE INVESTIGATION



Annexure A

SOIL PROFILING

PROJECT:	Jabulani Precinct Development	DATE PROFILED :	26/11/2009
SITE:	Parcel K	LOGGED BY:	Julian
		MACHINE:	TLB
TEST PIT:	9	CO-ORDINATES:	X-2904082 Y-086033

Sample No.	Depth (mm)	Description of Sample
	0	
	50	
	100	
	150	Slightly Moist, Dark Brown, Loose, Intact, Transported, Silty Gravely Sand with Small to Large
	200	Cobbles & Grass Roots
	250	
	300	
4022	350	Slightly Moist, Dark Brown, Blotched Light Yellow Orange, Speckled Black, Loose, Intact, Reworked
	400	Residual, Silty Sandy Gravel and Fine Roots. (Soft Weathered Shale)
	450	**Site Class = C.1**
	500	
	550	
	600	
	650	
4027	700	Slightly Moist, Light Red Brown, Loose, Intact, Transported, Clayey, Silty Sandy Gravel
	750	(Soft Weathered Shale & Andesite)
	800	**Site Class = H.1**
	850	
	900	
	950	
	1000	
	1050	
	1100	
	1150	
	1200	
4026	1250	Slightly Moist, Light Red brown, Blotched Light Yellow, Soft, Fissured, Residual, Silty Gravel.
	1300	(Soft Weathered Shale)
	1350	**Site Class = C.1**
	1400	
	1450	
	1500	
	1550	
	1600	
	1650	
	1700	
	1750	
	1800	
	1850	
	1900	
	1950	
	2000	
	2050	
	2100	
	2150	Refusal @ Depth of 1400mm on Very Dense Shale
	2200	Sidewalls Stable
	2250	No Watertable

C.H.Badenhorst (Geotechnical Investigator) P.O.Box 16738, DOWERGLEN P/f 011 453-6282

Civil Engineering Materials Laboratory

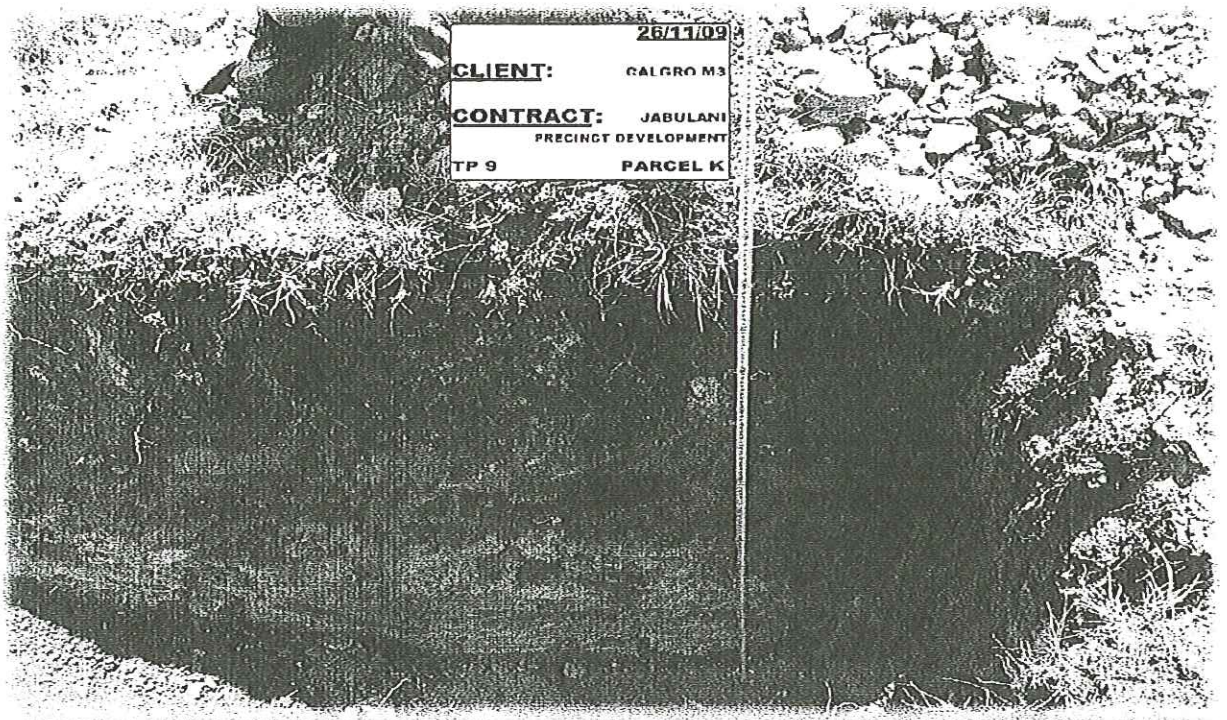
ROADLAB

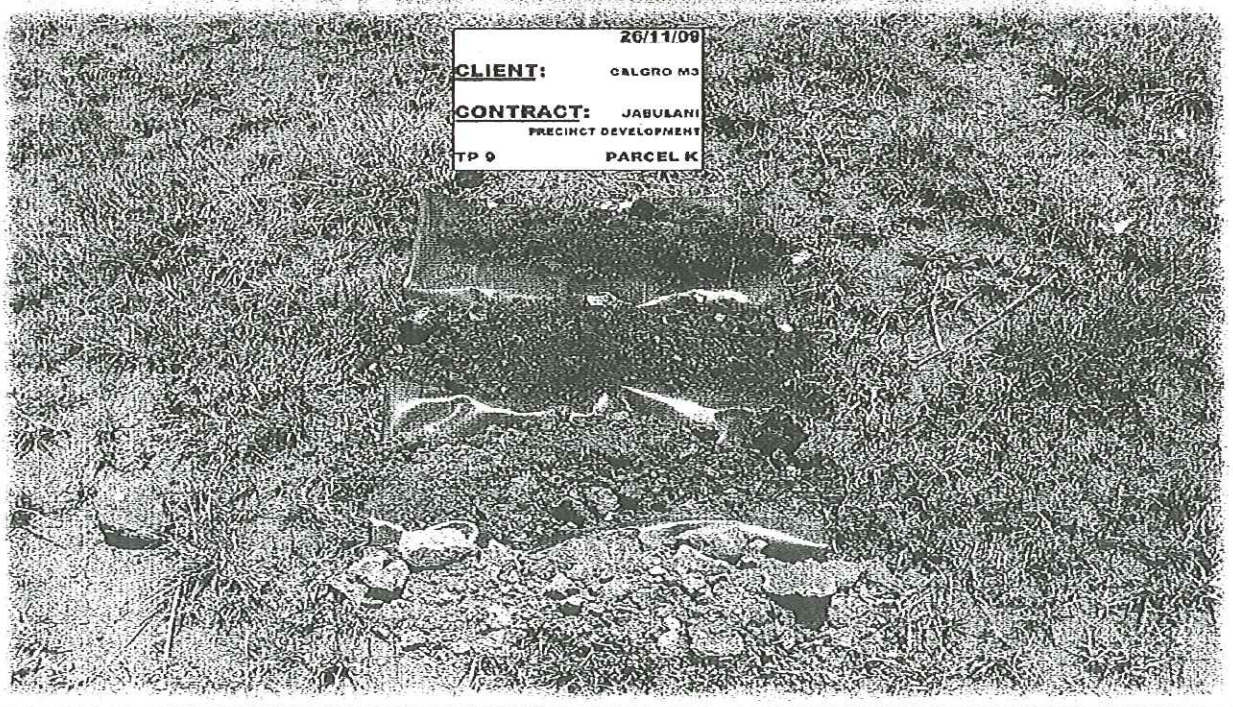
(PTY) LTD/(EDMS) BPK Reg. No. 65/08083/07
VAT No. 4790192266

HEAD OFFICE
168 RIETFONTEIN RD, PRIMROSE
P.O. BOX 1476, GERMISTON, 1400
TEL: 011 828 0279
FAX: 011 828 0273
www.roadlab.co.za
info@roadlab.co.za

41 YEARS. Est. 1965

CENTERLINE INVESTIGATION





Annexure A

SOIL PROFILING

PROJECT:	Jabulani Precinct Development	**DATE PROFILED :**	26/11/2009
SITE:	Parcel K	**LOGGED BY:**	Julian
		MACHINE:	TLB
TEST PIT:	10	**CO-ORDINATES:**	X-2904194 Y-086190

Sample No.	Depth (mm)	Description of Sample
	0	
	50	
	100	
	150	
	200	Slightly Moist, Dark Brown, Loose, Intact, Transported, Silty Gravely Sand with Grass Roots
	250	
	300	
	350	
	400	Slightly Moist, Dark Red Brown, Speckled Light Yellow Orange, Soft, Fissured, Reworked Residual,
	450	Silty, Clayey, Sand with Fine Roots & Scattered Hard Rock Cobbles.
	500	**Site Class = C1**
	550	
	600	
	650	
	700	
	750	
	800	
	850	
	900	
	950	
	1000	
	1050	
	1100	
	1150	
	1200	
	1250	
	1300	
	1350	
	1400	
	1450	
	1500	
4028	1550	Slightly Moist, Light Red Brown, Loose, Intact, Residual, Silty, Clayey, Gravely Sand (Ferricrete)
	1600	**Site Class = H.1**
	1650	
	1700	
	1750	
	1800	
	1850	
	1900	
	1950	
	2000	
	2050	
	2100	
	2150	Refusal @ Depth of 1400mm on Very Dense Shale
	2200	Sidewalls Stable
	2250	No Watertable

C.H.Badenhorst (Geotechnical Investigator) P.O.Box 16738, DOWERGLEN P/f 011 453-6282

Civil Engineering Materials Laboratory

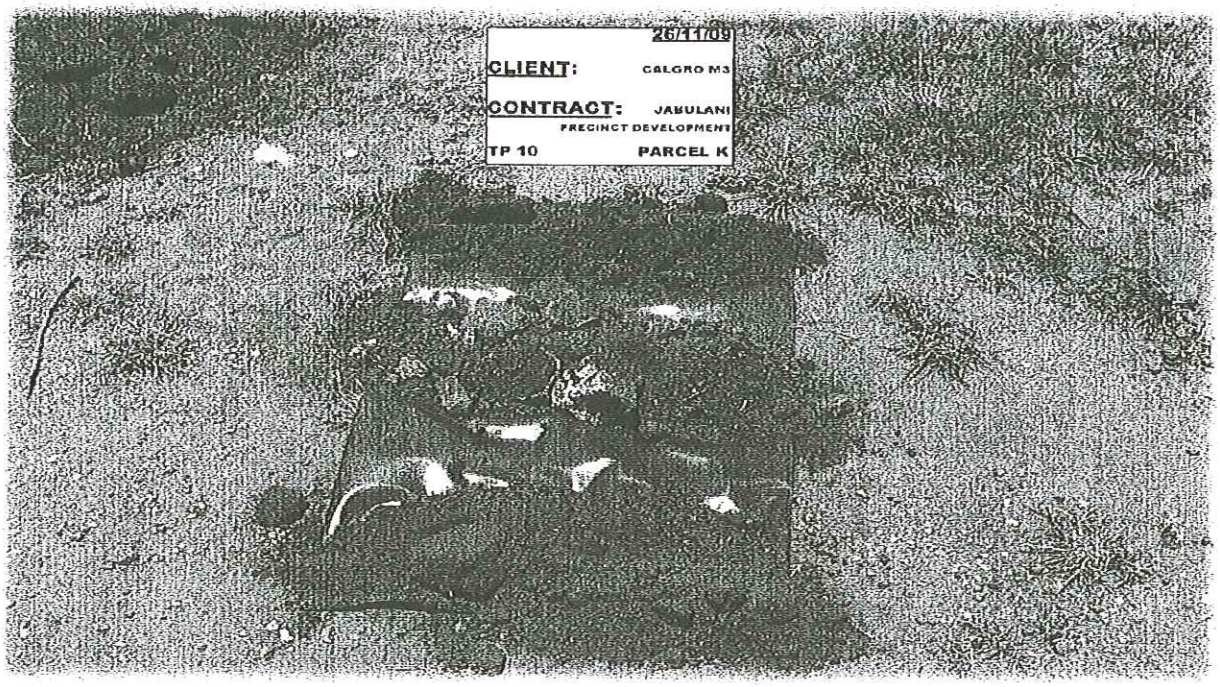
ROADLAB

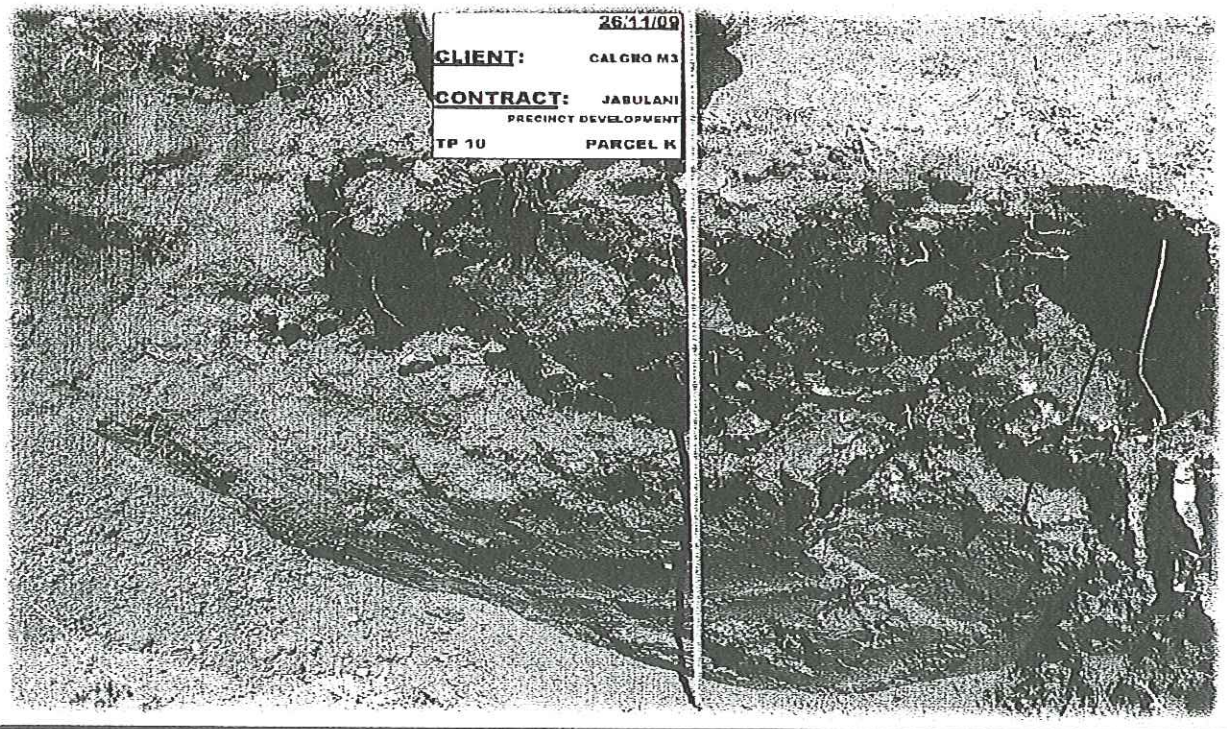
(PTY) LTD/(EDMS) BPK Reg. No. 65/08083/07
VAT No. 4790192266

