

Portion 183 of the farm
Zandfontein 317 JR -
Geotechnical Investigation for
Township Establishment Purposes

(Tshwane Metropolitan Municipality)

Client

Cosmopolitan Projects
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Report no: K9884-01
Project no: 9884-GB

December 2021

Title: Portion 183 of the farm Zandfontein 317 JR - Geotechnical Investigation for Township Establishment Purposes (Tshwane Metropolitan Municipality)

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Project no: 9884-GB

Report no: K9884-01

Project Team: S P Kok
Sigmalab
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V&S Cat Hire

Date: December 2021

A handwritten signature in blue ink, appearing to read "S P Kok".

Approved for **Geo Buro** Geotechnical Surveys

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1. Introduction

This firm was appointed by Mr Gideon Allison of Cosmopolitan Projects Tshwane (Pty) Ltd to conduct a geotechnical investigation of Portion 183 of the farm Zandfontein 317 JR (Tshwane Metropolitan Municipality). The aim of the investigation was to study the available geotechnical information, do in situ inspection and field work and to compile a report on the geotechnical conditions of the site. The investigation was carried out by S P Kok Pr Sci Nat (Engineering Geologist).

The purpose of the investigation is to:

- Determine the geological origin of the material on site.
- Determine the engineering properties of the different material layers.
- Give recommendations regarding the founding of structures.

2. Site location and description

The site locality is indicated on drawing number 9884-01: *Locality Map*. The site is located just west of the Booysens suburb and approximately 750m of the R50. The site covers an area of approximately 7,0327 hectares. It is undeveloped and covered by natural grass and some small trees. A house and some outbuildings are located in the south western corner of the site. There are no drainage features on the site and drainage is in the form of sheetflow in a north eastern direction.

The site boundaries are as follows:

North - Portion 178
East - Mulder street
West - Portion R/179 and
South - Erna Street.

A coordinate of the centre of the site is at -- 25.711164°S and 28.119805°E. The site slopes at 1,1 per cent in a north eastern direction and located at around 1285 masl.

3. General geology

According to the available geology map, the entire site is underlain by shale of the Silverton Formation of the Pretoria Group of the Transvaal Supergroup. A dolerite intrusion is located on the northern part of the site.

The residual dolerite and shale materials are often deeply weathered and the residual materials generally have a high heave potential. The overlying colluvium may also be compressible. No water was encountered in any of the test pits

The in situ materials tend to weathered to clayey materials. Most of the materials classified as clayey sand (SC). The regional geology is indicated on 9884-02: Geology Map and the site specific geology on drawing below.



4. Available information

Maps

- The published geology map of Pretoria (Government Printer) at a scale of 1 : 250 000.
- Groundwater information from the Department of Water Affairs (DWA).

Publications

- SACS (Statigraphy of South Africa) Handbook 8, Part 1 Geological Survey (now the Council for Geoscience).
- Brink, A B A (1985). Engineering geology of Southern Africa (Volume 1). Building Publications.

5. Climate

The site lies within the Highveld climatic region, the climate being described as warm temperate with summer rainfall.

The average daily maximum temperature is in the order of 28°C in January and 18°C in July. The rainy season is from October to March, with an average rainfall of about 740mm. Thornwaite's classification indicates sub humid, warm conditions with deficient moisture in all seasons.

The Weinert N-value is in the region of 2,4 which indicates that predominantly chemical decomposition of the underlying rock has taken place.

6. Investigation methods

The available information such as the geology map was studied. Ten test pits were excavated by means of a TLB to depths ranging from 2,1m to 3,4m and the soil profiles were described by an engineering geologist. Thirteen disturbed and one undisturbed samples were

taken and submitted to a laboratory testing. Foundation indicator tests (11), a CBR test and road indicator test and a collapse potential test were done.

The soil profile descriptions are attached in Appendix A (soil profiles) and the laboratory test results are included in Appendix B (laboratory test results).

All the available data was used to evaluate the site and to classify the area according to the system proposed by the NHBRC (National Home Builders Registration Council).

7.1 Soil Profile

Based on the soil profiles and the laboratory test results the site is divided into three geotechnical zones. The soil profiles are very similar in each zone and are very likely to change very little across the zone.

Gradual refusal occurred and no groundwater was encountered in any of the test pits. The field work was also done after the dry season.

The generalised soil profile for each zone is as follows:

Zone A

0, 0-0, 3m Moist, dark brown, soft, intact silty clay; Colluvium.

0, 3-1, 8m Moist, yellow brown to reddish brown, soft, intact gravelly clay; Slightly ferruginised residual diabase.

1, 8-3, 4m Moist, yellow brown to dark yellow brown with black speckles, firm, intact silt; Residual diabase / dolerite.

Zone B

0, 0-0, 4m Dry to slightly moist, grey brown to orange brown, loose, intact gravelly silt; Colluvium with fine roots.

0, 4-2, 2m Pinkish to purple brown; medium to highly weathered, closely bedded and jointed soft rock shale; Silverton Shale.

Zone C

0, 0-1, 5m Moist, black, soft to firm, slickensided, clay; Residual.

1, 5-2, 5m Moist to very moist, grey soft, slickensided clay; Residual.

2, 5-3, 0m Moist, light grey, loose to medium dense, jointed clayey gravel; Residual shale.

7.2 Laboratory test results

General

Thirteen disturbed and one undisturbed samples were taken and submitted to a laboratory testing.

Foundation indicator tests (11), a CBR test and road indicator test and a collapse potential test were done. The laboratory test results are included in Appendix B.

Zone A

Indicator tests

According to the Unified Classification System the samples are similar and classify mostly as MH (elastic silt).

From the grading analysis it is also evident that the samples are very similar fairly fine grained e.g. between 68 per cent and 99 percent (average of 86,8 percent) of the samples tested are finer than 2mm (i.e. sand). The silt fraction (<0,075mm) varied from 54 percent to 87 percent with an average of 68,3 percent. The clay fraction ranged from 15 to 47 percent with an average of 26,8 percent.

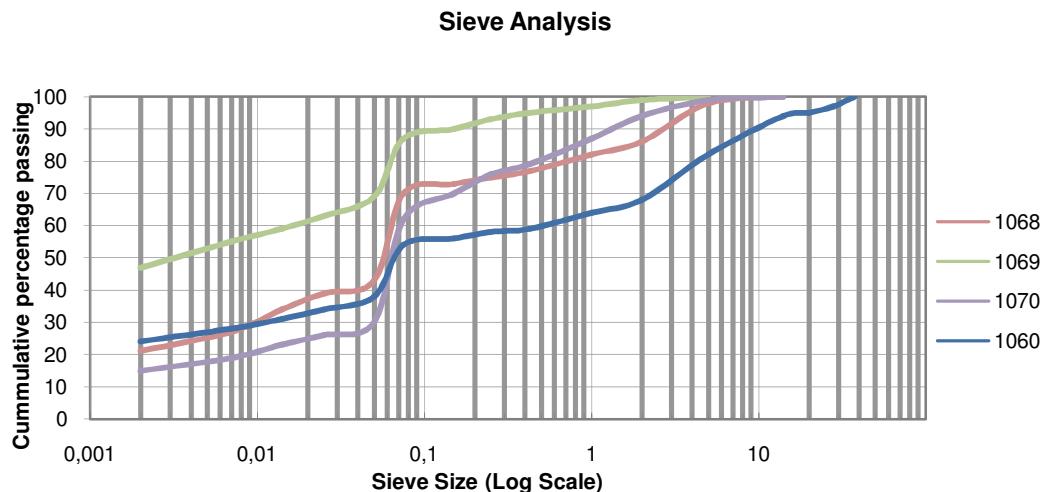
Another indication of the fineness of the samples is from the grading modulus. The grading modulus varied from 0,2 to 1,2 with an average of 0,70.

The Atterberg Limits are summarised as follows:

	Average	Minimum	Maximum
Liquid Limit	53.5	46	58
Plastic Limit	30.5	28	32
Plasticity Index	23	18	26
Linear shrinkage	11.5	9	13.5
PI Whole sample	15.5	9	25

It is evident that the Liquid Limits, Plasticity Indices (PI) and Linear Shrinkage of the samples are generally on the high side.

The following graph shows a summary of the grading analyses.



Heave potential

Using van der Merwe's method to determine the heave potential of material, it is evident that the materials generally classify as having a *Medium expansiveness* potential. The estimated amount of movement due to heave is in the order of 20mm.

7.3 Excavability

The material is generally easily excavatable and on this site it is soft excavation to a depth of 2,0m and probably deeper if an excavator is used.

7.4 Sidewall stability of excavations

The sidewalls remained stable due to some cohesion. All excavations deeper than 1,5m must be shored according to Health and Safety requirements.

7.5 Construction materials

The materials tested on site and inspected in the test pits are fine grained and not suitable for use in construction.

7.6 Zonation

The zone is classified according to the NHBRC as H2.

Zone B

Indicator tests

According to the Unified Classification System the samples are similar in this zone and classify as gravels i.e. GP-GC (poorly graded to clayey gravel), GC (clayey gravel) and GM (silty gravel).

From the grading analysis it is also evident that the samples are fairly similar and coarse grained e.g. between 15 per cent and 43 percent (average of 32,4 percent) of the samples tested are finer than 2mm (i.e. sand). The silt fraction (<0,075mm) varied from 10 percent to 26 percent with an average of 19,2 percent. The clay fraction ranged from 2 to 18 percent with an average of 9,6 percent.

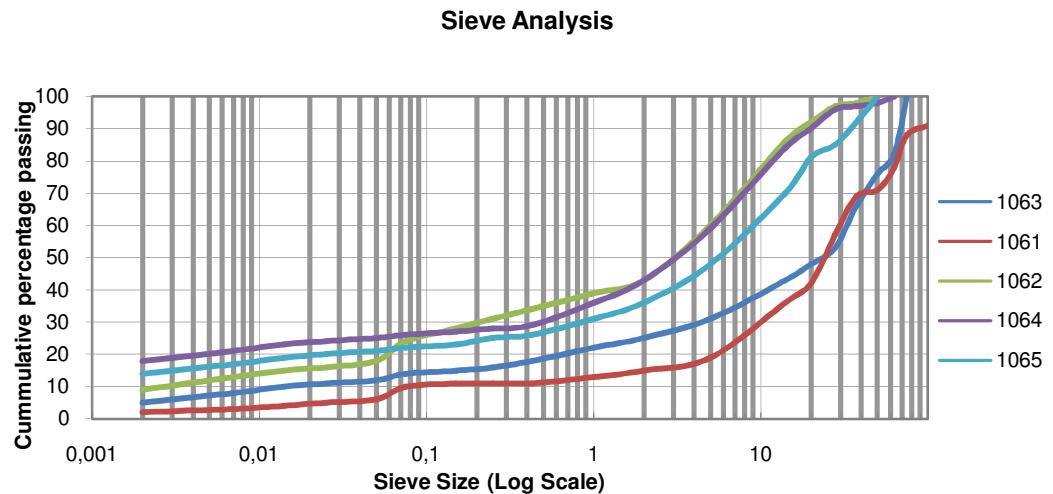
Another indication of the fineness of the samples is from the grading modulus. The grading modulus varied from 2,0 to 2,6 with an average of 2,2.

The Atterberg Limits are summarised as follows:

	Average	Minimum	Maximum
Liquid Limit	39.8	27	51
Plastic Limit	23.8	16	34
Plasticity Index	16	11	23
Linear shrinkage	8.1	5	11
PI Whole sample	3.6	2	5

It is evident that the Liquid Limits, Plasticity Indices (PI) and Linear Shrinkage of the samples are generally on the low side, but that the materials show low plasticity values indicating a low heave potential.