HEAD OFFICE
168 RIETFONTEIN RD, PRIMROSE
P.O. BOX 1476, GERMISTON, 1400
TEL: 011 828 0279
FAX: 011 828 0273
www.roadlab.co.za
info@roadlab.co.za

41 YEARS. Est. 1965

CENTERLINE INVESTIGATION





Annexure A

SOIL PROFILING

PROJECT:	Jabulani Precinct Development	DATE PROFILED :	26/11/2009
SITE:	Parcel K	LOGGED BY:	Julian
		MACHINE:	TLB
TEST PIT:	11	CO-ORDINATES:	X-2904284 Y-086263

Sample No.	Depth (mm)	Description of Sample
	0	
	50	
	100	
	150	Slightly Moist, Dark Brown, Loose, Intact, Transported, Silty Sandy Gravel with Small to Large
	200	Cobbles & Small Boulders
	250	
	300	
	350	
	400	
	450	
	500	
	550	
	600	Slightly Moist, Light Yellow Brown, Motlled Black, Loose, Intact, Residual, Silty, Sandy Gravel.
	650	(Ferricrete)
	700	**Site Class = C.1**
	750	
	800	
	850	
	900	
	950	
	1000	
	1050	
	1100	
	1150	
	1200	
	1250	
	1300	
4029	1350	Slightly Moist, Light White Brown, Blotched Light Yellow, Soft, Fissured, Residual, Sandy Gravely
	1400	Silt (Ferricrete & Decomposed Quartzitic Sandstone)
	1450	**CBR = 4% @ 95% Mod - G.10 / Site Class = C.2**
	1500	
	1550	
	1600	
	1650	
	1700	
	1750	
	1800	
	1850	
	1900	
	1950	
	2000	
	2050	
	2100	No Refusal
	2150	Sidewalls Stable
	2200	No Watertable
	2250	Large Boulders Around Tp on Surface

C.H.Badenhorst (Geotechnical Investigator) P.O.Box 16738, DOWERGLEN P/f 011 453-6282

Civil Engineering Materials Laboratory

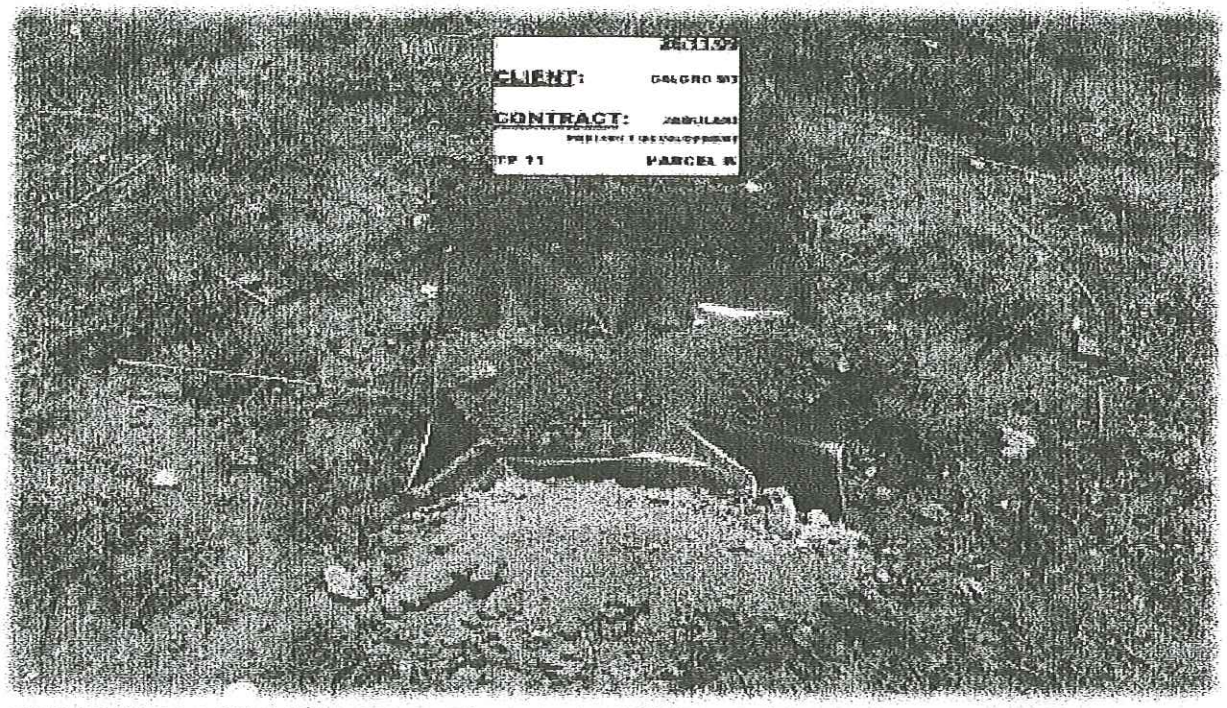
ROADLAB

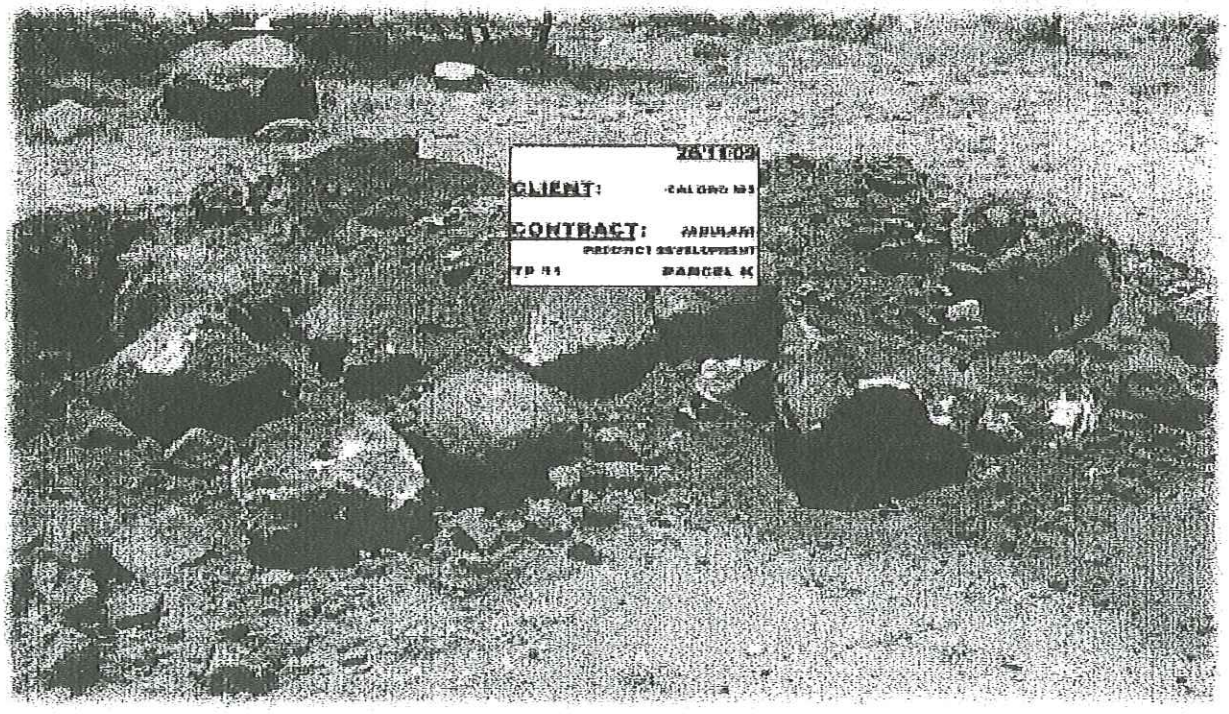
(PTY) LTD/(EDMS) BPK Reg. No. 65/08083/07
VAT No. 4790192266

HEAD OFFICE
168 RIETFONTEIN RD, PRIMROSE
P.O. BOX 1476, GERMISTON, 1400
TEL: 011 828 0279
FAX: 011 828 0273
www.roadlab.co.za
info@roadlab.co.za

41 YEARS. Est. 1965

CENTERLINE INVESTIGATION





Annexure A

SOIL PROFILING

PROJECT:	Jabulani Precinct Development	DATE PROFILED :	26/11/2009
SITE:	Parcel K	LOGGED BY:	Julian
		MACHINE:	TLB
TEST PIT:	12	CO-ORDINATES:	X-2904301 Y-086132

Sample No.	Depth (mm)	Description of Sample
	0	
	50	
	100	
	150	
	200	
	250	
	300	Slightly Moist, Dark Brown, Loose, Intact, Transported, Silty, Sandy Gravel
	350	
	400	
	450	
	500	
	550	
	600	
	650	
4030	700	Slightly Moist, Light Yellow Brown Mottled Black, Loose, Intact, Reworked Residual, Sandy, Silty
	750	Gravel (Decomposed to Soft Weathered Shale & Ferricrete)
	800	**Site Class = C.1**
	850	
	900	
	950	
	1000	
	1050	
	1100	
	1150	
	1200	
	1250	
	1300	
4029	1350	Slightly Moist, Light White Brown, Blotched Light Yellow, Soft, Fissured, Residual, Sandy Gravely
	1400	Silt.
	1450	**Site Class = C.2**
	1500	
	1550	
	1600	
	1650	
	1700	
	1750	
	1800	
	1850	
	1900	
	1950	
	2000	
	2050	
	2100	
	2150	No Refusal
	2200	Sidewalls Stable
	2250	No Watertable

C.H.Badenhorst (Geotechnical Investigator) P.O.Box 16738, DOWERGLEN P/f 011 453-6282

Civil Engineering Materials Laboratory

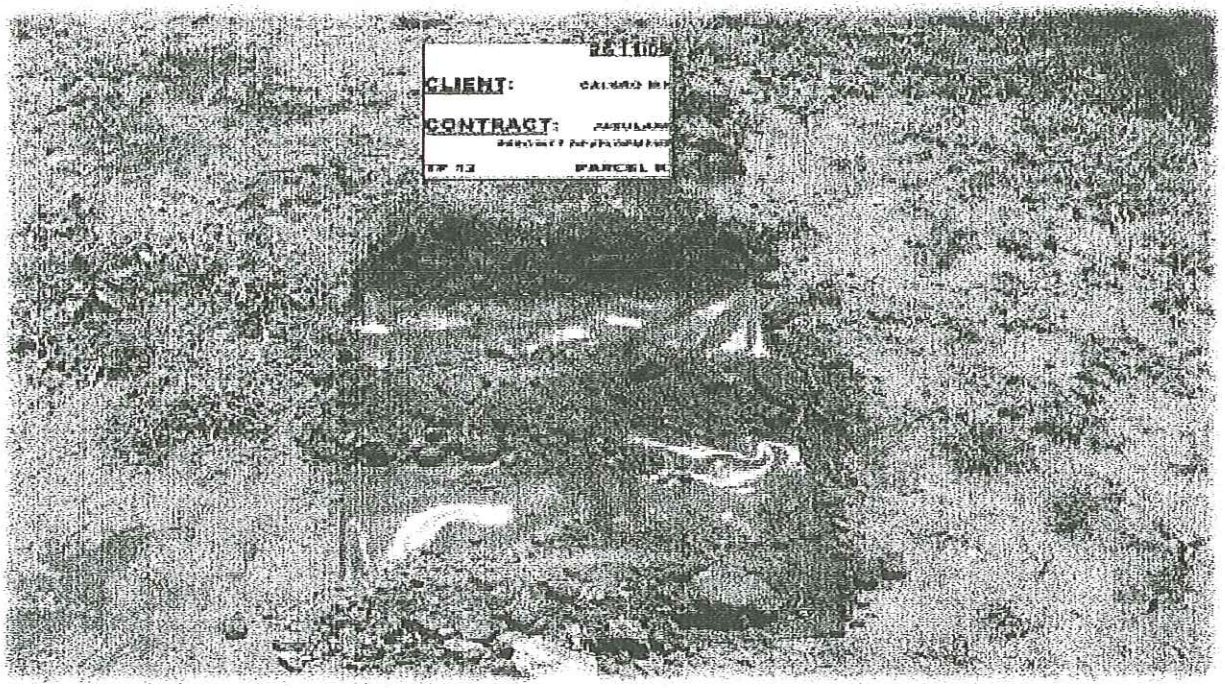
ROADLAB

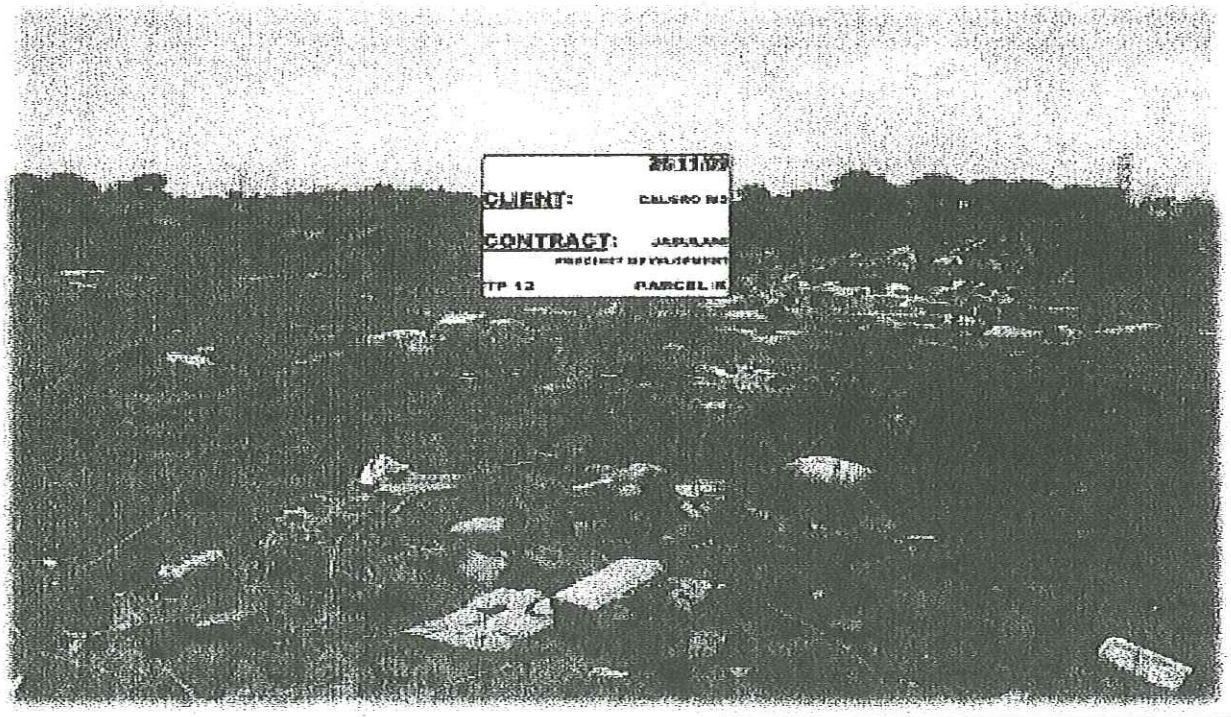
(PTY) LTD/(EDMS) BPK Reg. No. 65/03083/07
VAT No. 4790192266

HEAD OFFICE
168 RIETFONTEIN RD, PRIMROSE
P.O. BOX 1476, GERMISTON, 1400
TEL: 011 828 0279
FAX: 011 828 0273
www.roadlab.co.za
info@roadlab.co.za

41 YEARS. Est. 1965

CENTERLINE INVESTIGATION





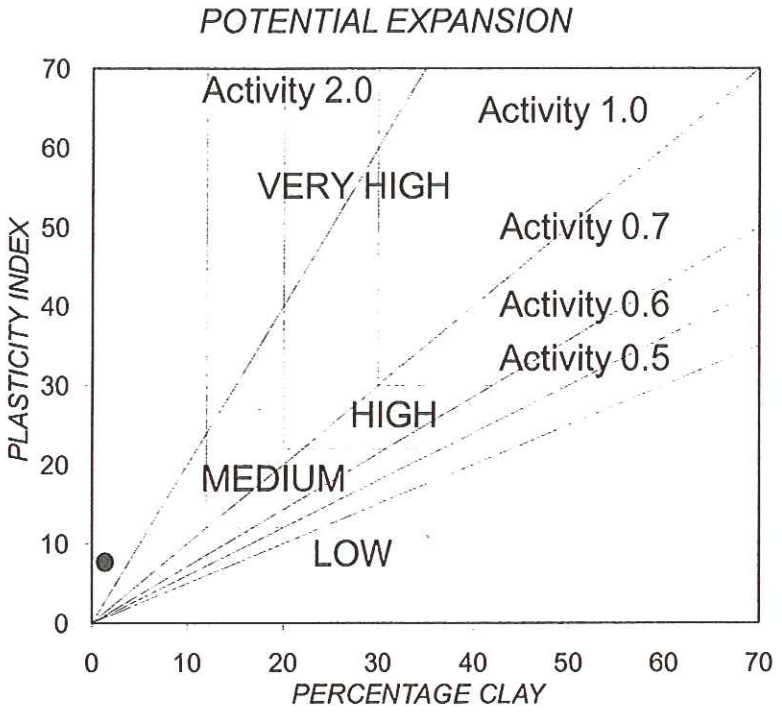
*FOUNDATION INDICATOR (TMH 1 : A1, A2, A3, A4, A5 & *A6)*

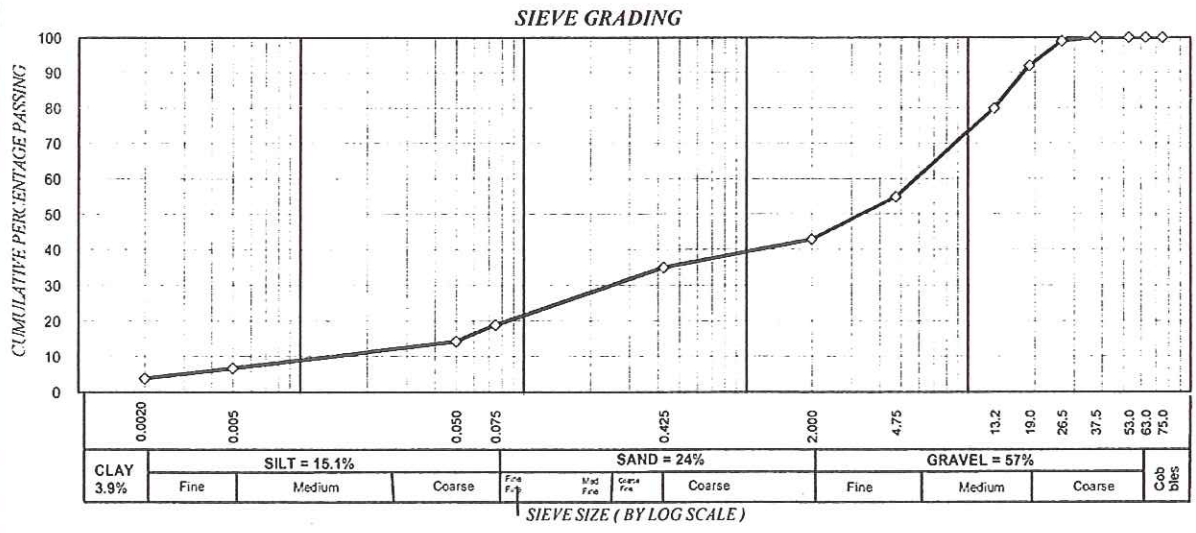
09078

Tp1:Layer 370-900mm

Material description	*Dark Red Orange*		*Depth :*	*370-900mm*	*Sample Number :*	*2009/I4018*
	Ferricrete		*Clients Marking :*	*Parcel K*	*Date Sampled :*	*2009/11/25*

Sieve analysis Cumulative percentage passing (mm)	*75.0*	100
	63.0	100
	53.0	100
	37.5	100
	26.5	99
	19.0	92
	13.2	80
	4.75	55
	2.000	43
	0.425	35
	0.075	19
	0.050	14.3
	0.005	6.8
	0.002	3.9
Soil Mortar Analysis % < 2.00mm	**2.000 - 0.425*	18.6
	**0.425 - 0.250*	48.2
	**0.250 - 0.150*	17.4
	**0.150 - 0.075*	15.8
	< 0.075	44.2
Effective size		<0.002
Uniformity Coefficient		-
Curvature Coefficient		-
Oversize Index		0.0
Shrinkage Product		319.2
Grading Coefficient		30.8
Grading modulus		2.03
Atter-berg Limits	*Liquid Limit*	34.0
	Plasticity Index	22.0
	Linear Shrinkage	9.1
Unified Soil Classification		CL
U.S. Highway Classification		A-2-6(0)
US Bureau		Sandy Loam



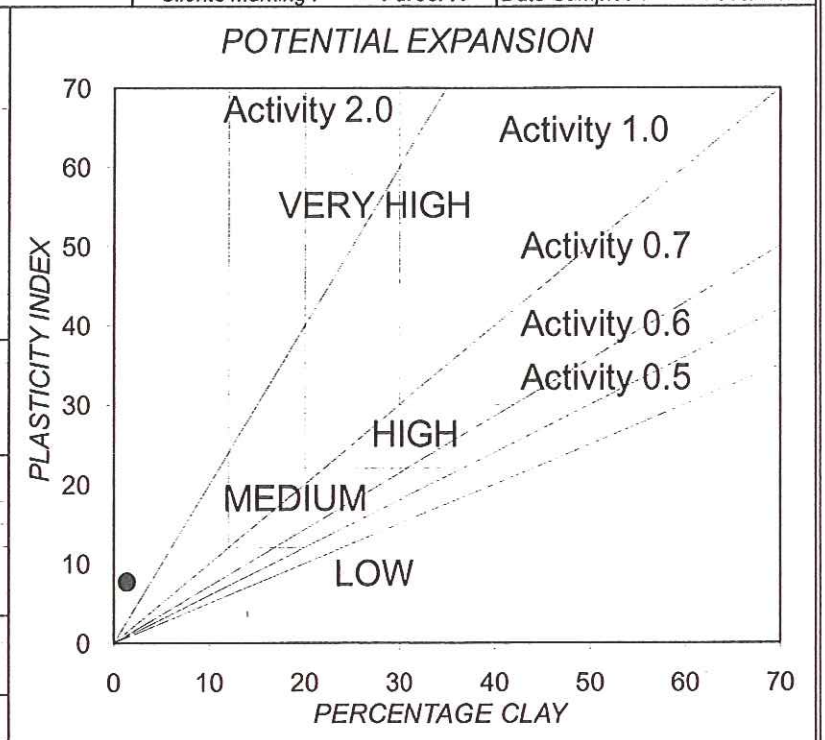


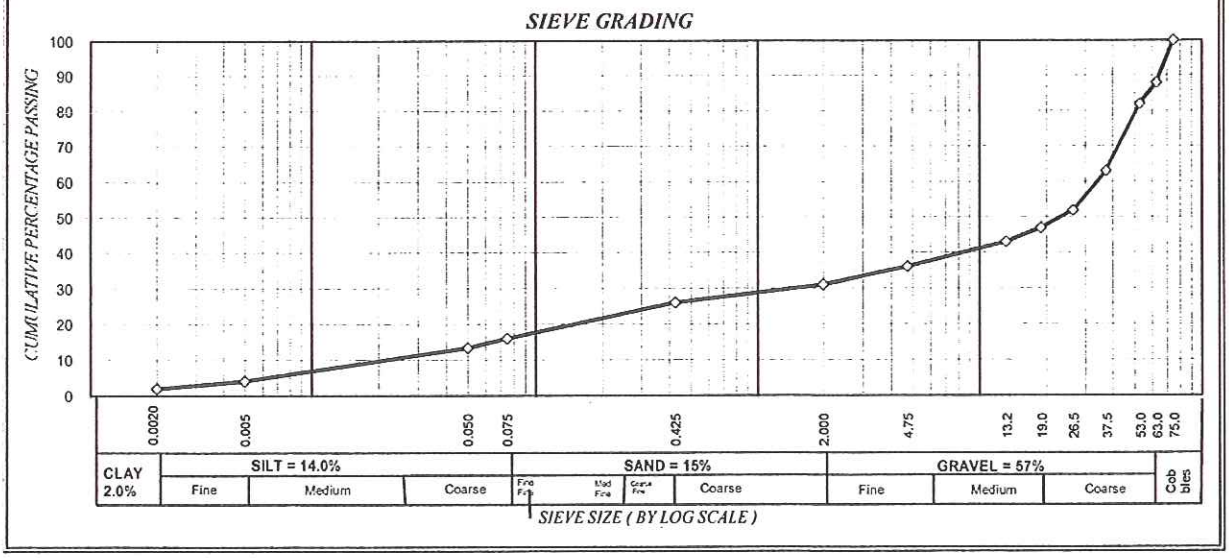
*FOUNDATION INDICATOR (TMH 1 : A1, A2, A3, A4, A5 & *A6)*

09078 **Tp1: Layer:900-1200mm**

Material description	Dark Yellow Orange	Depth : 900-1200mm	Sample Number : 2009/I4019
	Shale	Clients Marking : Parcel K	Date Sampled : 2009/11/25

Sieve analysis Cumulative percentage passing (mm)	75.0	100
	63.0	88
	53.0	82
	37.5	63
	26.5	52
	19.0	47
	13.2	43
	4.75	36
	2.000	31
	0.425	26
	0.075	16
	0.050	13.4
	0.005	4.1
	0.002	2.0
Soil Mortar Analysis % < 2.00mm	*2.000 - 0.425	16.1
	*0.425 - 0.250	40.5
	*0.250 - 0.150	30.1
	*0.150 - 0.075	13.3
	< 0.075	51.6
Effective size		<0.002
Uniformity Coefficient		-
Curvature Coefficient		-
Oversize Index		37.0
Shrinkage Product		200.2
Grading Coefficient		7.6
Grading modulus		2.27
Atter-berg Limits	Liquid Limit	35.0
	Plasticity Index	17.0
	Linear Shrinkage	7.7
Unified Soil Classification		CL
U.S. Highway Classification		A-2-6(0)
US Bureau		Sandy Loam





Civil Engineering Materials Laboratory

ROADLAB

(PTY) LTD (EDMS) BPK Reg. No. 65/08083/07
VAT No. 4790192266

HEAD OFFICE
168 RIETFONTEIN RD, PRIMROSE
P.O. BOX 1476, GERMISTON, 1400
TEL: 011 828 0279
FAX: 011 828 0273
www.roadlab.co.za
info@roadlab.co.za

41 YEARS. Est. 1965

C.H. Badenhorst
P.O. Box 16738
Dowerglen Ext. 3
1612

Dear Sir

Test Report : **JABULA PRECINCT DEVELOPMENT - SITE INVESTIGATION**

Please find the attached test results for the sample/s as submitted to and tested by Roadlab (PTY)Ltd. in Primrose, Germiston.
The unambiguous description of the sample/s as received are as follows :

SAMPLE No.	2009/4018			
CONTAINER USED FOR SAMPLING	Black Sampling Bags			
SIZE / WEIGHT OF SAMPLE	±70kg's			
MOISTURE CONDITION OF SAMPLE ON ARRIVAL	Slightly Moist			
HOLE No. / Km. / CHAINAGE	TP 1			
LAYER TESTED / SAMPLED FROM	370-900mm			
DATE SAMPLED	24/11/2009			
DATE RECEIVED	24/11/2009			
CLIENTS MARKING	Parcel K			
DESCRIPTION OF SAMPLE (COLOUR & TYPE)	Dark Red Orange Ferricrete			