The following graph shows a summary of the grading analyses.



Heave potential

Using van der Merwe's method to determine the heave potential of material, it is evident that the materials generally classify as having a *Low* expansiveness potential. The estimated amount of movement due to heave is less than 5mm.

7.7 Excavability

The material is generally easily excavable and on this site it is soft excavation to a depth of 2,0m and probably deeper if an excavator is used.

7.8 Sidewall stability of excavations

The sidewalls remained stable due to some cohesion. All excavations deeper than 1,5m must be shored according to Health and Safety requirements.

7.9 Construction materials

The materials tested on site and inspected in the test pits classify as a >G9 according to TRH 14 and are generally not suitable for use as construction materials for roads or fill where loads are placed on. However; these materials can probably be stabilised by cement or blended with coarser material to increase the material properties to G6 or G7.

7.10 Zonation

The entire stand is classified according to the NHBRC as R/S1.

Zone C

Indicator tests

According to the Unified Classification System the samples are similar and classify as MH (elastic silt). From the soil profiling the materials are clay.

From the laboratory testing it is also evident that the samples are very similar and fine grained e.g. between 81 per cent and 99 percent (average of 91,7 percent) of the samples tested are finer than 2mm (i.e. sand). The silt fraction (<0,075mm) varied from 70 percent to 87 percent with an average of 79

percent. The clay fraction ranged from 44 to 49 percent with an average of 46,7 percent.

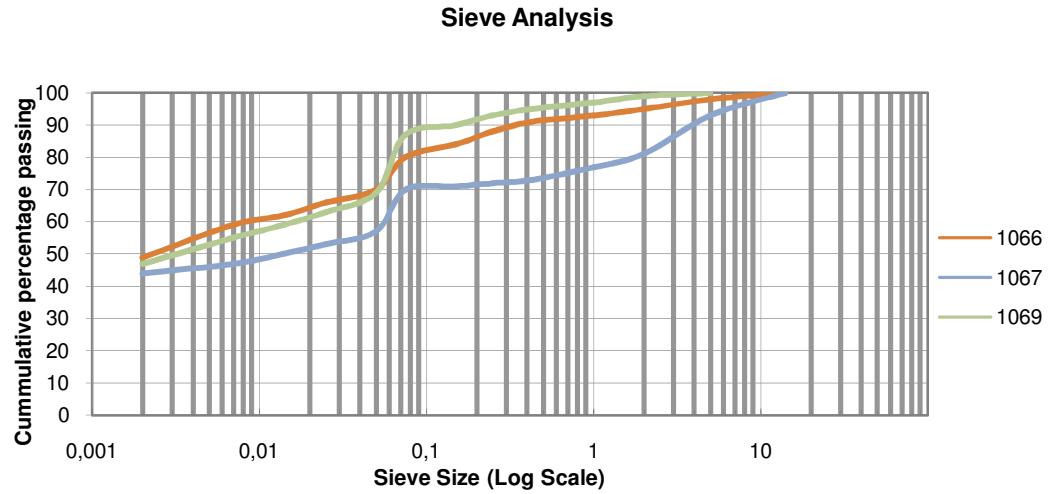
The grading modulus varied from 0,2 to 0,8 with an average of 0,40 indicating fine grained material.

The Atterberg Limits are summarised as follows:

	Average	Minimum	Maximum
Liquid Limit	66	58	76
Plastic Limit	39	32	47
Plasticity Index	27	26	29
Linear shrinkage	13.3	13	13.5
PI Whole sample	23.3	21	25

It is evident that the Liquid Limits, Plasticity Indices (PI) and Linear Shrinkage of the samples are high, indicating a high heave potential.

The following graph shows a summary of the grading analyses.



Heave potential

Using van der Merwe's method to determine the heave potential of material, it is evident that the materials classify as having a *High* expansiveness potential. The estimated amount of movement due to heave is in excess of 30mm.

7.11 Excavability

The material is generally easily excavable and on this site it is soft excavation to a depth of 2,0m and probably deeper if an excavator is used.

7.12 Sidewall stability of excavations

The sidewalls collapsed on the slickesides of the clay. **Excavations in this zone must be considered dangerous.** All excavations deeper than 1,5m must be shored according to Health and Safety requirements.

7.13 Construction materials

These materials are not suitable for use in construction.

7.14 Zonation

The entire stand is classified according to the NHBRC as H3.

7.15 Slope stability (entire site)

The area is fairly flat and no slope stability problems are foreseen.

7.16 Collapse potential

A collapse potential test was done on the colluvium of the site as it may be slightly collapsible. However, the test results showed that it is only slightly collapsible and will not pose any significant geotechnical problem.

7. Foundation design and precautionary measures

The foundation design for each zone is summarised as follows and the preferred / recommended foundation system(s) is highlighted in grey

Zone A NHBRC Class H2

For the construction of single and double storey structures the following founding options can be considered:

- | | |
|---|---|
| Soil Raft | <ul style="list-style-type: none"> • Remove in situ material to 1,0m beyond perimeter of the building to a depth of 1,5 times the width of the widest foundation or to a competent horizon and replace with material compacted to 93% MOD AASHTO density at -1% to +2% of optimum moisture content
 • Normal construction with lightly reinforced strip foundations and light reinforcement in masonry |
| Stiffened strip footings, stiffened or cellular raft | <ul style="list-style-type: none"> • Stiffened strip footings or stiffened or cellular raft with lightly reinforced or articulated masonry. • Bearing pressure not to exceed 50 kPa • Fabric reinforcement in floor slabs • Site drainage and service/plumbing precautions |
| Deep strip foundations
Compaction of in situ soils below individual footings | <ul style="list-style-type: none"> • Normal construction with drainage precautions • Founding on a competent horizon below the problem horizon at approximately 1,6m |

Zone B NHBRC Class R/S1

For the construction of single and double storey structures the following founding options can be considered:

Modified normal	<ul style="list-style-type: none"> • Reinforced strip footings • Articulation joints at some internal and all external doors • Light reinforcement in masonry • Site drainage and service / plumbing precautions • Foundations pressure not to exceed 50kPa •
Compaction of in situ soils below individual footings	<ul style="list-style-type: none"> • Remove in situ material below foundations to a depth and width of 1,5 times the foundation width or to a competent horizon and replace with material compacted to 93% MOD AASHTO density at -1% to +2% of optimum moisture content • Normal construction with lightly reinforced strip foundations and light reinforcement in masonry
Soil Raft	<ul style="list-style-type: none"> • Remove in situ material to 1,0m beyond perimeter of the building to a depth of 1,5 times the width of the widest foundation or to a competent horizon and replace with material compacted to 93% MOD AASHTO density at -1% to +2% of optimum moisture content • Normal construction with lightly reinforced strip foundations and light reinforcement in masonry

Zone C NHBRC Class H3

For the construction of single and double storey structures the following founding options can be considered:

Soil Raft	<ul style="list-style-type: none"> • Remove in situ material to 1,0m beyond perimeter of the building to a depth of 1,5 times the width of the widest foundation or to a competent horizon and replace with material compacted to 93% MOD AASHTO density at -1% to +2% of optimum moisture content
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Stiffened strip footings, stiffened or cellular raft	<ul style="list-style-type: none"> • Stiffened strip footings or stiffened or cellular raft with lightly reinforced or articulated masonry. • Bearing pressure not to exceed 50 kPa • Fabric reinforcement in floor slabs • Site drainage and service/plumbing precautions
Deep strip foundations Compaction of in situ soils below individual footings	<ul style="list-style-type: none"> • Normal construction with drainage precautions • Founding on a competent horizon below the problem horizon at approximately 2,5m
Piled construction	<ul style="list-style-type: none"> • Piled foundations with suspended floor slabs with or without ground beams • Site drainage and plumbing / service precautions
Split construction	<ul style="list-style-type: none"> • Combination of reinforced masonry and full movement joints • Suspended floors or fabric reinforced ground slabs acting independently from the building • Site drainage and plumbing / service precautions

Precautionary measures that must be implemented are as follows:

- The fall of the trenches shall be away from the buildings to improve drainage.
- The selection of piping materials shall take cognisance of corrosion (both external and internal).
- Water pipes shall have a minimum cover of 500mm.
- Wherever practical, service trenches shall not be excavated along the length of structures within the first 3,0m beyond the perimeter of structures.
- The ground immediately against the buildings shall be shaped to fall in excess of 75 mm over the first 1,0 m beyond the perimeter of the

building, from where it shall drain freely away from the structures. Apron slabs, where provided shall have the same fall.

8. Conclusions and recommendations

The regional geology is indicated on drawing number 9884-02: Geology Map. The available map and the test pits excavated on site showed that the site is underlain by residual shale with a dolerite intrusion in the northern part of the site.

The site is currently undeveloped and the planned development is a residential houses and / complexes.

According to the NHBRC the site is classified as follows:

Zone	NHBRC Class	Amount of movement due to heave mm	Competent founding level
A	H2	20mm	>2,5 to >3,4m
B	R/S1	<5mm	0,2m to 1m with avg 0,6m
C	H3	>30	2,5m+

The precautionary measures to reduce water ingress must be implemented as changes in moisture content can cause ground movement.

Excavations (for foundations and underground services) must be inspected on the site during construction.

No suitable construction materials were identified for use in layer works. All construction materials should be imported or additional testing be done on the in situ materials by stabilising with cement or by blending with coarser materials to improve the materials from G9 to say G6.

No excavation problems are foreseen. All excavations deeper than 1,5m must be shored. **In Zone C sidewall collapse occurred on the slickensides of the clay.**

A collapse potential test showed that the collapse potential of the near surface materials is considered to be insignificant.

The NHBRC will require a Construction report for enrolment of residential units.

9. Report provisions

The aim of the investigation was to estimate through site investigation; professional judgment and past experience the geotechnical conditions of the site, different soil horizons with their different geotechnical properties, areas subject to a perched water table, and areas of poor drainage, areas underlain by hard rock and to estimate their distribution. However, it is impossible to guarantee that isolated zones of different geotechnical conditions, foundation materials, blanketing layers or any other geotechnical problems have not been missed.

10 . References

- 11.1 GEOLOGICAL MAP
 Number and title: 2528 Pretoria
 Scale: 1:250000
 Date of publication: 1969
 Source: Government Printer
- 11.2 Jennings, JE, Brink, ABA and Williams, AAB (1973). **Revised guide to soil profiling for Civil Engineering Purposes in SA.** Trans SAICE, Vol 5, No 1, pp 3-12.
- 11.3 Van der Merwe, DH (1964). **The prediction of heave from the plasticity index and the percentage clay fraction.** Trans SAIC Vol 6, No 6, pp 103-7.
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- 11.6 Jennings, JE & Kerrich, JE (1962). **The heaving of buildings and the associated Economic consequences, with particular reference to the Orange/Free State Gold Fields.** The Civil Engineer in SA. Vol4, No. 11.
- 11.7 Jennings, DE and Robertson, A Mac G (1974). **Settlement and collapse potential.** Reply to ABA Brink in SAICE Div. Soil Mech. And Found Eng. Newsletter No.2 pp 1-5.
- 11.8 South African Institute of Civil Engineers/Institution of Structural Engineers (1995). **Code of Practice P: Foundation and Superstructures for Single Storey Residential Buildings of Masonry Construction.** Joint Structural Division, Johannesburg.
- 11.9 Partridge, TC Wood, KC and Brink, ABA (1993). **Priorities for urban expansion within The PWV metropolitan region. The primacy of geotechnical constraints.** South African Geographical Journal, Vol 75, pp 9-13.
- 11.10 National Home Builders Registration Council (2015). **Home builders manual Parts 1 and 2.** Revision no. 1 February 1999.
- 11.11 SAIEG/SAICE (1996). **Guidelines for Urban Engineering Geological Investigations.**

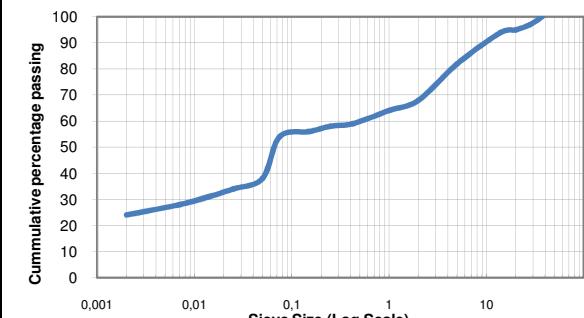
Appendix A: Soil Profile Descriptions

Project no: 9884
Logged by: SP Kok
Date excavated: 2021-10-28
Date profiled: 2021-10-28

Client: Cosmopolitan Projects
Contractor: V&S Cat Hire
Operator: Alfred
Machine: Cat 422 F

Geo Buro

TP NO: 1

Sample	Unified	Sieve Analysis	Photo
●	MH Medium heave		
●	MH Medium heave		
●	MH Medium heave		

Soil Description Log:

0,00 - 0,50: Dry to slightly moist, light grey brown, loose, intact silty gravel with nodular ferricrete; Ferruginised colluvium.