SIEVE ANA - LYSIS (mm) (TMH A1a)	75.0	100			
	63.0	100			
	53.0	100			
	37.5	100			
	26.5	99			
	19.0	92			
	13.2	80			
	4.75	55			
	2.00	43			
	0.425	35			
	0.075	19			

ATTERBERG LIMITS (TMH A2&A3)	LL%	34.0			
	P.I.	22.0			
	LS%	9.0			
GM		2.03			
CLASSIFI - CATION	H.R.B.*	A-2-7(0)			
	COLTO*	<G9			
	T.R.H. 14*	G8			

MOD AASHTO (TMH A7)	OMC%	15.4			
	MDD(KG/M^3)	1807			
C.B.R.	COMP MC	15.2			
	% SWELL	1.24			
U.C.S. (TMH A13T) C.B.R. (TMH A8)	100%	25			
	98%	21			
	97%	20			
	95%	16			
	93%	13			
	90%	9			
PROCTOR ITS : DRY (kPa)		N/A			
MOD ITS : DRY (kPa)		N/A			
STABILISED WITH	IN LAB				
	ON SITE	Neat			
TEST TYPE		CBR & F/Ind			
SAMPLED BY		Roadlab			
DELIVERED BY		Roadlab			
SAMPLED ACCORDING TO		Clients Requirements			
ENVIRONMENTAL CONDITION WHEN SAMPLED		Sunny			
REMARKS & NOTES		None			

Remarks :

*Opinions & Interpretations are not included in our schedule of Accreditation
SANAS Accredited Laboratory No. T 0296
The samples were subjected to analysis according to TMH 1
The results reported relate only to the sample tested
Further use of the above information is not the responsibility or liability of Roadlab
Documents may only be reproduced or published in their full context
Compiled By : Liza Lubbe

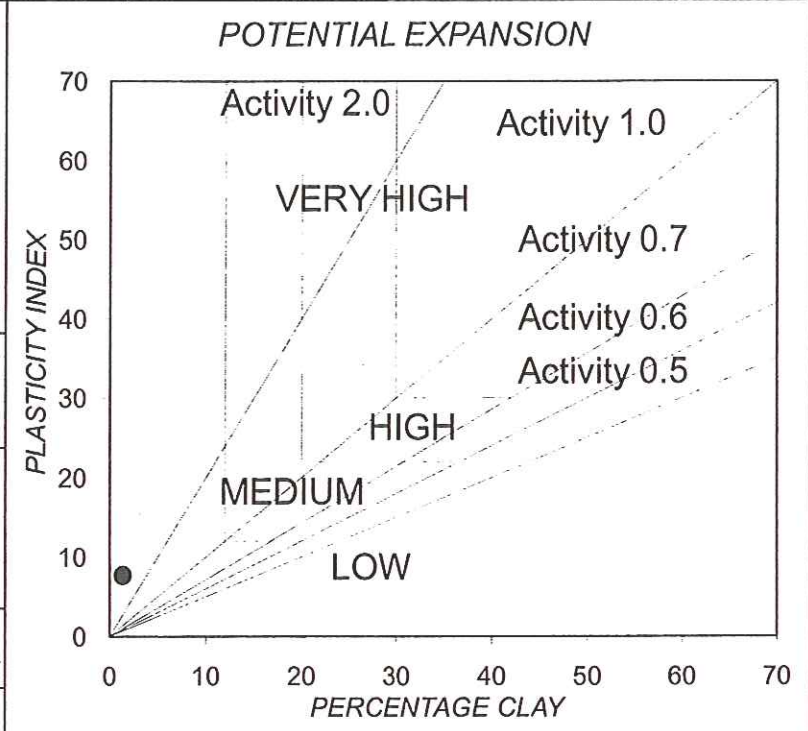
*FOUNDATION INDICATOR (TMH 1 : A1, A2, A3, A4, A5 & *A6)*

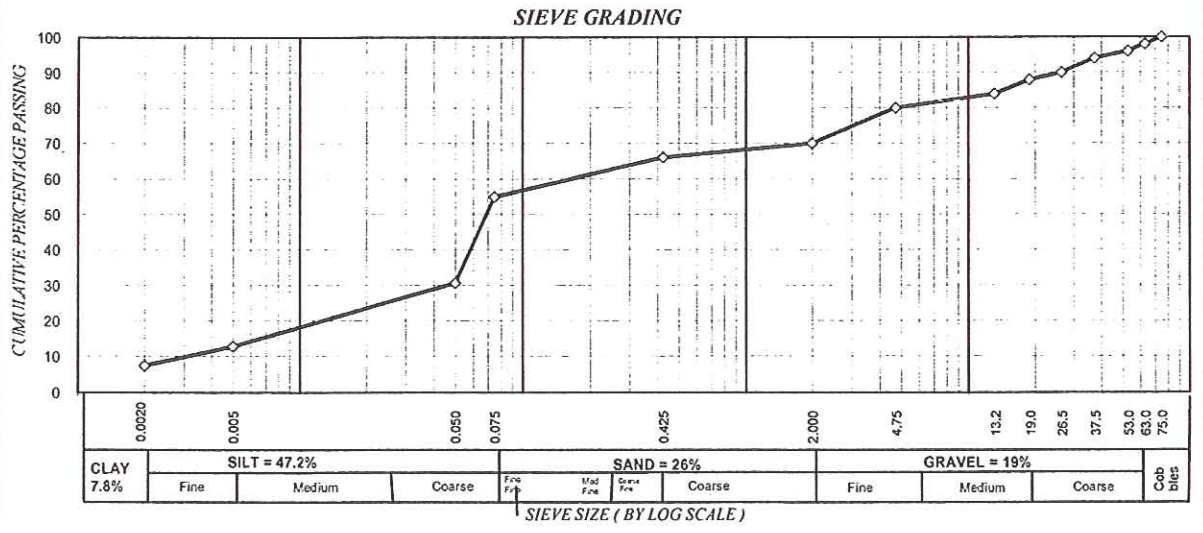
09078

TP2: Layer: 600-1500mm

Material description	Dark Red Orange		Depth :	600-1500mm	Sample Number : 2009/I4020
	Shale Ferricrete		Clients Marking :	Parcel K	Date Sampled : 2009/11/25

Sieve analysis Cumulative percentage passing (mm)	75.0	100
	63.0	98
	53.0	96
	37.5	94
	26.5	90
	19.0	88
	13.2	84
	4.75	80
	2.000	70
	0.425	66
	0.075	55
	0.050	30.7
	0.005	12.8
	0.002	7.4
Soil Mortar Analysis % < 2.00mm	*2.000 - 0.425	5.7
	*0.425 - 0.250	50.4
	*0.250 - 0.150	25.6
	*0.150 - 0.075	18.3
	< 0.075	78.6
Effective size		<0.002
Uniformily Coefficient		-
Curvature Coefficient		-
Oversize Index		6.0
Shrinkage Product		602.6
Grading Coefficient		16.0
Grading modulus		1.09
Atter-berg Limits	Liquid Limit	40.0
	Plasticity Index	20.0
	Linear Shrinkage	9.1
Unified Soil Classification		CL
U.S. Highway Classification		A-6(8)
US Bureau		Sandy Loam





Civil Engineering Materials Laboratory

ROADLAB

(PTY) LTD (EDMS) BPK Reg No 65/08083/07
VAT No 4790192266

HEAD OFFICE
168 RIETFONTEIN RD, PRIMROSE
P.O. BOX 1476, GERMISTON, 1400
TEL: 011 828 0279
FAX: 011 828 0273
www.roadlab.co.za
info@roadlab.co.za

41 YEARS. Est. 1965

C.H. Badenhorst
P.O. Box 16738
Dowerglen Ext. 3
1612

Dear Sir

Test Report : JABULA PRECINCT DEVELOPMENT - SITE INVESTIGATION

Please find the attached test results for the sample/s as submitted to and tested by Roadlab (PTY)Ltd. in Primrose, Germiston.
The unambiguous description of the sample/s as received are as follows :

SAMPLE No.	2009/4020			
CONTAINER USED FOR SAMPLING	Black Sampling Bags			
SIZE / WEIGHT OF SAMPLE	±70kg's			
MOISTURE CONDITION OF SAMPLE ON ARRIVAL	Slightly Moist			
HOLE No. / Km. / CHAINAGE	TP 2			
LAYER TESTED / SAMPLED FROM	600-1500mm			
DATE SAMPLED	23/11/2009			
DATE RECEIVED	23/11/2009			
CLIENTS MARKING	Parcel K			
DESCRIPTION OF SAMPLE (COLOUR & TYPE)	Dark Red Orange Shale Ferricrete			

SIEVE ANALYSIS (mm) (TMH A1a)	75.0	100			
	63.0	98			
	53.0	96			
	37.5	94			
	26.5	90			
	19.0	88			
	13.2	84			
	4.75	80			
	2.00	70			
	0.425	66			
	0.075	55			

ATTERBERG LIMITS (TMH A2&A3)	LL%	40.0			
	P.I.	20.0			
	LS%	9.1			
GM		0.94			
CLASSIFICATION	H.R.B.*	A-6(8)			
	COLTO*	<G9			
	T.R.H. 14*	G8			

MOD AASHTO (TMH A7)	OMC%	10.6			
	MDD(KG/M³)	2010			
C.B.R.	COMP MC	10.4			
	% SWELL	0.49			
U.C.S. (TMH A13T) C.B.R. (TMH A8)	100%	25			
	98%	22			
	97%	20			
	95%	17			
	93%	14			
	90%	9			
PROCTOR ITS : DRY (kPa)		N/A			
MOD ITS : DRY (kPa)		N/A			
STABILISED WITH	IN LAB				
	ON SITE	Neat			
TEST TYPE		CBR			
SAMPLED BY		Roadlab			
DELIVERED BY		Roadlab			
SAMPLED ACCORDING TO		Clients Requirements			
ENVIRONMENTAL CONDITION WHEN SAMPLED		Sunny			
REMARKS & NOTES		None			

Remarks :

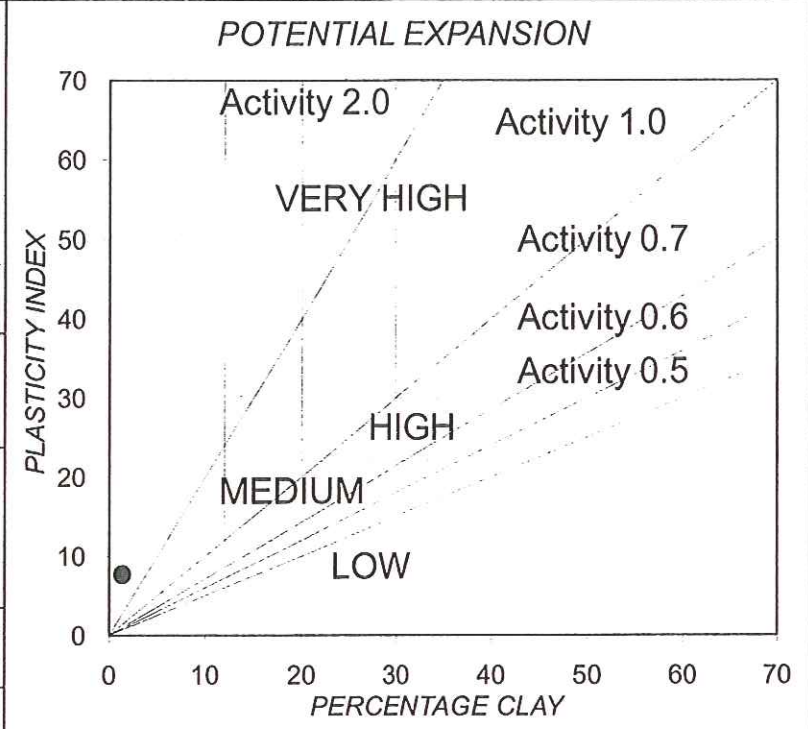
*Opinions & Interpretations are not included in our schedule of Accreditation
SANAS Accredited Laboratory No. T 0296
The samples were subjected to analysis according to TMH 1
The results reported relate only to the sample tested
Further use of the above information is not the responsibility or liability of Roadlab
Documents may only be reproduced or published in their full context
Compiled By : Liza Lubbe

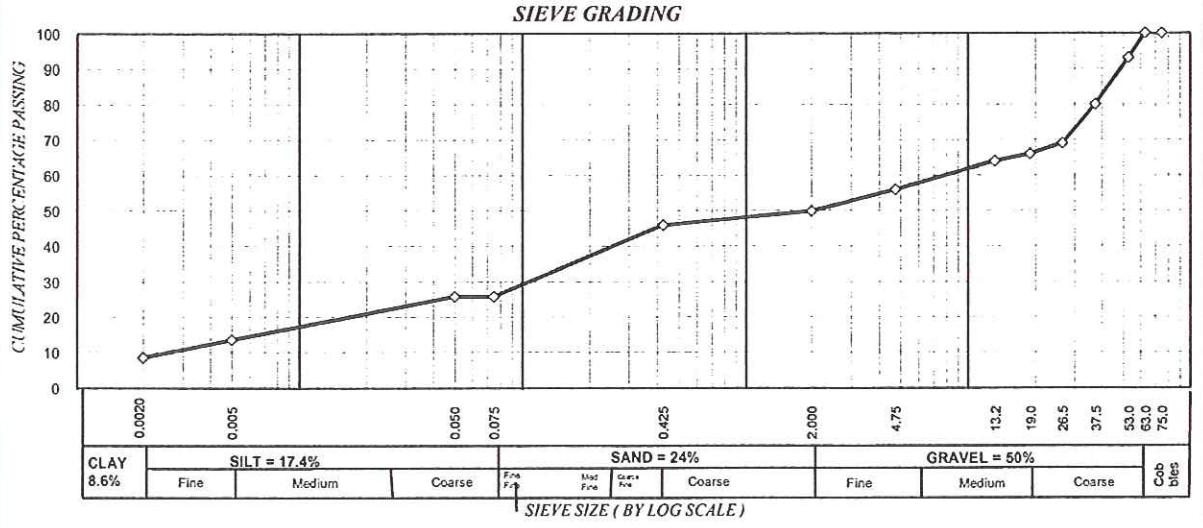
*FOUNDATION INDICATOR (TMH 1 : A1, A2, A3, A4, A5 & *A6)*

09078 — *TP3: Layer:300-1000mm*

Material description	Dark Red Orange		Depth :	300-1000mm	Sample Number : 2009/I4021
	Shale Andesite		Clients Marking :	Parcel K	Date Sampled : 2009/11/25

Sieve analysis Cumulative percentage passing (mm)	75.0	100
	63.0	100
	53.0	93
	37.5	80
	26.5	69
	19.0	66
	13.2	64
	4.75	56
	2.000	50
	0.425	46
	0.075	26
	0.050	26.0
	0.005	13.7
	0.002	8.6
Soil Mortar Analysis % < 2.00mm	*2.000 - 0.425	8.0
	*0.425 - 0.250	40.0
	*0.250 - 0.150	24.6
	*0.150 - 0.075	27.4
	< 0.075	52.0
Effeclive size		<0.002
Uniformity Coefficient		-
Curvature Coefficient		-
Oversize Index		20.0
Shrinkage Product		506.0
Grading Coefficient		10.6
Grading modulus		1.78
Atter-berg Limits	Liquid Limit	42.0
	Plasticity Index	26.0
	Linear Shrinkage	11.0
Unified Soil Classification		CL
U.S. Highway Classification		A-2-7(2)
US Bureau		Sandy Clay Loam





Civil Engineering Materials Laboratory

ROADLAB

(PTY) LTD (EDMS) BPK Reg. No 65/08083/07
VAT No. 4790192266

HEAD OFFICE
168 RIETFONTEIN RD, PRIMROSE
P.O. BOX 1476, GERMISTON, 1400
TEL: 011 828 0279
FAX: 011 828 0273
www.roadlab.co.za
info@roadlab.co.za

41 YEARS. Est. 1965

C.H. Badenhorst
P.O. Box 16738
Dowerglen Ext. 3
1612

Dear Sir

Test Report : **JABULA PRECINCT DEVELOPMENT - SITE INVESTIGATION**

Please find the attached test results for the sample/s as submitted to and tested by Roadlab (PTY)Ltd. in Primrose, Germiston.
The unambiguous description of the sample/s as received are as follows :

SAMPLE No.		2009/4021			
CONTAINER USED FOR SAMPLING		Black Sampling Bags			
SIZE / WEIGHT OF SAMPLE		±70kg's			
MOISTURE CONDITION OF SAMPLE ON ARRIVAL		Slightly Moist			
HOLE No. / Km. / CHAINAGE		TP 3			
LAYER TESTED / SAMPLED FROM		300-1000mm			
DATE SAMPLED		24/11/2009			
DATE RECEIVED		24/11/2009			
CLIENTS MARKING		Parcel K			
DESCRIPTION OF SAMPLE (COLOUR & TYPE)		Dark Red Orange Shale Andersite			
SIEVE ANA - LYSIS (mm) (TMH A1a)	75.0	100			
	63.0	100			
	53.0	93			
	37.5	80			
	26.5	69			
	19.0	66			
	13.2	64			
	4.75	56			
	2.00	50			
	0.425	46			
	0.075	26			
ATTERBERG LIMITS (TMH A2&A3)	LL%	42.0			
	P.I.	26.0			
	LS%	11.0			
GM		1.78			
CLASSIFI - CATION	H.R.B.*	A-2-7(0)			
	COLTO*	<G9			
	T.R.H. 14*	G9			
MOD AASHTO (TMH A7)	OMC%	14.1			
	MDD(KG/M^3)	1755			
C.B.R.	COMP MC	13.9			
	% SWELL	1.39			
U.C.S. (TMH A13T) C.B.R. (TMH A8)	100%	24			
	98%	19			
	97%	17			
	95%	12			
	93%	10			
	90%	7			
PROCTOR ITS : DRY (kPa)		N/A			
MOD ITS : DRY (kPa)		N/A			
STABILISED WITH	IN LAB				
	ON SITE	Neat			
TEST TYPE		CBR & F/Ind			
SAMPLED BY		Roadlab			
DELIVERED BY		Roadlab			
SAMPLED ACCORDING TO		Clients Requirements			
ENVIRONMENTAL CONDITION WHEN SAMPLED		Sunny			
REMARKS & NOTES		None			

Remarks :

*Opinions & Interpretations are not included in our schedule of Accreditation
SANAS Accredited Laboratory No T 0296
The samples were subjected to analysis according to TMH 1
The results reported relate only to the sample tested
Further use of the above information is not the responsibility or liability of Roadlab
Documents may only be reproduced or published in their full context
Compiled By : Liza Lubbe

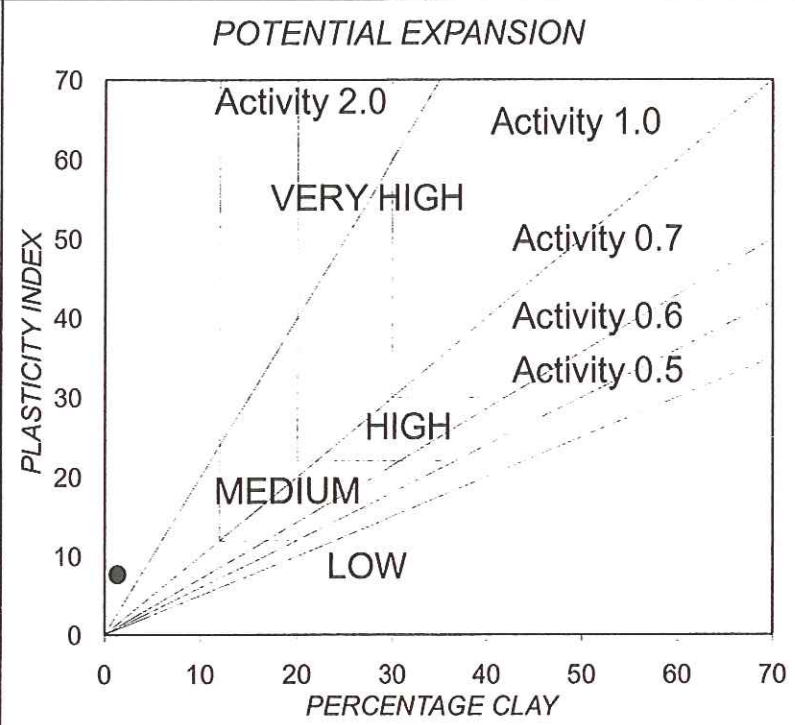
*FOUNDATION INDICATOR (TMH 1 : A1, A2, A3, A4, A5 & *A6)*

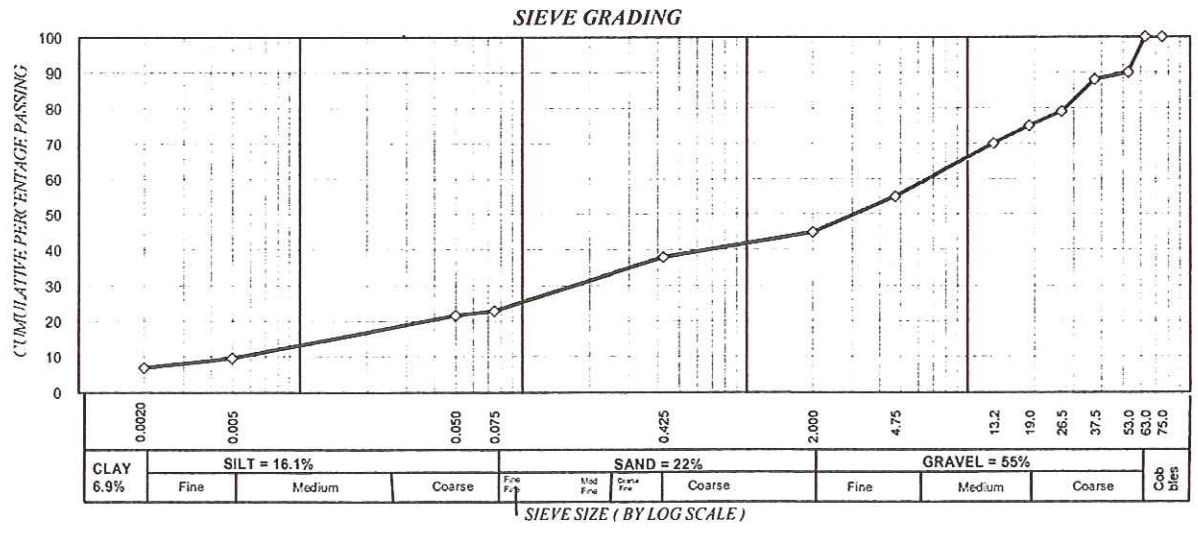
09078

TP4: Layer:150-1200mm

Material description	*Dark Red Orange*		*Depth :*	*150-1200mm*	*Sample Number :* *2009/I4022*
	Shale		*Clients Marking :*	*Parcel K*	*Date Sampled :* *2009/11/25*

Sieve analysis Cumulative percentage passing (mm)	*75.0*	100
	63.0	100
	53.0	90
	37.5	88
	26.5	79
	19.0	75
	13.2	70
	4.75	55
	2.000	45
	0.425	38
	0.075	23
	0.050	21.7
	0.005	9.6
	0.002	6.9
Soil Mortar Analysis % < 2.00mm	**2.000 - 0.425*	15.6
	**0.425 - 0.250*	36.2
	**0.250 - 0.150*	27.0
	**0.150 - 0.075*	21.3
	< 0.075	51.1
Effective size		<0.002
Uniformity Coefficient		-
Curvature Coefficient		-
Oversize Index		12.0
Shrinkage Product		306.3
Grading Coefficient		18.7
Grading modulus		1.94
Atter-berg Limits	*Liquid Limit*	34.0
	Plasticity Index	18.0
	Linear Shrinkage	8.1
Unified Soil Classification		CL
U.S. Highway Classification		A-2-6(1)
US Bureau		Sandy Clay Loam



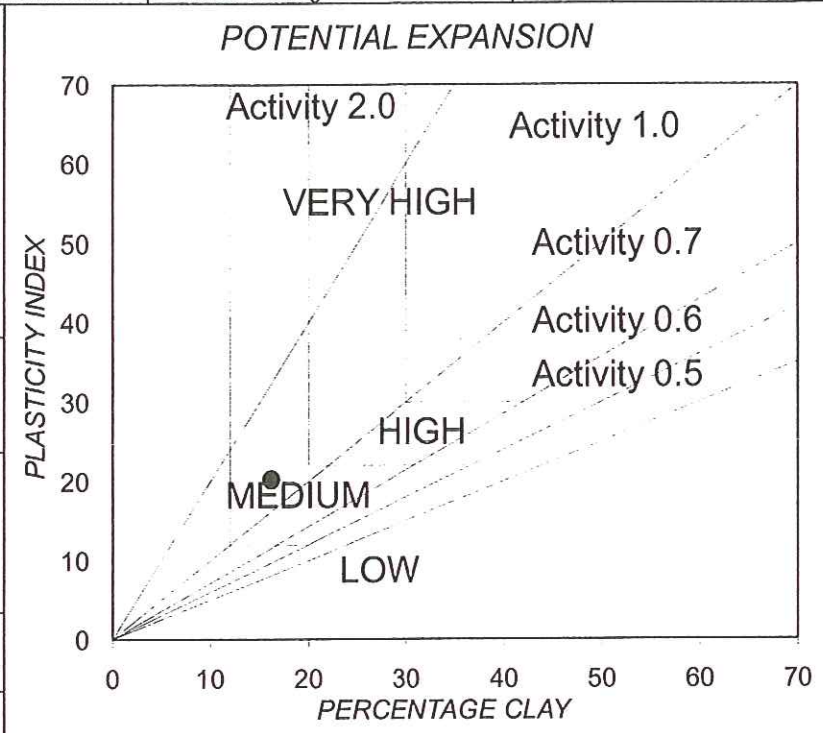


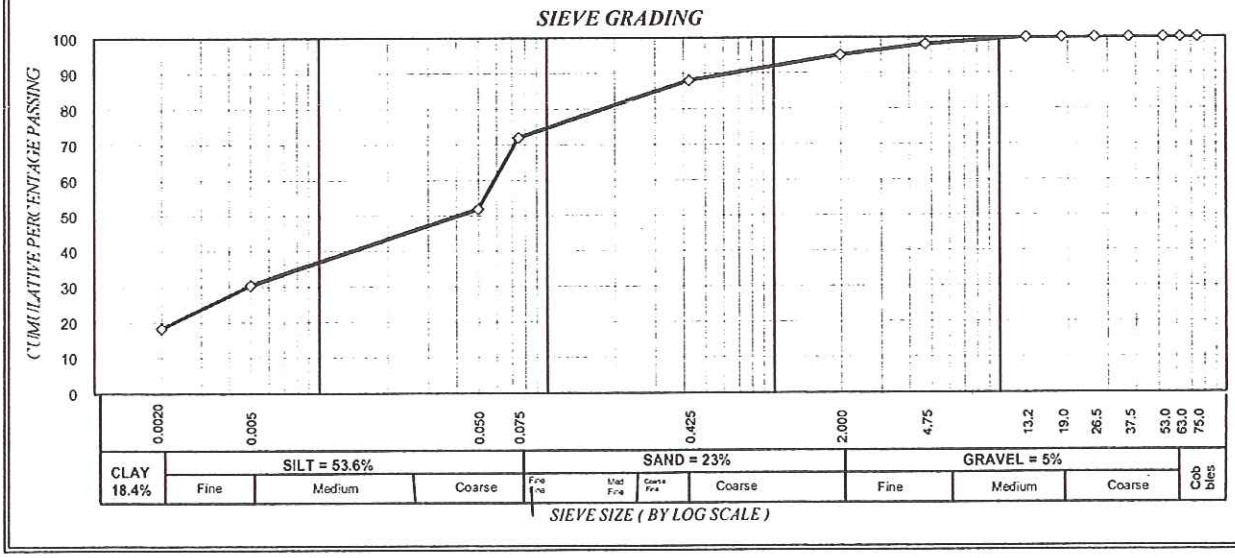
FOUNDATION INDICATOR (TMH 1 : A1, A2, A3, A4, A5 & *A6)

09078 — Tp5:Layer 750-1500mm — Annexure B

Material description	Light Red Brown	Depth : 750-1500mm	Sample Number : 2009/I4023
	Quartzitic & Ferricrete Nodules	Clients Marking : Parcel K	Date Sampled : 2009/12/04