0,50 - 2,20: Slightly moist, dark orange brown to reddish brown with black staining on joints, firm to stiff, relict jointed clayey silt; Residual shale (saprolitic).

2,20 - 2,90: Slightly moist, light grey brown, medium dense to dense, relict jointed silty gravel; Residual shale (saprolitic).

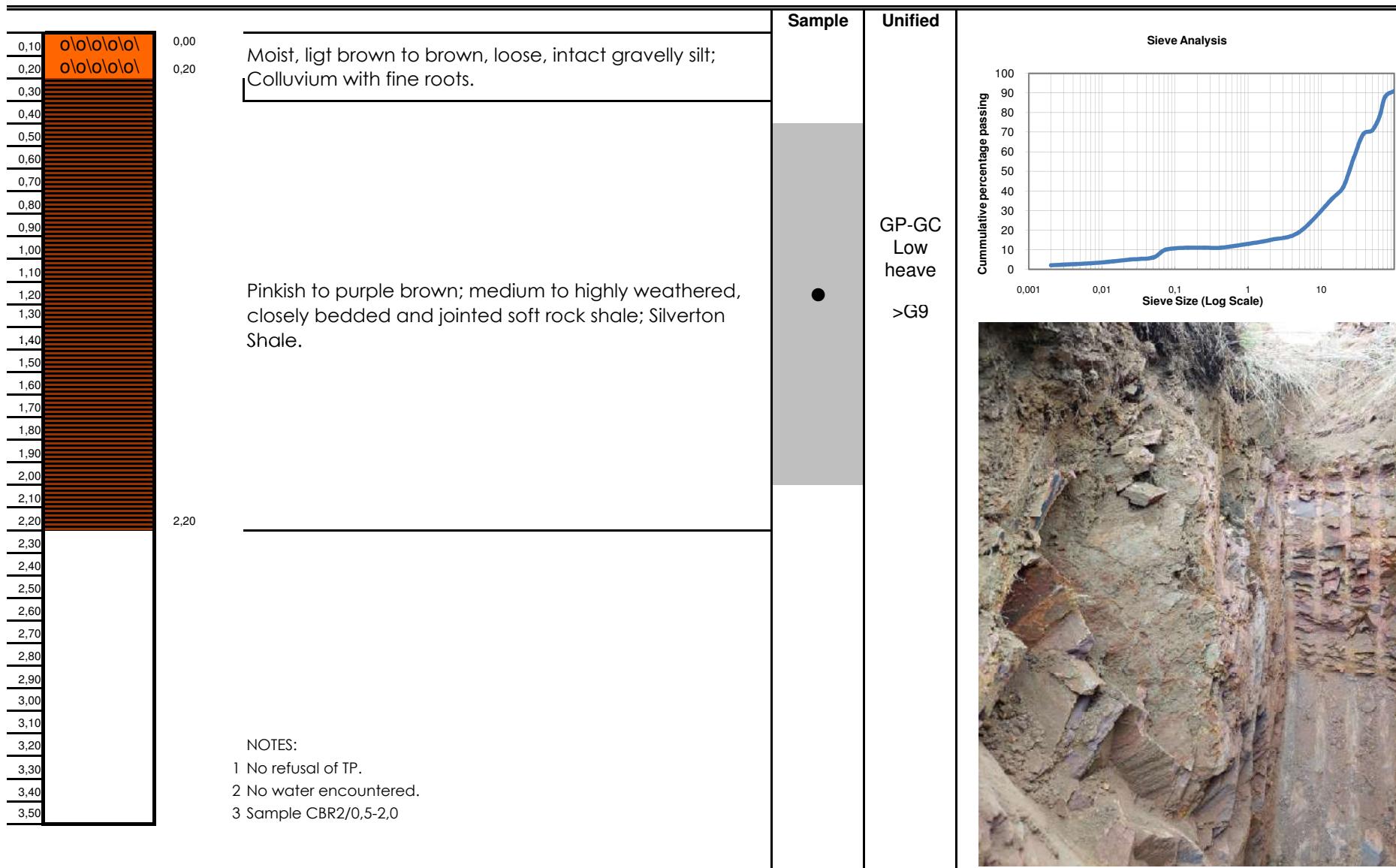
2,90 - 3,50: NOTES:
1 No refusal of TP.
2 No water encountered.
3 Samples - TP1/1,0m.

Project no: 9884
Logged by: SP Kok
Date excavated: 2021-10-28
Date profiled: 2021-10-28

Client: Cosmopolitan Projects
Contractor: V&S Cat Hire
Operator: Alfred
Machine: Cat 422 F

Geo Buro

TP NO: 2

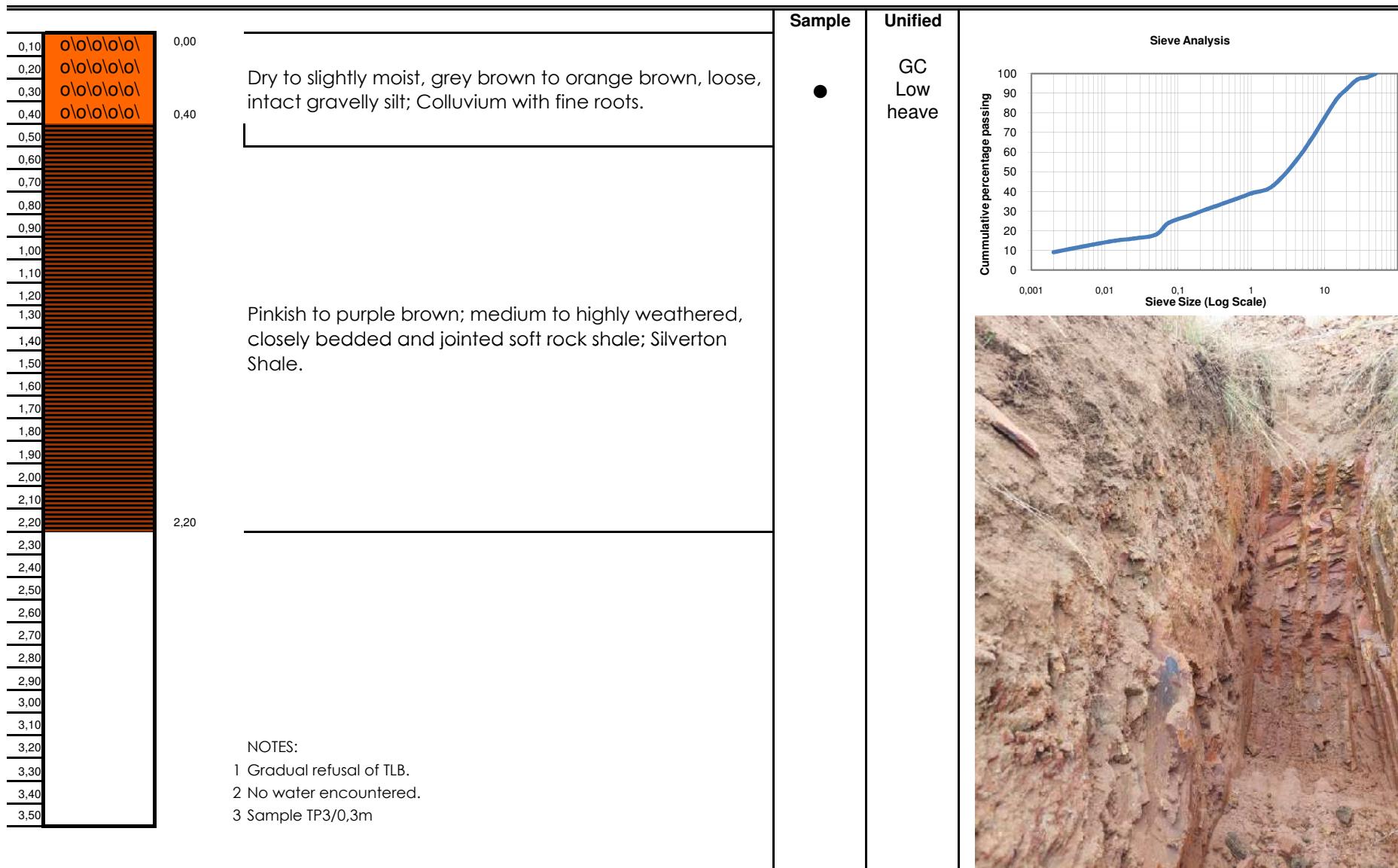


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Logged by: SP Kok
Date excavated: 2021-10-28
Date profiled: 2021-10-28

Client: Cosmopolitan Projects
Contractor: V&S Cat Hire
Operator: Alfred
Machine: Cat 422 F