Sieve analysis Cumulative percentage passing (mm)	75.0	100
	63.0	100
	53.0	100
	37.5	100
	26.5	100
	19.0	100
	13.2	100
	4.75	98
	2.000	95
	0.425	88
	0.075	72
	0.050	51.9
	0.005	30.5
	0.002	18.4
Soil Mortar Analysis % < 2.00mm	*2.000 - 0.425	7.4
	*0.425 - 0.250	38.0
	*0.250 - 0.150	22.5
	*0.150 - 0.075	32.1
	< 0.075	75.8
Effective size		<0.002
Uniformity Coefficient		-
Curvature Coefficient		-
Oversize Index		0.0
Shrinkage Product		950.4
Grading Coefficient		4.9
Grading modulus		0.45
Atter-berg Limits	Liquid Limit	41.0
	Plasticity Index	23.0
	Linear Shrinkage	10.8
Unified Soil Classification		CL
U.S. Highway Classification		A-7-6(12)
US Bureau		Sandy Loam



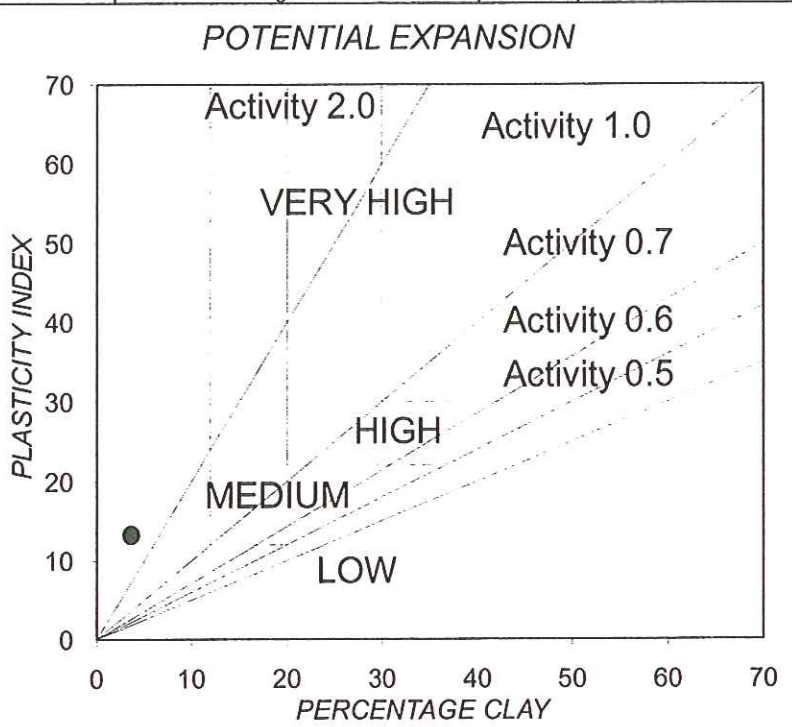


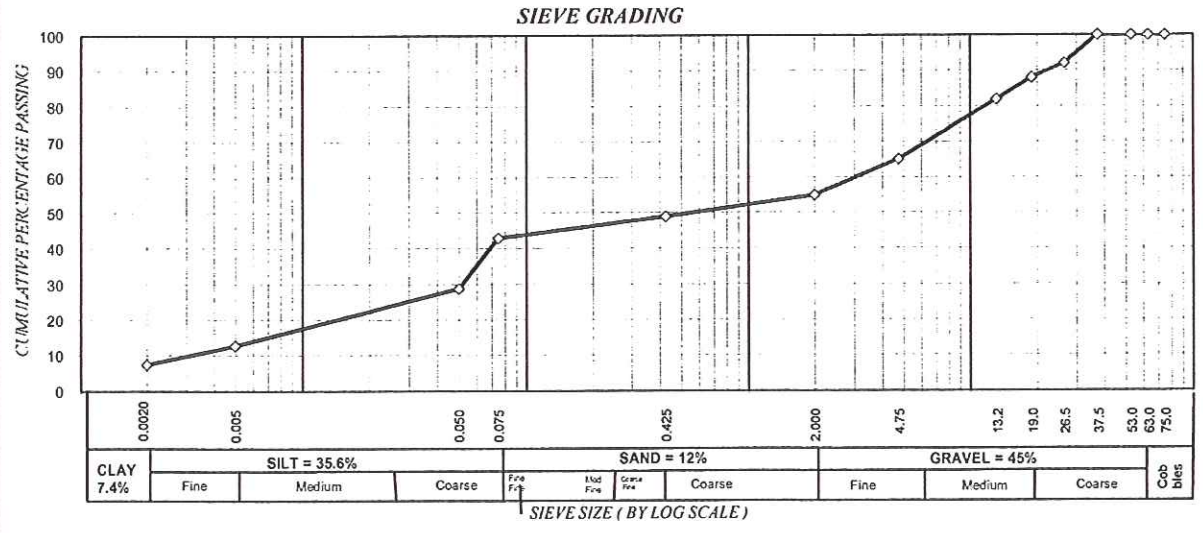
FOUNDATION INDICATOR (TMH 1 : A1, A2, A3, A4, A5 & *A6)

09078 — Tp6:Layer 450-1600mm — Annexure B

Material description	Light Red Brown / Shale	Depth :	450-1600mm	Sample Number :	2009/I4024
		Clients Marking :	Parcel K	Date Sampled :	2009/12/08

Sieve analysis Cumulative percentage passing (mm)	75.0	100
	63.0	100
	53.0	100
	37.5	100
	26.5	92
	19.0	88
	13.2	82
	4.75	65
	2.000	55
	0.425	49
	0.075	43
	0.050	28.9
	0.005	12.8
	0.002	7.4
Soil Mortar Analysis % < 2.00mm	*2.000 - 0.425	10.9
	*0.425 - 0.250	36.5
	*0.250 - 0.150	29.2
	*0.150 - 0.075	23.3
	< 0.075	78.2
Effective size		<0.002
Uniformity Coefficient		-
Curvature Coefficient		-
Oversize Index		0.0
Shrinkage Product		597.8
Grading Coefficient		24.1
Grading modulus		1.53
Atter-berg Limits	Liquid Limit	44.0
	Plasticity Index	27.0
	Linear Shrinkage	12.2
Unified Soil Classification		CL
U.S. Highway Classification		A-7-6(7)
US Bureau		Sandy Clay Loam





Civil Engineering Materials Laboratory

ROADLAB

(PTY) LTD (EDMS) BPK Reg No 65/03063/07
VAT No 4790192266

HEAD OFFICE
168 RIETFONTEIN RD, PRIMROSE
P.O. BOX 1476, GERMISTON, 1400
TEL: 011 828 0279
FAX: 011 828 0273
www.roadlab.co.za
info@roadlab.co.za

41 YEARS. Est. 1965

C.H. Badenhorst
P.O. Box 16738
Dowerglen Ext. 3
1612

Dear Sir

Test Report :

Please find the attached test results for the sample/s as submitted to and tested by Roadlab (PTY)Ltd. in Primrose, Germiston.
The unambiguous description of the sample/s as received are as follows :

SAMPLE No.	2009/4024			
CONTAINER USED FOR SAMPLING	Black Sampling Bags			
SIZE / WEIGHT OF SAMPLE	±70kg's			
MOISTURE CONDITION OF SAMPLE ON ARRIVAL	Slightly Moist			
HOLE No. / Km. / CHAINAGE	TP 6			
LAYER TESTED / SAMPLED FROM	450-1600mm			
DATE SAMPLED	24/11/2009			
DATE RECEIVED	24/11/2009			
CLIENTS MARKING	Parcel K			
DESCRIPTION OF SAMPLE (COLOUR & TYPE)	Light Red Brown Shale			

SIEVE ANA - LYSIS (mm) (TMH A1a)	75.0	100			
	63.0	100			
	53.0	100			
	37.5	100			
	26.5	92			
	19.0	88			
	13.2	82			
	4.75	65			
	2.00	55			
	0.425	49			
	0.075	43			

ATTERBERG LIMITS (TMH A2&A3)	LL%	44.0			
	P.I.	27.0			
	LS%	12.2			
GM		1.53			
CLASSIFI - CATION	H.R.B.*	A-6(7)			
	COLTO*	<G9			
	T.R.H. 14*	G9			

MOD AASHTO (TMH A7)	OMC%	13.3			
	MDD(KG/M³)	1592			
C.B.R.	COMP MC	13.1			
	% SWELL	1.05			
U.C.S. (TMH A13T) C.B.R. (TMH A8)	100%	10			
	98%	9			
	97%	9			
	95%	9			
	93%	8			
	90%	7			
PROCTOR ITS : DRY (kPa)		N/A			
MOD ITS : DRY (kPa)		N/A			
STABILISED WITH	IN LAB				
	ON SITE	Neat			
TEST TYPE		Foundation Indicator & CBR			
SAMPLED BY		Roadlab			
DELIVERED BY		Roadlab			
SAMPLED ACCORDING TO		Clients Requirements			
ENVIRONMENTAL CONDITION WHEN SAMPLED		Sunny			
REMARKS & NOTES		None			

Remarks :

*Opinions & Interpretations are not included in our schedule of Accreditation
SANAS Accredited Laboratory No. T 0296
The samples were subjected to analysis according to TMH 1
The results reported relate only to the sample tested
Further use of the above information is not the responsibility or liability of Roadlab
Documents may only be reproduced or published in their full context
Compiled By : Liza Lubbe

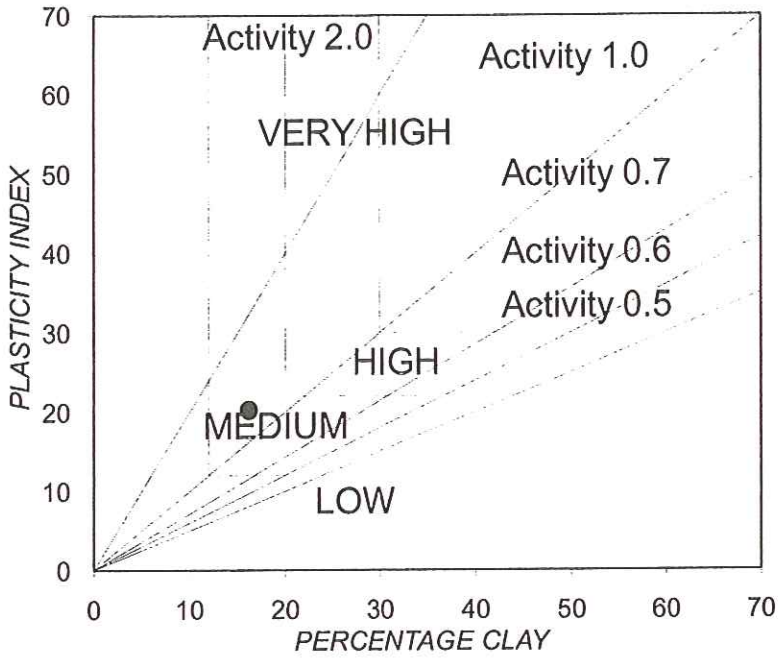
FOUNDATION INDICATOR (TMH 1 : A1, A2, A3, A4, A5 & *A6)

09078 — Tp7: Layer:500-1000mm — Annexure B

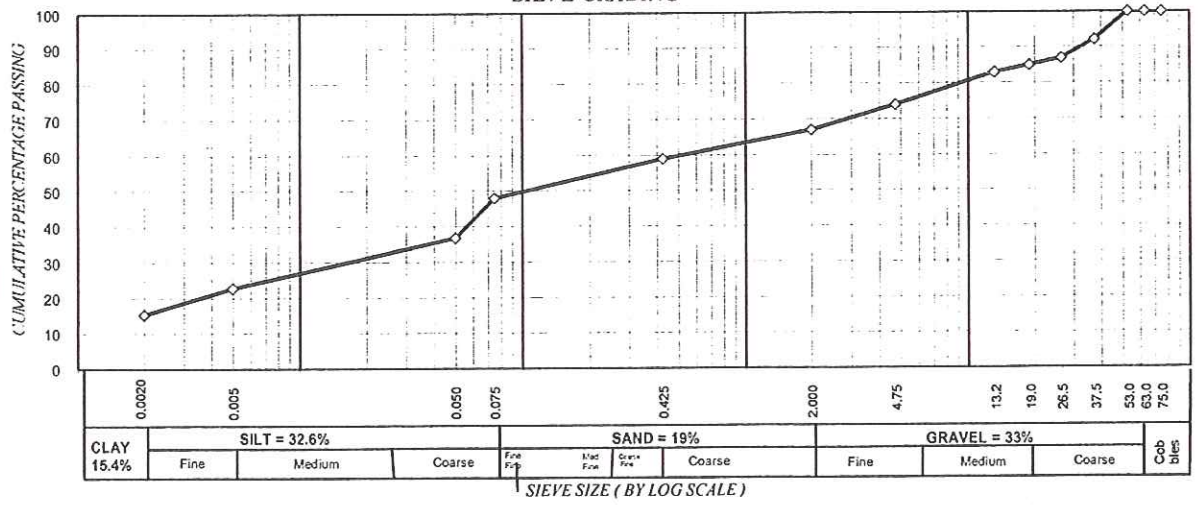
Material description	Dark Brown / Shale Ferricrete Nodules	Depth : 500-1000mm	Clients Marking : Parcel K	Sample Number : 2009/I4025	Date Sampled : 2009/12/04

Sieve analysis Cumulative percentage passing (mm)	75.0	100
	63.0	100
	53.0	100
	37.5	92
	26.5	87
	19.0	85
	13.2	83
	4.75	74
	2.000	67
	0.425	59
	0.075	48
	0.050	36.8
	0.005	22.8
	0.002	15.4
Soil Mortar Analysis % < 2.00mm	*2.000 - 0.425	11.9
	*0.425 - 0.250	33.2
	*0.250 - 0.150	20.9
	*0.150 - 0.075	34.0
	< 0.075	71.6
Effective size		<0.002
Uniformity Coefficient		-
Curvature Coefficient		-
Oversize Index		8.0
Shrinkage Product		755.2
Grading Coefficient		14.8
Grading modulus		1.26
Atter-berg Limits	Liquid Limit	48.0
	Plasticity Index	28.0
	Linear Shrinkage	12.8
Unified Soil Classification		CL
U.S. Highway Classification		A-7-6(9)
US Bureau		Sandy Loam