Geo Buro

TP NO: 3



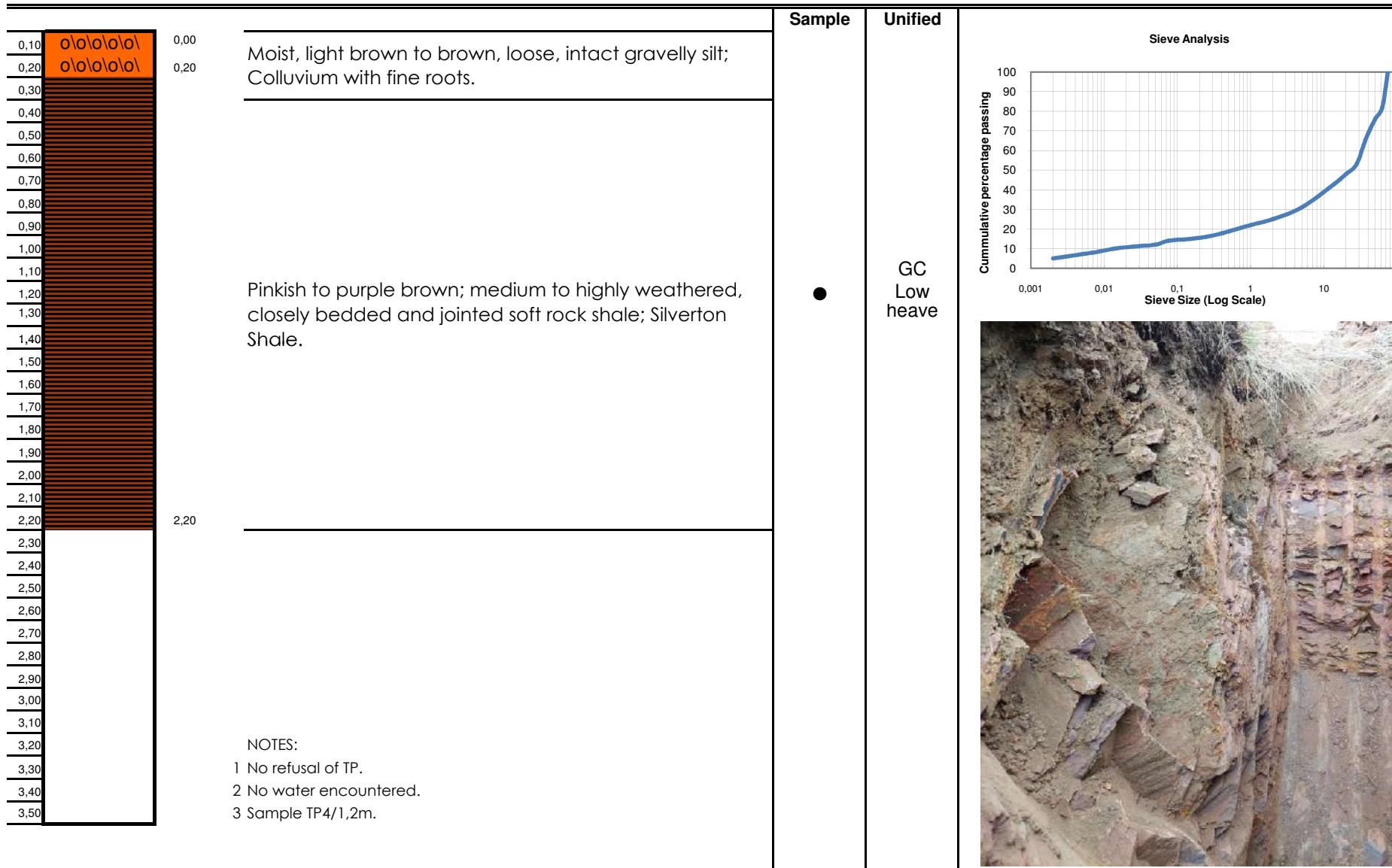
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Logged by: SP Kok
Date excavated: 2021-10-28
Date profiled: 2021-10-28

Client:
Contractor:
Operator:
Machine:

Cosmopolitan Projects
V&S Cat Hire
Alfred
Cat 422 F

Geo Buro

TP NO: 4

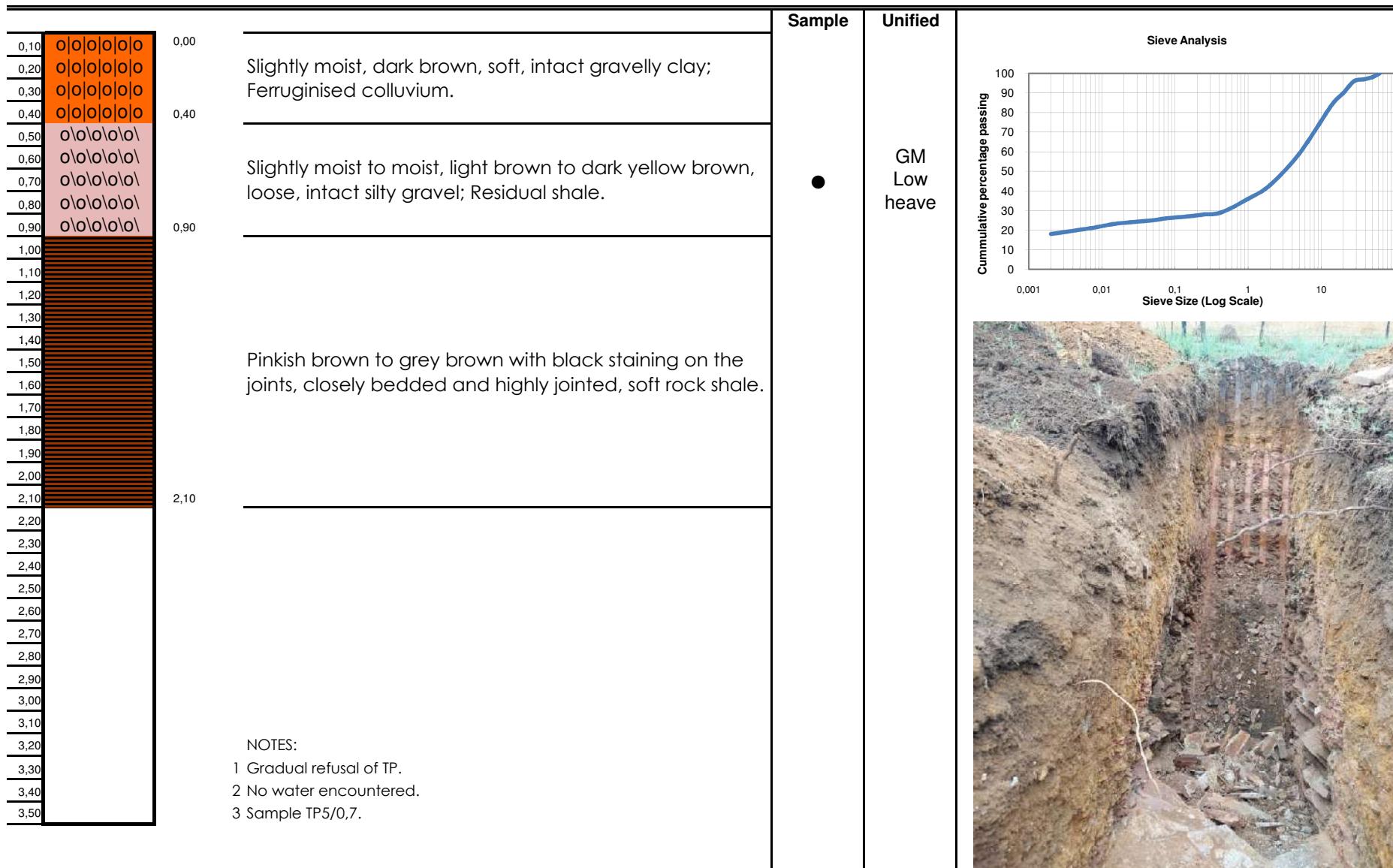


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Logged by: SP Kok
Date excavated: 2021-10-28
Date profiled: 2021-10-28

Client: Cosmopolitan Projects
Contractor: V&S Cat Hire
Operator: Alfred
Machine: Cat 422 F

Geo Buro

TP NO: 5

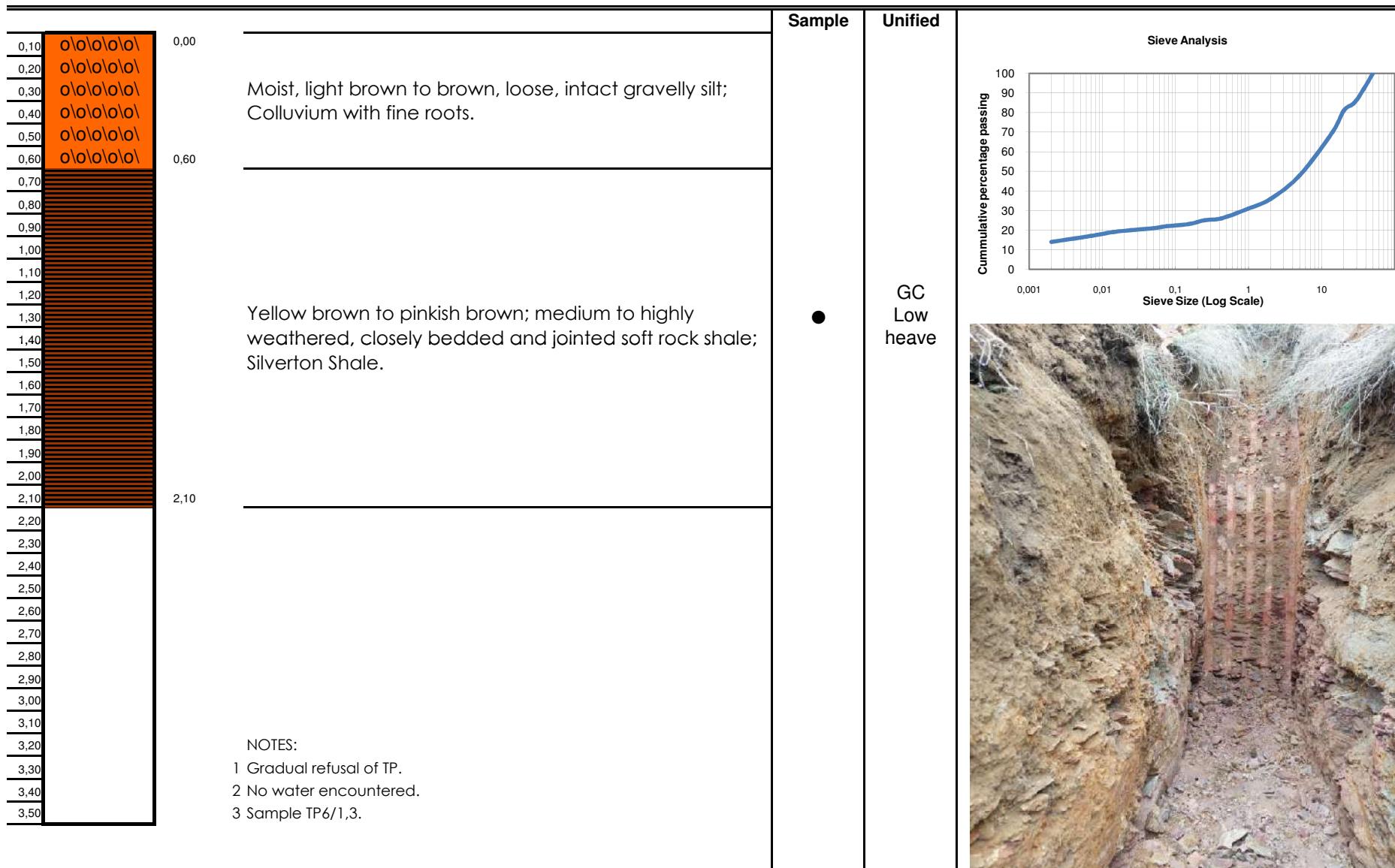


Project no: 9884
Logged by: SP Kok
Date excavated: 2021-10-28
Date profiled: 2021-10-28

Client: Cosmopolitan Projects
Contractor: V&S Cat Hire
Operator: Alfred
Machine: Cat 422 F

Geo Buro

TP NO: 6



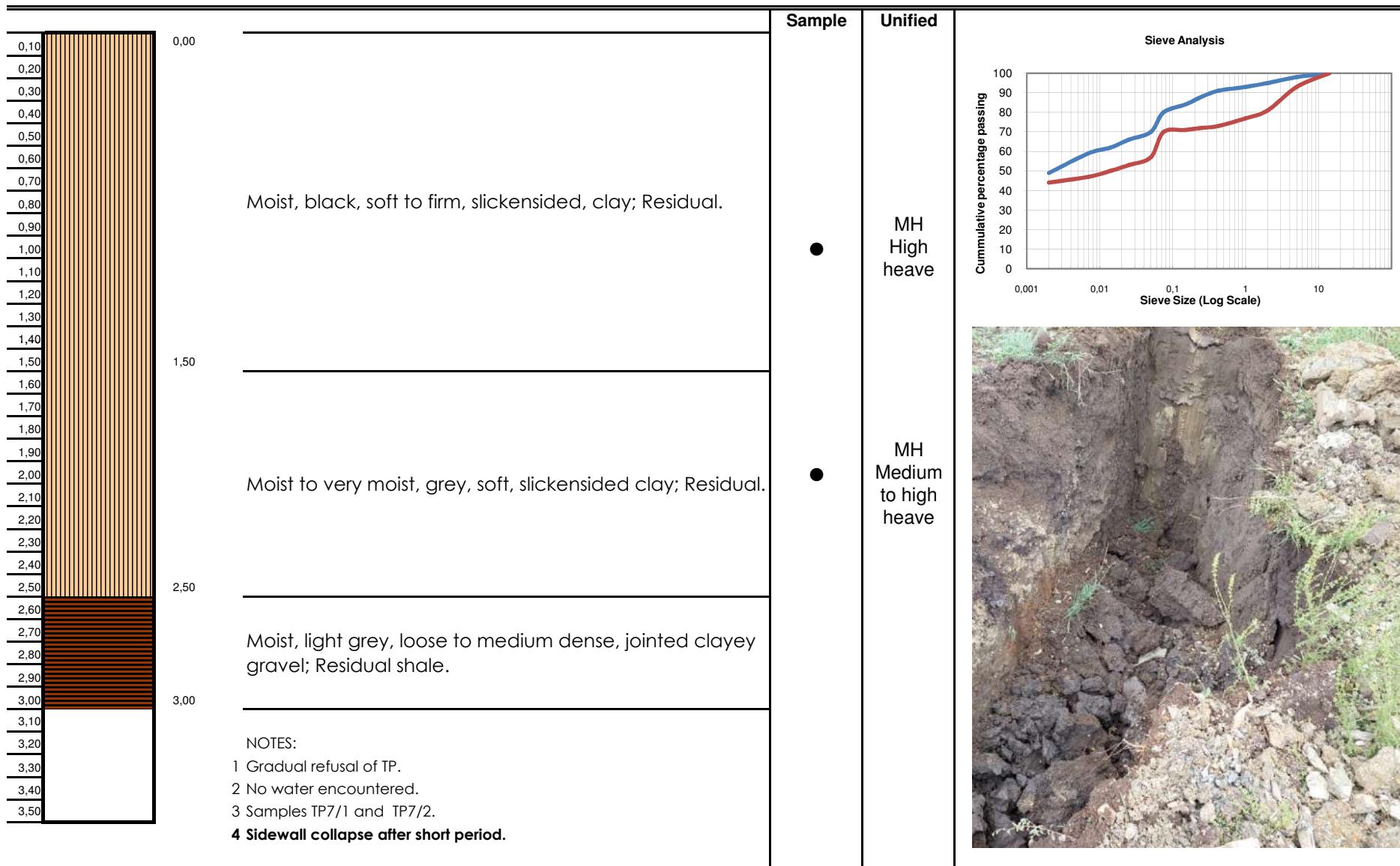
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Logged by: SP Kok
Date excavated: 2021-10-28
Date profiled: 2021-10-28

Client:
Contractor:
Operator:
Machine:

Cosmopolitan Projects
V&S Cat Hire
Alfred
Cat 422 F

Geo Buro

TP NO: 7

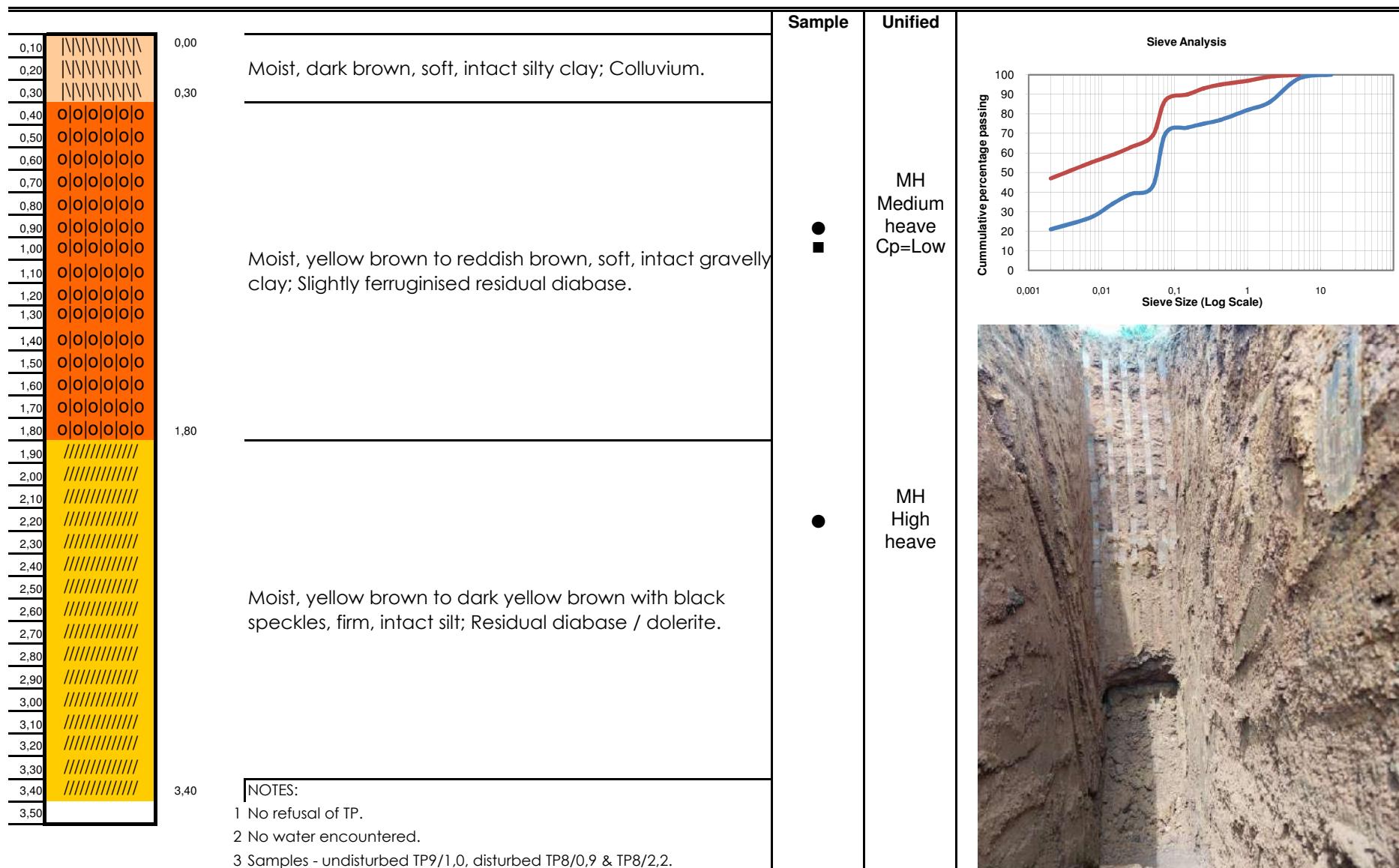


Project no: 9884
Logged by: SP Kok
Date excavated: 2021-10-28
Date profiled: 2021-10-28

Client: Cosmopolitan Projects
Contractor: V&S Cat Hire
Operator: Alfred
Machine: Cat 422 F

Geo Buro

TP NO: 8

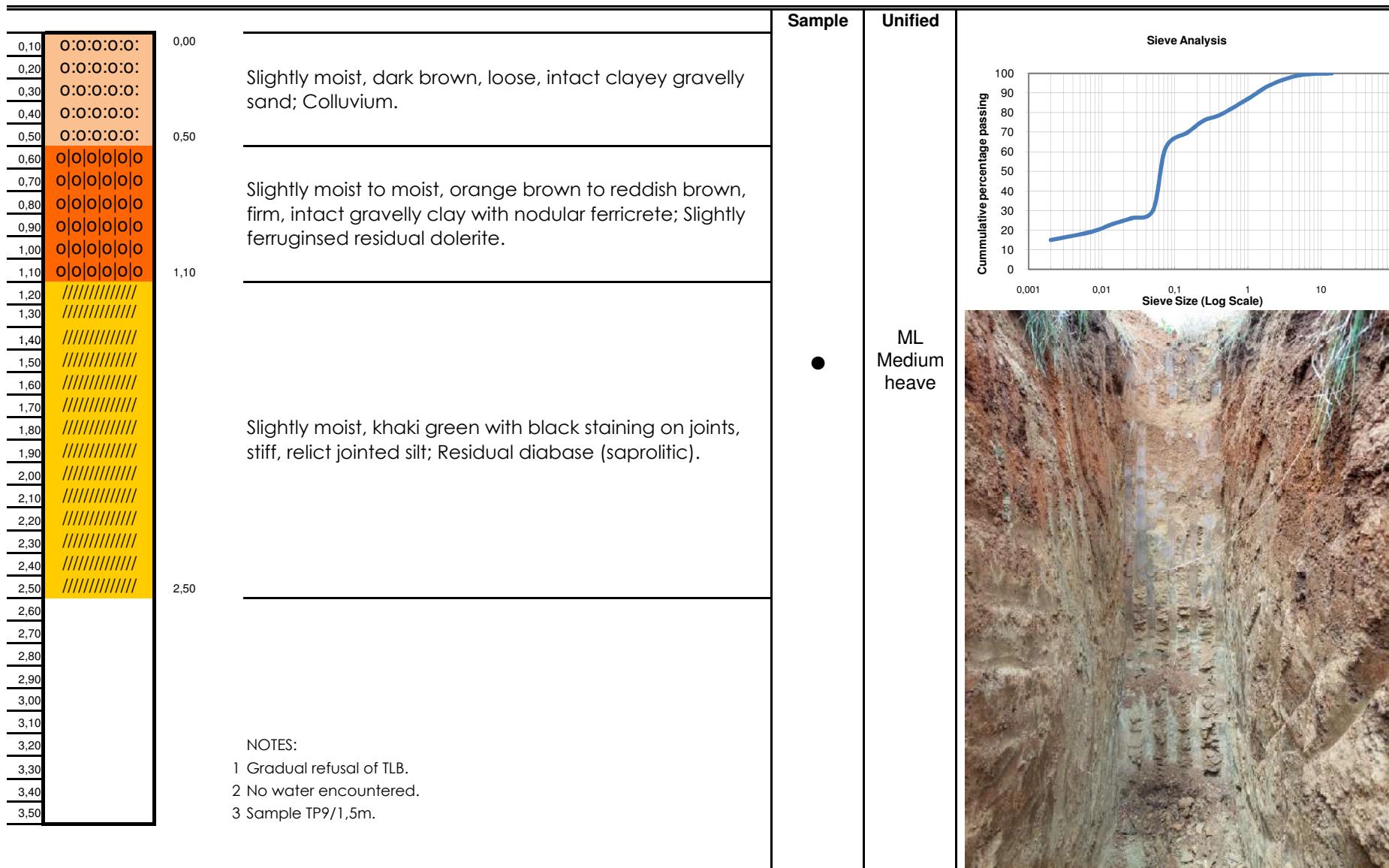


Project no: 9884
Logged by: SP Kok
Date excavated: 2021-10-28
Date profiled: 2021-10-28

Client: Cosmopolitan Projects
Contractor: V&S Cat Hire
Operator: Alfred
Machine: Cat 422 F