POTENTIAL EXPANSION



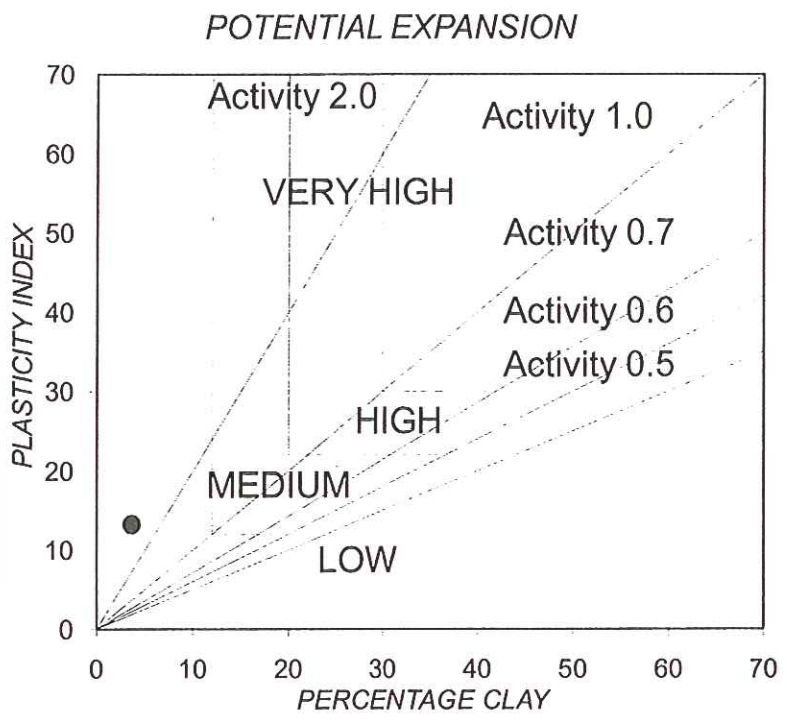
SIEVE GRADING

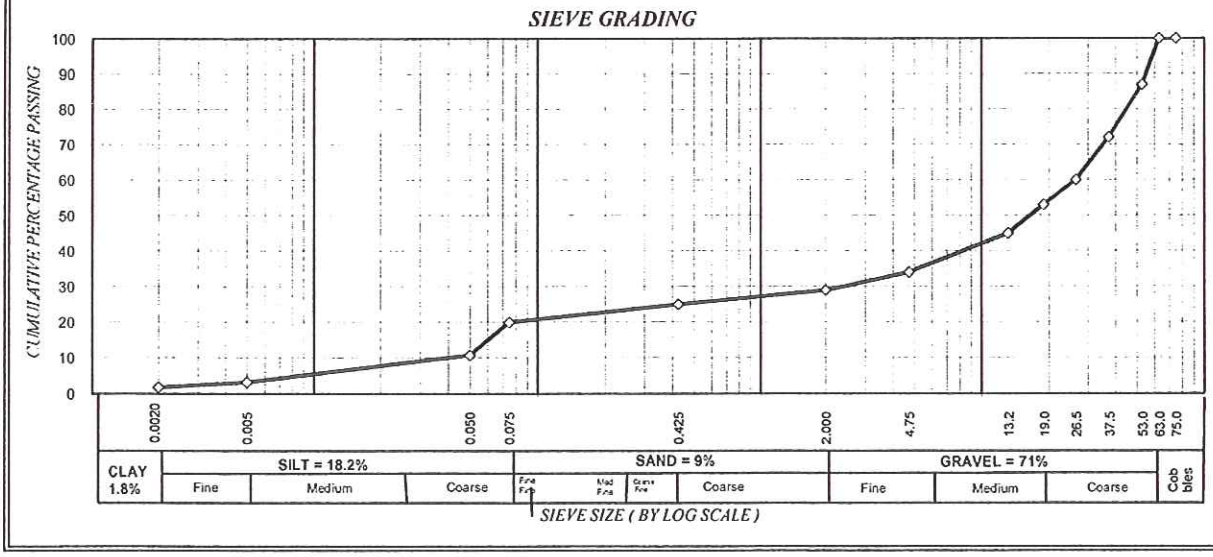


*FOUNDATION INDICATOR (TMH 1 : A1, A2, A3, A4, A5 & *A6)*

09078 — *Tp8:Layer 700-1600mm* — Annexure B

Material description		Dark Yellow Orange / Shale	Depth : 700-1600mm	Sample Number : 2009/I4026
			Clients Marking : Parcel K	Date Sampled : 2009/12/08
Sieve analysis Cumulative percentage passing (mm)	75.0	100		
	63.0	100		
	53.0	87		
	37.5	72		
	26.5	60		
	19.0	53		
	13.2	45		
	4.75	34		
	2.000	29		
	0.425	25		
	0.075	20		
	0.050	10.7		
	0.005	3.2		
	0.002	1.8		
Soil Mortar Analysis % < 2.00mm	*2.000 - 0.425	13.8		
	*0.425 - 0.250	49.0		
	*0.250 - 0.150	2.0		
	*0.150 - 0.075	26.0		
	< 0.075	11.0		
Effective size		<0.002		
Uniformity Coefficient		-		
Curvature Coefficient		-		
Oversize Index		28.0		
Shrinkage Product		180.0		
Grading Coefficient		10.5		
Grading modulus		2.26		
Atter-berg Limits	Liquid Limit	40.0		
	Plasticity Index	16.0		
	Linear Shrinkage	7.2		
Unified Soil Classification		ML-CL		
U.S. Highway Classification		A-2-6(0)		
US Bureau		Sandy Loam		





Civil Engineering Materials Laboratory

ROADLAB

(PTY) LTD (EDMS) BPK Reg No 65/08083/07
VAT No 4790192266

HEAD OFFICE
168 RIETFONTEIN RD, PRIMROSE
P.O. BOX 1476, GERMISTON, 1400
TEL: 011 828 0279
FAX: 011 828 0273
www.roadlab.co.za
info@roadlab.co.za

41 YEARS. Est. 1965

C.H. Badenhorst
P.O. Box 16738
Dowerglen Ext. 3
1612

Dear Sir

Test Report :

Please find the attached test results for the sample/s as submitted to and tested by Roadlab (PTY)Ltd. in Primrose, Germiston.
The unambiguous description of the sample/s as received are as follows :

SAMPLE No.	2009/4026			
CONTAINER USED FOR SAMPLING	Black Sampling Bags			
SIZE / WEIGHT OF SAMPLE	±70kg's			
MOISTURE CONDITION OF SAMPLE ON ARRIVAL	Slightly Moist			
HOLE No. / Km. / CHAINAGE	TP 8			
LAYER TESTED / SAMPLED FROM	700-1600mm			
DATE SAMPLED	24/11/2009			
DATE RECEIVED	24/11/2009			
CLIENTS MARKING	Parcel K			
DESCRIPTION OF SAMPLE (COLOUR & TYPE)	Dark Yellow Orange Shale			

SIEVE ANA - LYSIS (mm) (TMH A1a)	75.0	100			
	63.0	100			
	53.0	87			
	37.5	72			
	26.5	60			
	19.0	53			
	13.2	45			
	4.75	34			
	2.00	29			
	0.425	25			
	0.075	20			

ATTERBERG LIMITS (TMH A2&A3)	LL%	40.0			
	P.I.	16.0			
	LS%	7.2			
GM		2.26			
CLASSIFI - CATION	H.R.B.*	A-2-6(0)			
	COLTO*	G7			
	T.R.H. 14*	G7			

MOD AASHTO (TMH A7)	OMC%	14.3			
	MDD(KG/M^3)	1888			
C.B.R.	COMP MC	14.1			
	% SWELL	1.19			
U.C.S. (TMH A13T) C.B.R. (TMH A8)	100%	26			
	98%	24			
	97%	22			
	95%	20			
	93%	17			
	90%	12			
PROCTOR ITS : DRY (kPa)		N/A			
MOD ITS : DRY (kPa)		N/A			
STABILISED WITH	IN LAB				
	ON SITE	Neat			
TEST TYPE		Foundation Indicator & CBR			
SAMPLED BY		Roadlab			
DELIVERED BY		Roadlab			
SAMPLED ACCORDING TO		Clients Requirements			
ENVIRONMENTAL CONDITION WHEN SAMPLED		Sunny			
REMARKS & NOTES		None			

Remarks :

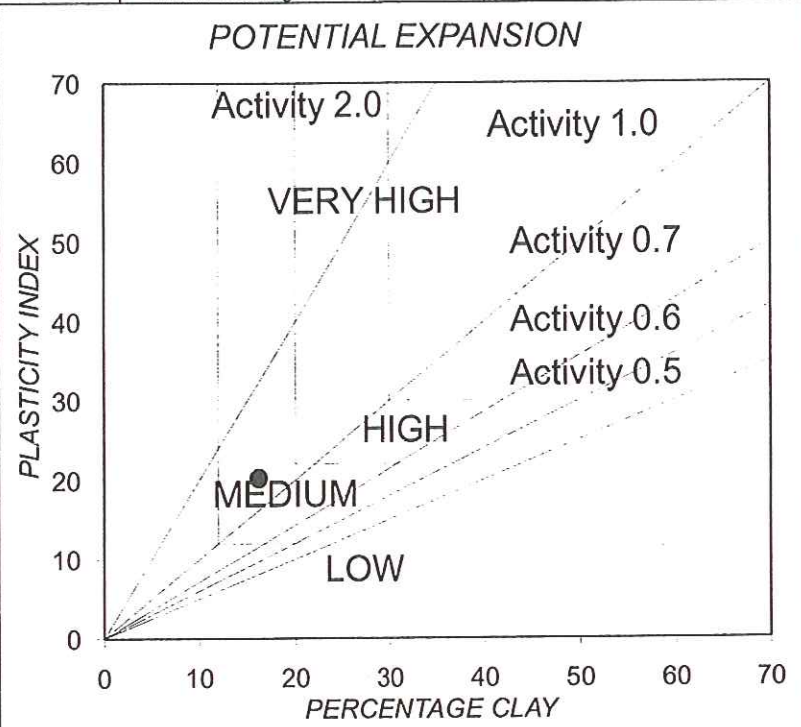
*Opinions & Interpretations are not included in our schedule of Accreditation
SANAS Accredited Laboratory No T 0296
The samples were subjected to analysis according to TMH 1
The results reported relate only to the sample tested
Further use of the above information is not the responsibility or liability of Roadlab
Documents may only be reproduced or published in their full context
Compiled By : Liza Lubbe

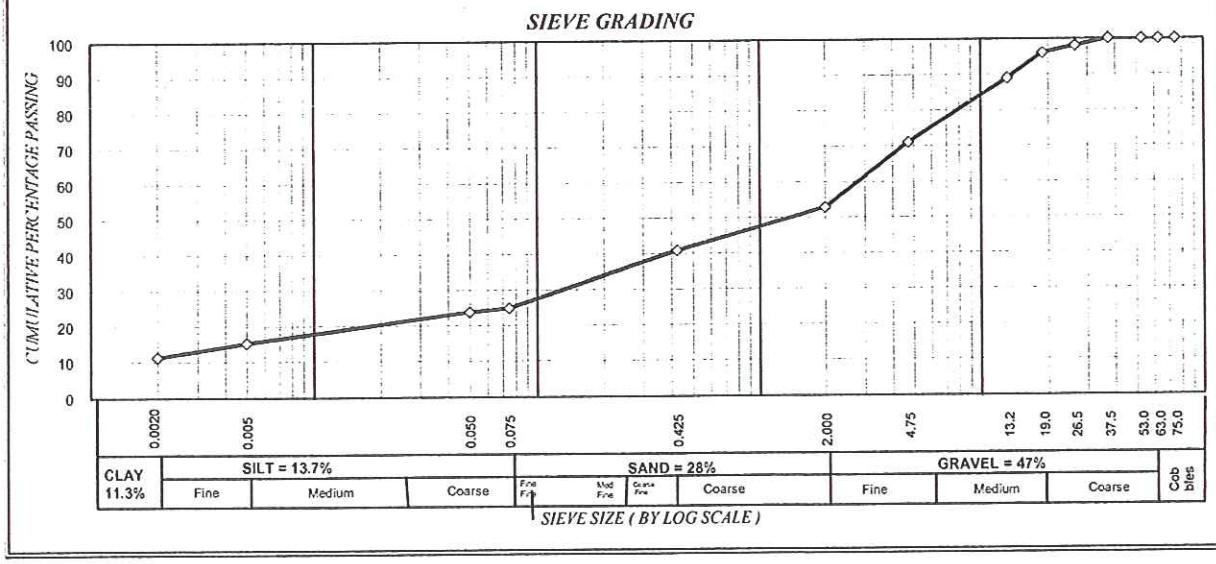
FOUNDATION INDICATOR (TMH 1 : A1, A2, A3, A4, A5 & *A6)

09078 — TP9: Layer: 470-850mm — Annexure B

Material description	Dusky Red / Ferricrete	Depth : 470-850mm	Sample Number : 2009/I4027
		Clients Marking : Parcel K	Date Sampled : 2009/12/04

Sieve analysis Cumulative percentage passing (mm)	75.0	100
	63.0	100
	53.0	100
	37.5	100
	26.5	98
	19.0	96
	13.2	89
	4.75	71
	2.000	53
	0.425	41
	0.075	25
	0.050	23.9
	0.005	15.3
	0.002	11.3
Soil Mortar Analysis % < 2.00mm	*2.000 - 0.425	22.6
	*0.425 - 0.250	28.4
	*0.250 - 0.150	20.0
	*0.150 - 0.075	28.9
	< 0.075	47.2
Effective size		<0.002
Uniformity Coefficient		-
Curvature Coefficient		-
Oversize Index		0.0
Shrinkage Product		455.1
Grading Coefficient		32.0
Grading modulus		1.81
Atter-berg Limits	Liquid Limit	49.0
	Plasticity Index	21.0
	Linear Shrinkage	11.1
Unified Soil Classification		ML-CL
U.S. Highway Classification		A-2-7(0)
US Bureau		Sandy Clay Loam