Geo Buro

TP NO: 9

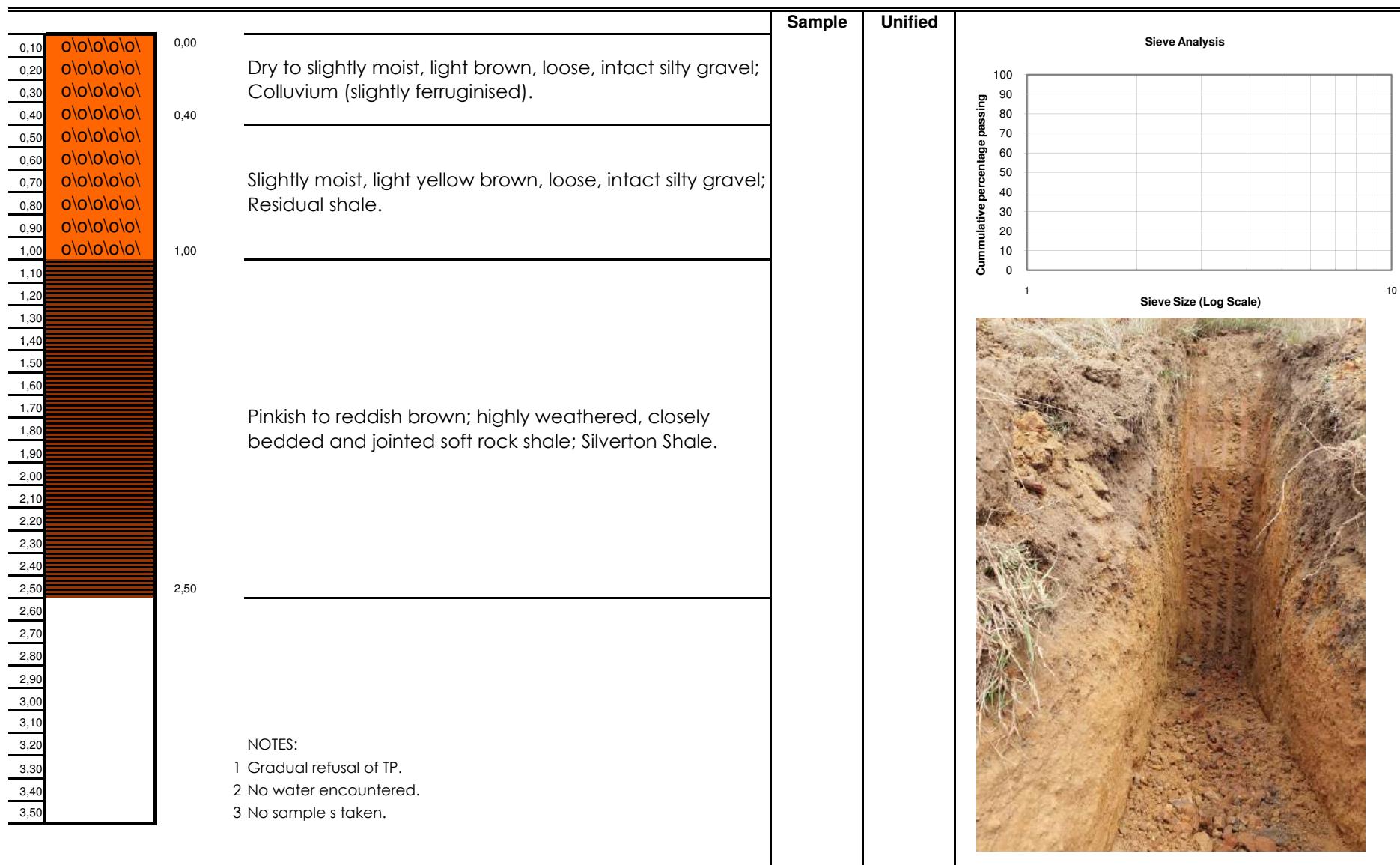


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Geo Buro

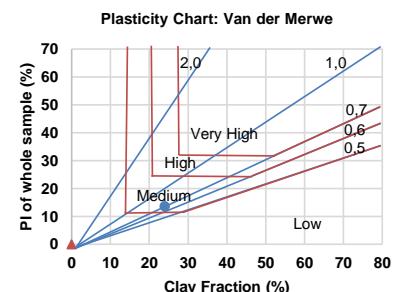
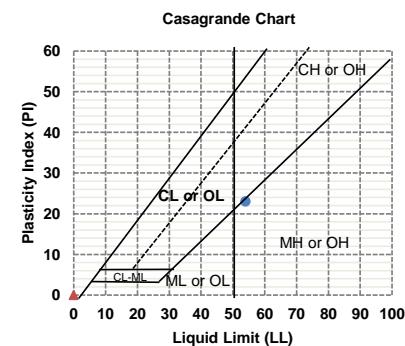
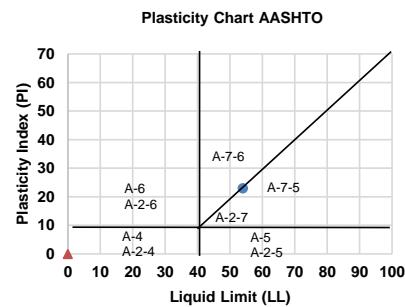
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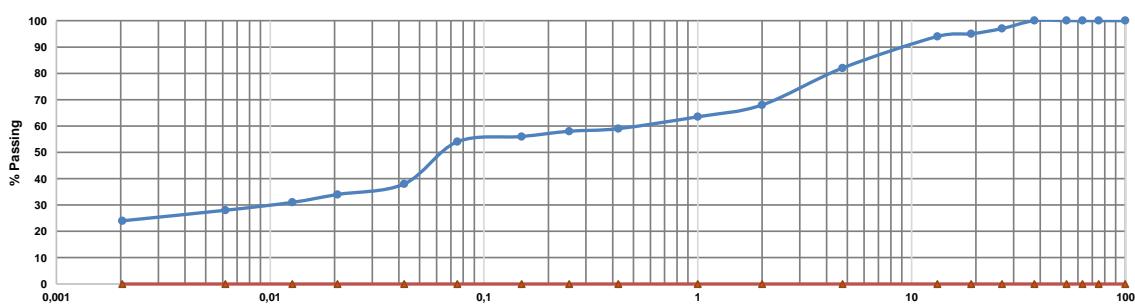
Appendix B: Laboratory Test Results

FOUNDATION INDICATOR TEST REPORT

Client : Geo Buro cc	Client Reference : N/A
Address : 187 Clover Avenue	Order Number : N/A
: ST Rosaneco Estate	
: Lyttleton AH, 0157	
Attention : Emuel Kok	Date Received : 25/10/2021
E-mail : geoburo@telkomsa.net	Date Tested : 25/10/2021 - 02/11/2021
Project : Portion 183 Zandfontein	Date Reported : 26/11/2021
Job Number : S1088	Report Status : Final
SAMPLE INFORMATION AND PROPERTIES	
Sample Number	1 060
Sample Position	TP 1
Client Marking	TP 1
Sample Depth (m)	1,0
Sample Container	Plastic Bag
Condition of Sample	Good
Sample Size / Weight (g)	±10kg
Description of Sample	-
Colour	-
Type	-
Sampled By	Client
SANS 3001-GR1 and SANS 3001-GR3 (Hydrometer)	
Sieve Aperture Size (mm)	Percentage Passing Nearest 1%
100	100
75	100
63	100
50	100
37,5	100
28	97
20	95
14	94
5	82
2	68
1	64
0,425	59
0,250	58
0,150	56
0,075	54
0,042	38
0,021	34
0,013	31
0,006	28
0,002	24
SANS 3001-PR5	
Soil-mortar (%)	68,0
Coarse sand soil-mortar (%)	13,2
Fine sand soil-mortar (%)	7,4
Coarse fine sand soil-mortar (%)	1,5
Medium fine sand soil-mortar (%)	2,9
Fine fine sand soil-mortar (%)	2,9
Silt and clay soil-mortar (%)	79,4
Coarse sand ratio	0,1
Grading Modulus = GM	1,2
SANS 3001-GR10	
Liquid Limit (%)	54
Plastic Limit (%)	31
Plasticity Index (%)	23
Linear Shrinkage (%)	11,0
Overall Plasticity Index (%)	14
SANS 3001-GR20 and SANS 5844	
Moisture Content (%)	N/T
Relative Density (kg/m³)	N/T
SOIL CLASSIFICATIONS	
AASHTO (ASTM D3282)	A-7-5(10)
USCS (ASTM D2487)	MH

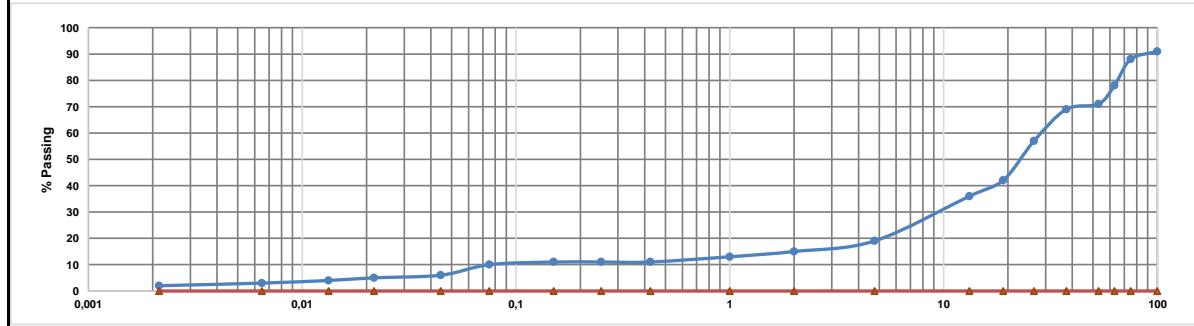


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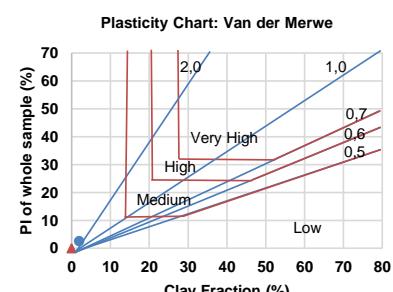
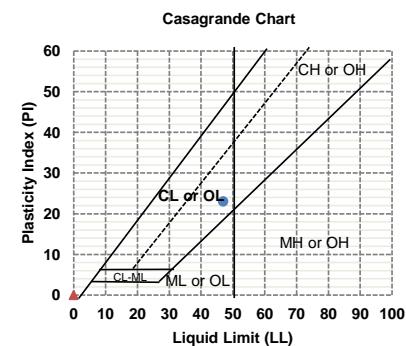
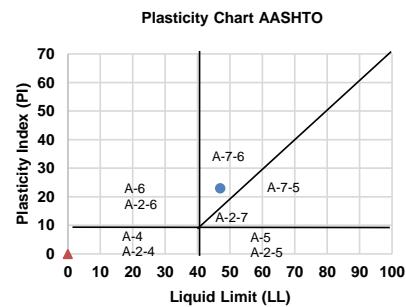


FOUNDATION INDICATOR TEST REPORT

Client : Geo Buro cc	Client Reference : N/A
Address : 187 Clover Avenue	Order Number : N/A
: ST Rosaneco Estate	
: Lyttleton AH, 0157	
Attention : Emuel Kok	Date Received : 25/10/2021
E-mail : geoburo@telkomsa.net	Date Tested : 25/10/2021 - 02/11/2021
Project : Portion 183 Zandfontein	Date Reported : 26/11/2021
Job Number : S1088	Report Status : Final
SAMPLE INFORMATION AND PROPERTIES	
Sample Number	1 061
Sample Position	CBR 2
Client Marking	CBR 2
Sample Depth (m)	0,5-2,0
Sample Container	Plastic Bag
Condition of Sample	Good
Sample Size / Weight (g)	±80kg
Description of Sample	-
Colour	-
Type	-
Sampled By	Client
SANS 3001-GR1 and SANS 3001-GR3 (Hydrometer)	
Sieve Aperture Size (mm)	Percentage Passing Nearest 1%
100	91
75	88
63	78
50	71
37,5	69
28	57
20	42
14	36
5	19
2	15
1	13
0,425	11
0,250	11
0,150	11
0,075	10
0,045	6
0,022	5
0,013	4
0,006	3
0,002	2
SANS 3001-PR5	
Soil-mortar (%)	15,0
Coarse sand soil-mortar (%)	26,7
Fine sand soil-mortar (%)	6,7
Coarse fine sand soil-mortar (%)	0,0
Medium fine sand soil-mortar (%)	0,0
Fine fine sand soil-mortar (%)	6,7
Silt and clay soil-mortar (%)	66,7
Coarse sand ratio	0,3
Grading Modulus = GM	2,6
SANS 3001-GR10	
Liquid Limit (%)	47
Plastic Limit (%)	24
Plasticity Index (%)	23
Linear Shrinkage (%)	11,0
Overall Plasticity Index (%)	3
SANS 3001-GR20 and SANS 5844	
Moisture Content (%)	N/T
Relative Density (kg/m³)	N/T
SOIL CLASSIFICATIONS	
AASHTO (ASTM D3282)	A-2-7(0)
USCS (ASTM D2487)	GP-GC

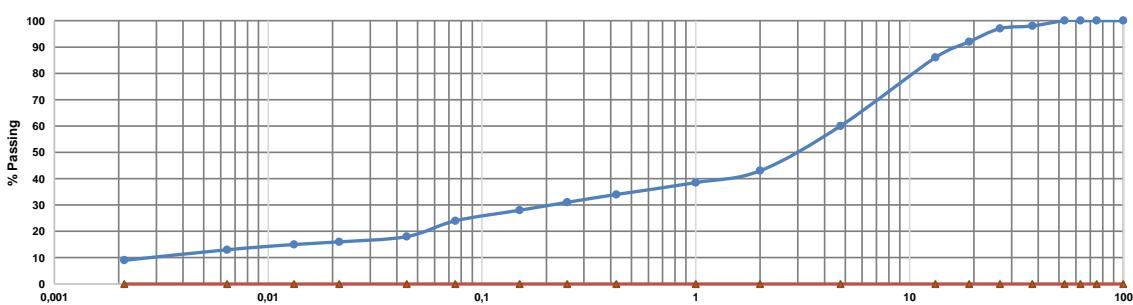


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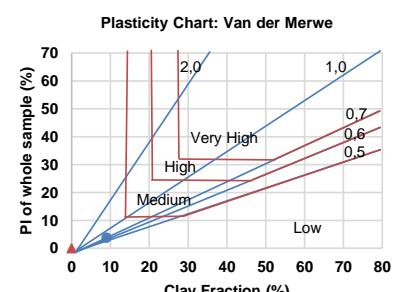
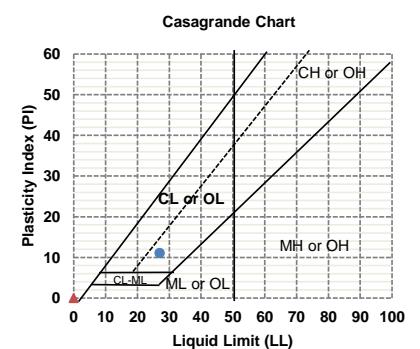
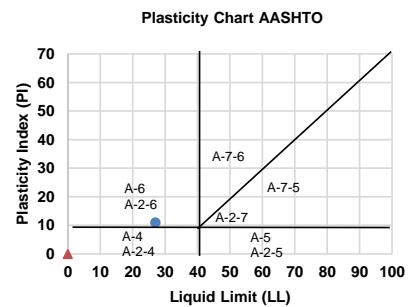


FOUNDATION INDICATOR TEST REPORT

Client : Geo Buro cc	Client Reference : N/A
Address : 187 Clover Avenue	Order Number : N/A
: ST Rosaneco Estate	
: Lyttleton AH, 0157	
Attention : Emuel Kok	Date Received : 25/10/2021
E-mail : geoburo@telkomsa.net	Date Tested : 25/10/2021 - 02/11/2021
Project : Portion 183 Zandfontein	Date Reported : 27/11/2021
Job Number : S1088	Report Status : Final
SAMPLE INFORMATION AND PROPERTIES	
Sample Number	1 062
Sample Position	TP 3
Client Marking	TP 3
Sample Depth (m)	0,3
Sample Container	Plastic Bag
Condition of Sample	Good
Sample Size / Weight (g)	±10kg
Description of Sample	-
Colour	-
Type	-
Sampled By	Client
SANS 3001-GR1 and SANS 3001-GR3 (Hydrometer)	
Sieve Aperture Size (mm)	Percentage Passing Nearest 1%
100	100
75	100
63	100
50	100
37,5	98
28	97
20	92
14	86
5	60
2	43
1	39
0,425	34
0,250	31
0,150	28
0,075	24
0,045	18
0,021	16
0,013	15
0,006	13
0,002	9
SANS 3001-PR5	
Soil-mortar (%)	43,0
Coarse sand soil-mortar (%)	20,9
Fine sand soil-mortar (%)	23,3
Coarse fine sand soil-mortar (%)	7,0
Medium fine sand soil-mortar (%)	7,0
Fine fine sand soil-mortar (%)	9,3
Silt and clay soil-mortar (%)	55,8
Coarse sand ratio	0,2
Grading Modulus = GM	2,0
SANS 3001-GR10	
Liquid Limit (%)	27
Plastic Limit (%)	16
Plasticity Index (%)	11
Linear Shrinkage (%)	5,0
Overall Plasticity Index (%)	4
SANS 3001-GR20 and SANS 5844	
Moisture Content (%)	N/T
Relative Density (kg/m³)	N/T
SOIL CLASSIFICATIONS	
AASHTO (ASTM D3282)	A-2-6(0)
USCS (ASTM D2487)	GC



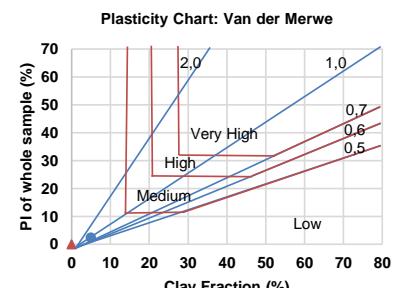
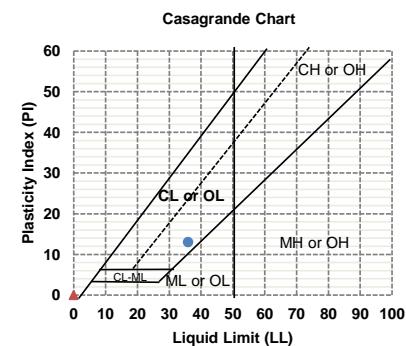
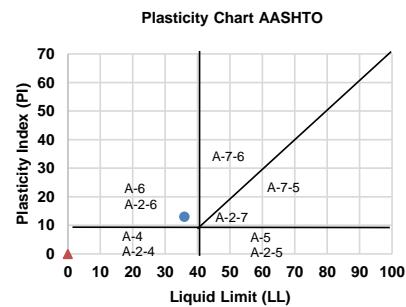
Date Received	: 25/10/2021
Date Tested	: 25/10/2021 - 02/11/2021
Date Reported	: 27/11/2021
Report Status	: Final



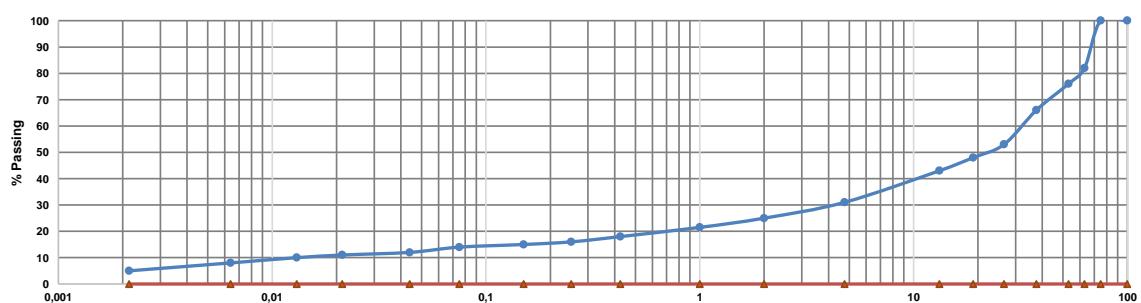
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FOUNDATION INDICATOR TEST REPORT

Client : Geo Buro cc	Client Reference : N/A
Address : 187 Clover Avenue	Order Number : N/A
: ST Rosaneco Estate	
: Lyttleton AH, 0157	
Attention : Emuel Kok	Date Received : 25/10/2021
E-mail : geoburo@telkomsa.net	Date Tested : 25/10/2021 - 02/11/2021
Project : Portion 183 Zandfontein	Date Reported : 27/11/2021
Job Number : S1088	Report Status : Final
SAMPLE INFORMATION AND PROPERTIES	
Sample Number	1 063
Sample Position	TP 4
Client Marking	TP 4
Sample Depth (m)	1,2
Sample Container	Plastic Bag
Condition of Sample	Good
Sample Size / Weight (g)	±10kg
Description of Sample	-
Colour	-
Type	-
Sampled By	Client
SANS 3001-GR1 and SANS 3001-GR3 (Hydrometer)	
Sieve Aperture Size (mm)	Percentage Passing Nearest 1%
100	100
75	100
63	82
50	76
37,5	66
28	53
20	48
14	43
5	31
2	25
1	22
0,425	18
0,250	16
0,150	15
0,075	14
0,044	12
0,021	11
0,013	10
0,006	8
0,002	5
SANS 3001-PR5	
Soil-mortar (%)	25,0
Coarse sand soil-mortar (%)	28,0
Fine sand soil-mortar (%)	16,0
Coarse fine sand soil-mortar (%)	8,0
Medium fine sand soil-mortar (%)	4,0
Fine fine sand soil-mortar (%)	4,0
Silt and clay soil-mortar (%)	56,0
Coarse sand ratio	0,3
Grading Modulus = GM	2,4
SANS 3001-GR10	
Liquid Limit (%)	36
Plastic Limit (%)	23
Plasticity Index (%)	13
Linear Shrinkage (%)	7,0
Overall Plasticity Index (%)	2
SANS 3001-GR20 and SANS 5844	
Moisture Content (%)	N/T
Relative Density (kg/m³)	N/T
SOIL CLASSIFICATIONS	
AASHTO (ASTM D3282)	A-2-6(0)
USCS (ASTM D2487)	GC

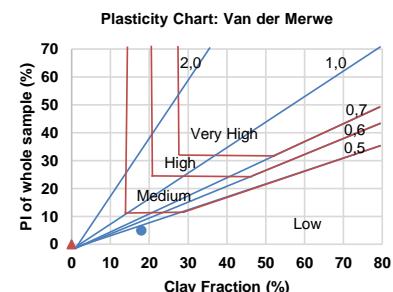
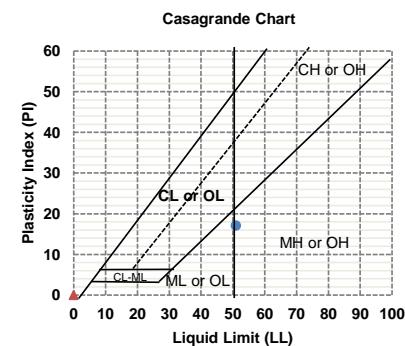
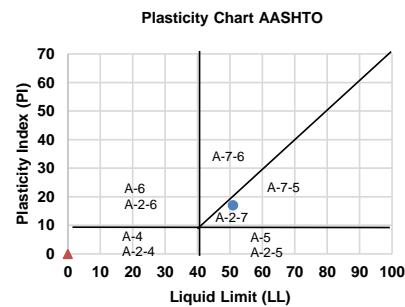