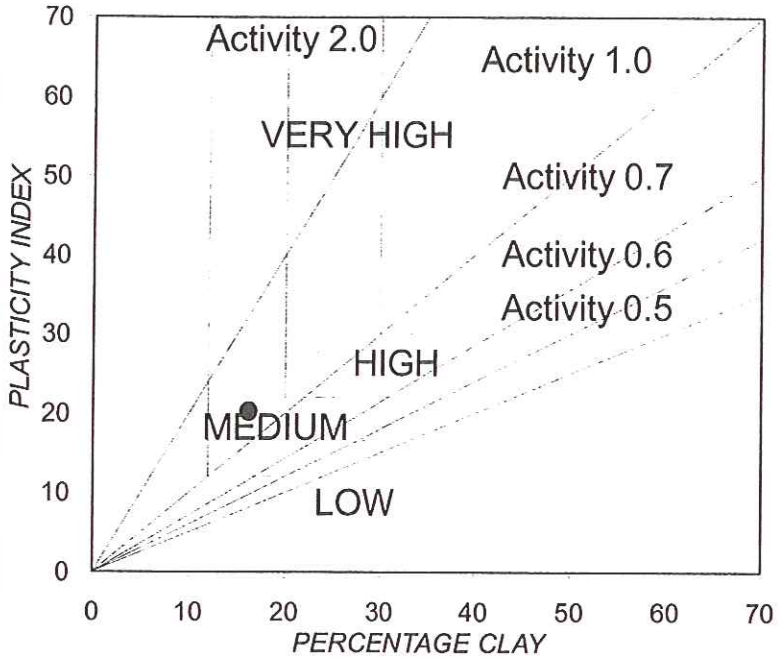
*FOUNDATION INDICATOR (TMH 1 : A1, A2, A3, A4, A5 & *A6)*

09078 — *TP10: Layer:570-1650mm* — Annexure B

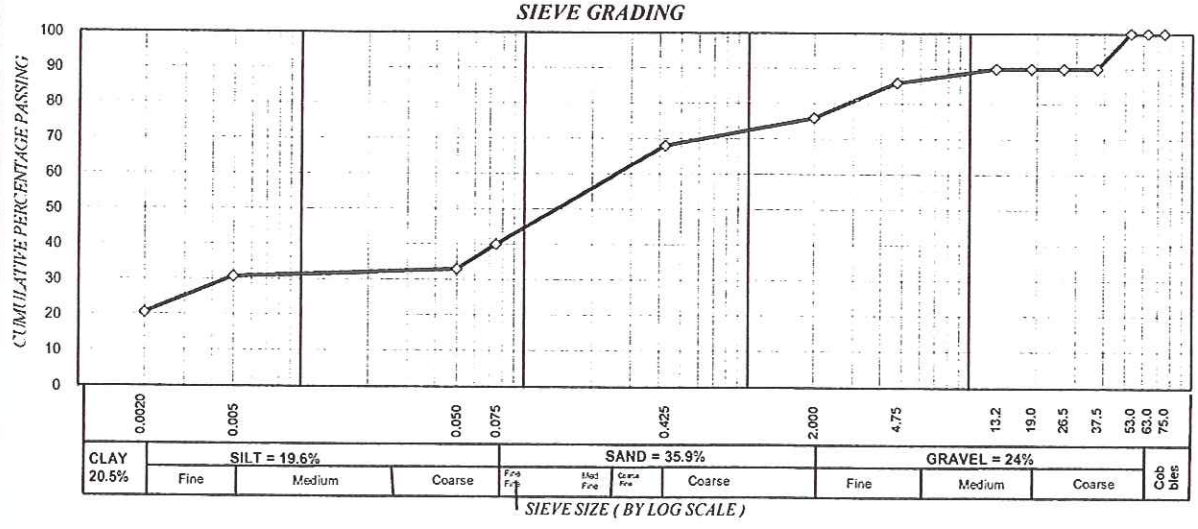
Material description		Dusky Red / Ferricrete	Depth : 570-1650mm	Sample Number : 2009/I4028
			Clients Marking : Parcel K	Date Sampled : 2009/12/07

Sieve analysis Cumulative percentage passing (mm)	75.0	100
	63.0	100
	53.0	100
	37.5	90
	26.5	90
	19.0	90
	13.2	90
	4.75	86
	2.000	76
	0.425	68
	0.075	40
	0.050	33.0
	0.005	30.8
	0.002	20.5
Soil Mortar Analysis % < 2.00mm	*2.000 - 0.425	10.5
	*0.425 - 0.250	30.2
	*0.250 - 0.150	18.7
	*0.150 - 0.075	40.6
	< 0.075	52.8
Effective size		<0.002
Uniformity Coefficient		-
Curvature Coefficient		-
Oversize Index		10.0
Shrinkage Product		496.4
Grading Coefficient		12.0
Grading modulus		1.16
Atter-berg Limits	Liquid Limit	41.0
	Plasticity Index	14.0
	Linear Shrinkage	7.3
Unified Soil Classification		ML-CL
U.S. Highway Classification		A-7-6(1)
US Bureau		Sandy Clay

POTENTIAL EXPANSION



SIEVE GRADING

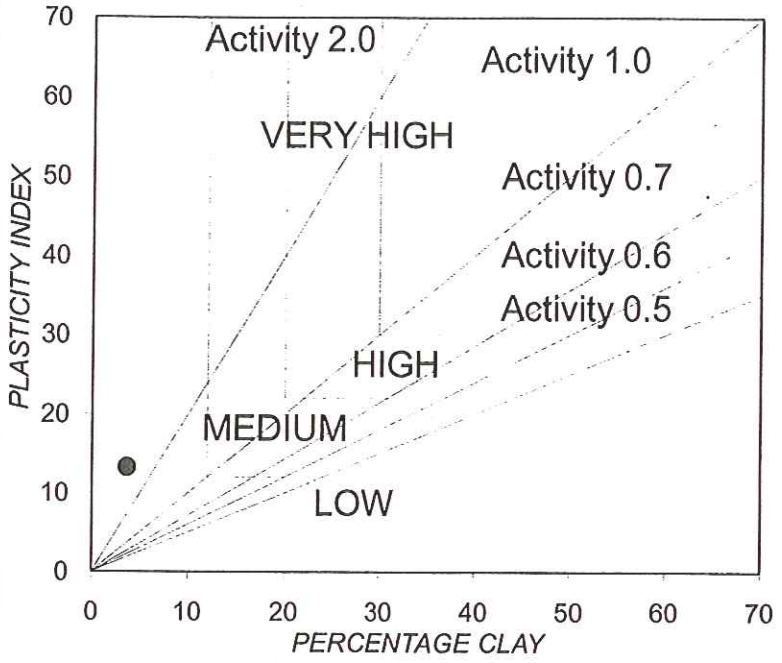


*FOUNDATION INDICATOR (TMH 1 : A1, A2, A3, A4, A5 & *A6)*

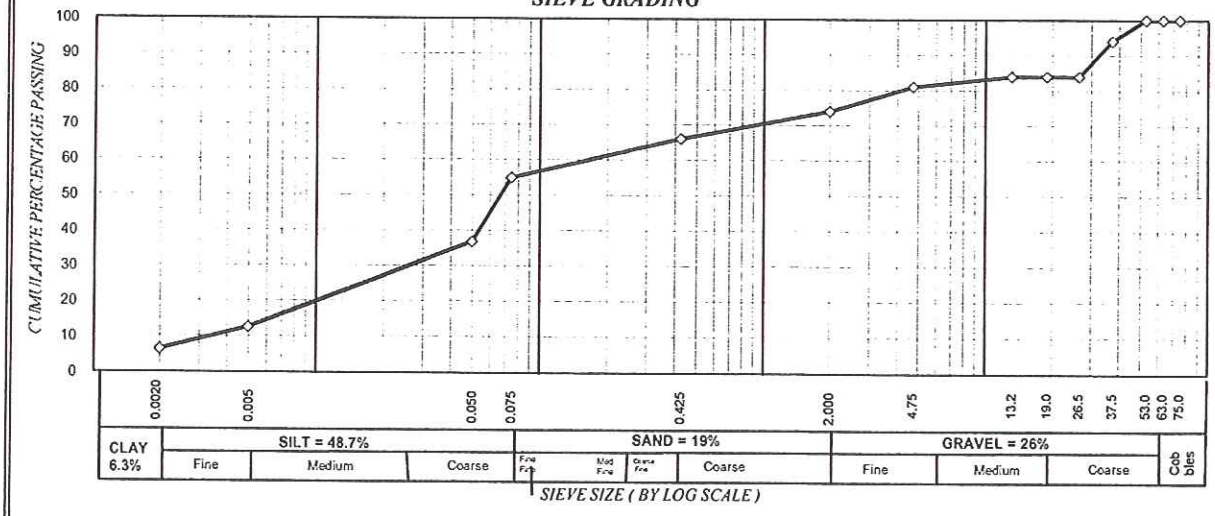
09078 — *Tp11:Layer 740-1500mm* — Annexure B

Material description		Light Red Brown	Depth : 740-1500mm	Sample Number : 2009/I4029
		Ferricrete & Quartzitic	Clients Marking : Parcel K	Date Sampled : 2009/12/08
Sieve analysis Cumulative percentage passing (mm)	75.0	100		
	63.0	100		
	53.0	100		
	37.5	94		
	26.5	84		
	19.0	84		
	13.2	84		
	4.75	81		
	2.000	74		
	0.425	66		
	0.075	55		
	0.050	36.9		
	0.005	12.6		
	0.002	6.3		
Soil Mortar Analysis % < 2.00mm	*2.000 - 0.425	10.8		
	*0.425 - 0.250	39.3		
	*0.250 - 0.150	32.8		
	*0.150 - 0.075	17.1		
	< 0.075	11.0		
Effective size		<0.002		
Uniformity Coefficient		-		
Curvature Coefficient		-		
Oversize Index		6.0		
Shrinkage Product		732.6		
Grading Coefficient		8.1		
Grading modulus		1.05		
After-berg Limits	Liquid Limit	49.0		
	Plasticity Index	21.0		
	Linear Shrinkage	11.1		
Unified Soil Classification		ML-CL		
U.S. Highway Classification		A-7-6(10)		
US Bureau		Sandy Loam		

POTENTIAL EXPANSION



SIEVE GRADING



Civil Engineering Materials Laboratory

ROADLAB

(PTY) LTD (EDMS) BPK Reg No 65/08063/07
VAT No 4790192266

HEAD OFFICE
168 RIETFONTEIN RD. PRIMROSE
P.O. BOX 1476, GERMISTON, 1400
TEL: 011 828 0279
FAX: 011 828 0273
www.roadlab.co.za
info@roadlab.co.za

41 YEARS. Est. 1965

C.H. Badenhorst
P.O. Box 16738
Dowerglen Ext. 3
1612

Dear Sir

Test Report :

Please find the attached test results for the sample/s as submitted to and tested by Roadlab (PTY)Ltd. in Primrose, Germiston.
The unambiguous description of the sample/s as received are as follows :

SAMPLE No.		2009/4029			
CONTAINER USED FOR SAMPLING		Black Sampling Bags			
SIZE / WEIGHT OF SAMPLE		±70kg's			
MOISTURE CONDITION OF SAMPLE ON ARRIVAL		Slightly Moist			
HOLE No. / Km. / CHAINAGE		TP 11			
LAYER TESTED / SAMPLED FROM		740-1500mm			
DATE SAMPLED		24/11/2009			
DATE RECEIVED		24/11/2009			
CLIENTS MARKING		Parcel K			
DESCRIPTION OF SAMPLE (COLOUR & TYPE)		Light Red Brown Ferricrete & Quartzitic			
SIEVE ANA - LYSIS (mm) (TMH A1a)	75.0	100			
	63.0	100			
	53.0	100			
	37.5	94			
	26.5	84			
	19.0	84			
	13.2	84			
	4.75	81			
	2.00	74			
	0.425	66			
	0.075	55			
ATTERBERG LIMITS (TMH A2&A3)	LL%	49.0			
	P.I.	21.0			
	LS%	11.1			
GM		1.05			
CLASSIFI - CATION	H.R.B.*	A-7-5(0)			
	COLTO*	<G9			
	T.R.H. 14*	G10			
MOD AASHTO (TMH A7)	OMC%	14.5			
	MDD(KG/M³)	1767			
C.B.R.	COMP MC	14.3			
	% SWELL	3.65			
U.C.S. (TMH A13T) C.B.R. (TMH A8)	100%	5			
	98%	5			
	97%	4			
	95%	4			
	93%	3			
	90%	2			
PROCTOR ITS : DRY (kPa)		N/A			
MOD ITS : DRY (kPa)		N/A			
STABILISED WITH	IN LAB				
	ON SITE	Neat			
TEST TYPE		Foundation Indicator & CBR			
SAMPLED BY		Roadlab			
DELIVERED BY		Roadlab			
SAMPLED ACCORDING TO		Clients Requirements			
ENVIRONMENTAL CONDITION WHEN SAMPLED		Sunny			
REMARKS & NOTES		None			

Remarks :

*Opinions & Interpretations are not included in our schedule of Accreditation
SANAS Accredited Laboratory No. T 0296
The samples were subjected to analysis according to TMH 1
The results reported relate only to the sample tested
Further use of the above information is not the responsibility or liability of Roadlab
Documents may only be reproduced or published in their full context
Compiled By : Liza Lubbe

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

09078 — *TP12: Layer:370-820mm* — Annexure B

Material description	Dark Red Orange / Shale & Ferricrete	Depth : 370-820mm	Sample Number : 2009/I4030
		Clients Marking : Parcel K	Date Sampled : 2009/12/04

Sieve analysis Cumulative percentage passing (mm)	75.0	100
	63.0	100
	53.0	100
	37.5	96
	26.5	94
	19.0	92
	13.2	88
	4.75	68
	2.000	56
	0.425	50
	0.075	41
	0.050	23.4
	0.005	10.6
	0.002	6.5
Soil Mortar Analysis % < 2.00mm	*2.000 - 0.425	10.7
	*0.425 - 0.250	47.4
	*0.250 - 0.150	22.9
	*0.150 - 0.075	19.0
	< 0.075	73.2
Effective size		<0.002
Uniformity Coefficient		-
Curvature Coefficient		-
Oversize Index		4.0
Shrinkage Product		625.0
Grading Coefficient		25.8
Grading modulus		1.53
Atter-berg Limits	Liquid Limit	49.0
	Plasticity Index	26.0
	Linear Shrinkage	12.5
Unified Soil Classification		OL
U.S. Highway Classification		A-7-6(5)
US Bureau		Sandy Loam