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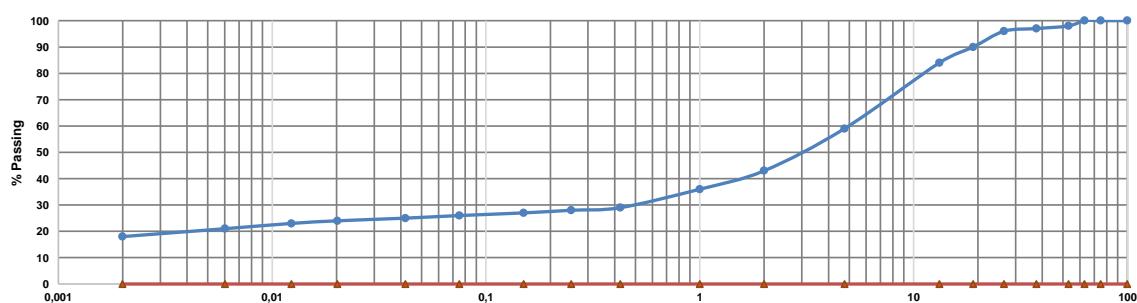


FOUNDATION INDICATOR TEST REPORT

Client : Geo Buro cc	Client Reference : N/A
Address : 187 Clover Avenue	Order Number : N/A
: ST Rosaneco Estate	
: Lyttleton AH, 0157	
Attention : Emuel Kok	Date Received : 25/10/2021
E-mail : geoburo@telkomsa.net	Date Tested : 25/10/2021 - 02/11/2021
Project : Portion 183 Zandfontein	Date Reported : 27/11/2021
Job Number : S1088	Report Status : Final
SAMPLE INFORMATION AND PROPERTIES	
Sample Number	1 064
Sample Position	TP 5
Client Marking	TP 5
Sample Depth (m)	0,7
Sample Container	Plastic Bag
Condition of Sample	Good
Sample Size / Weight (g)	±10kg
Description of Sample	-
Colour	-
Type	-
Sampled By	Client
SANS 3001-GR1 and SANS 3001-GR3 (Hydrometer)	
Sieve Aperture Size (mm)	Percentage Passing Nearest 1%
100	100
75	100
63	100
50	98
37,5	97
28	96
20	90
14	84
5	59
2	43
1	36
0,425	29
0,250	28
0,150	27
0,075	26
0,042	25
0,020	24
0,012	23
0,006	21
0,002	18
SANS 3001-PR5	
Soil-mortar (%)	43,0
Coarse sand soil-mortar (%)	32,6
Fine sand soil-mortar (%)	7,0
Coarse fine sand soil-mortar (%)	2,3
Medium fine sand soil-mortar (%)	2,3
Fine fine sand soil-mortar (%)	2,3
Silt and clay soil-mortar (%)	60,5
Coarse sand ratio	0,3
Grading Modulus = GM	2,0
SANS 3001-GR10	
Liquid Limit (%)	51
Plastic Limit (%)	34
Plasticity Index (%)	17
Linear Shrinkage (%)	9,0
Overall Plasticity Index (%)	5
SANS 3001-GR20 and SANS 5844	
Moisture Content (%)	N/T
Relative Density (kg/m³)	N/T
SOIL CLASSIFICATIONS	
AASHTO (ASTM D3282)	A-2-7(1)
USCS (ASTM D2487)	GM

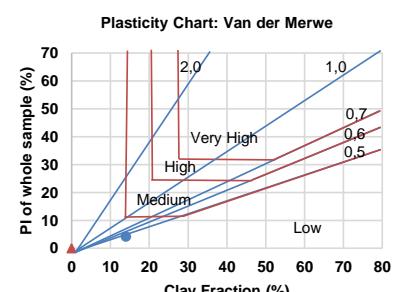
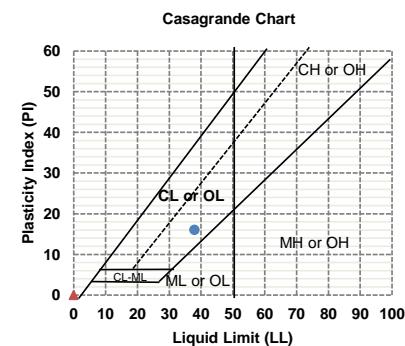
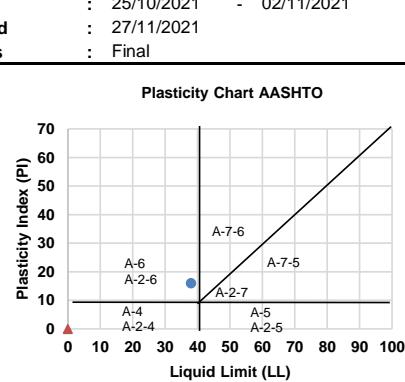
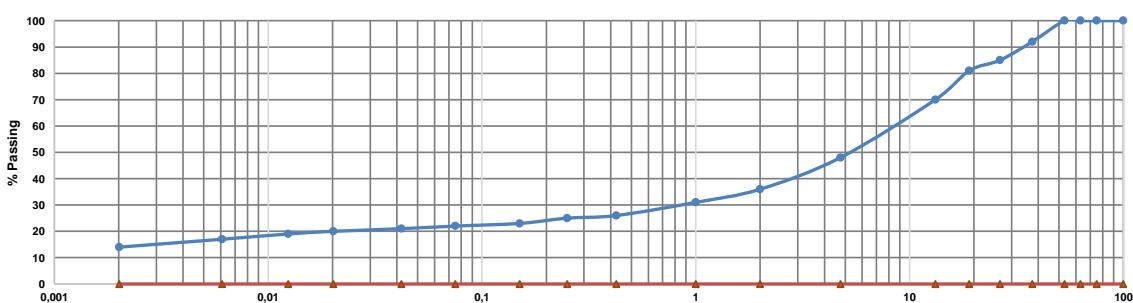


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FOUNDATION INDICATOR TEST REPORT

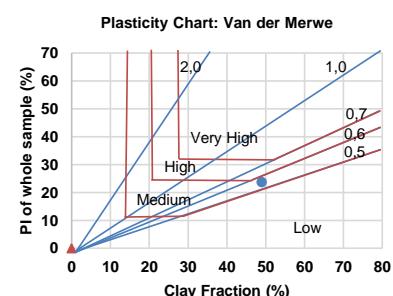
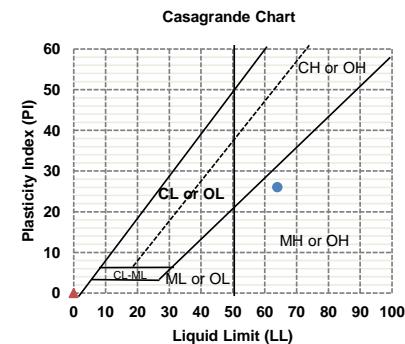
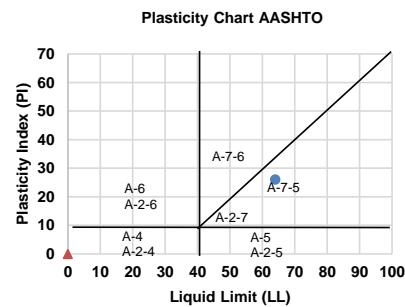
Client : Geo Buro cc	Client Reference : N/A
Address : 187 Clover Avenue	Order Number : N/A
: ST Rosaneco Estate	
: Lyttleton AH, 0157	
Attention : Emuel Kok	Date Received : 25/10/2021
E-mail : geoburo@telkomsa.net	Date Tested : 25/10/2021 - 02/11/2021
Project : Portion 183 Zandfontein	Date Reported : 27/11/2021
Job Number : S1088	Report Status : Final
SAMPLE INFORMATION AND PROPERTIES	
Sample Number	1 065
Sample Position	TP 6
Client Marking	TP 6
Sample Depth (m)	1,3
Sample Container	Plastic Bag
Condition of Sample	Good
Sample Size / Weight (g)	±10kg
Description of Sample	-
Colour	-
Type	-
Sampled By	Client
SANS 3001-GR1 and SANS 3001-GR3 (Hydrometer)	
Sieve Aperture Size (mm)	Percentage Passing Nearest 1%
100	100
75	100
63	100
50	100
37,5	92
28	85
20	81
14	70
5	48
2	36
1	31
0,425	26
0,250	25
0,150	23
0,075	22
0,042	21
0,020	20
0,012	19
0,006	17
0,002	14
SANS 3001-PR5	
Soil-mortar (%)	36,0
Coarse sand soil-mortar (%)	27,8
Fine sand soil-mortar (%)	11,1
Coarse fine sand soil-mortar (%)	2,8
Medium fine sand soil-mortar (%)	5,6
Fine fine sand soil-mortar (%)	2,8
Silt and clay soil-mortar (%)	61,1
Coarse sand ratio	0,3
Grading Modulus = GM	2,2
SANS 3001-GR10	
Liquid Limit (%)	38
Plastic Limit (%)	22
Plasticity Index (%)	16
Linear Shrinkage (%)	8,5
Overall Plasticity Index (%)	4
SANS 3001-GR20 and SANS 5844	
Moisture Content (%)	N/T
Relative Density (kg/m³)	N/T
SOIL CLASSIFICATIONS	
AASHTO (ASTM D3282)	A-2-6(0)
USCS (ASTM D2487)	GC



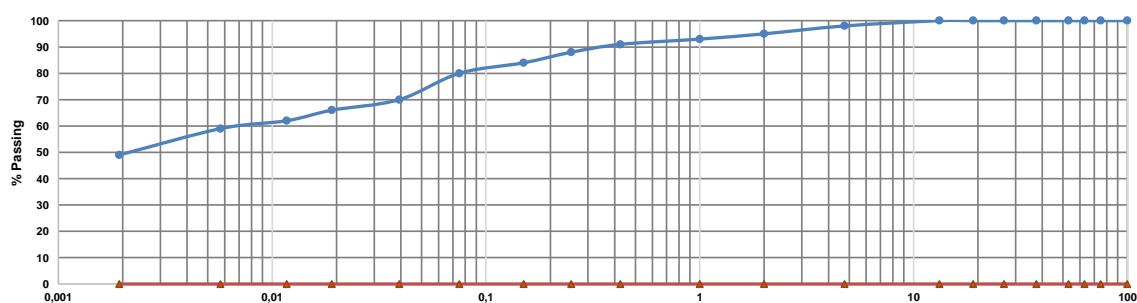
Remarks:

FOUNDATION INDICATOR TEST REPORT

Client : Geo Buro cc	Client Reference : N/A
Address : 187 Clover Avenue	Order Number : N/A
: ST Rosaneco Estate	
: Lyttleton AH, 0157	
Attention : Emuel Kok	Date Received : 25/10/2021
E-mail : geoburo@telkomsa.net	Date Tested : 25/10/2021 - 02/11/2021
Project : Portion 183 Zandfontein	Date Reported : 27/11/2021
Job Number : S1088	Report Status : Final
SAMPLE INFORMATION AND PROPERTIES	
Sample Number	1 066
Sample Position	TP 7
Client Marking	TP 7
Sample Depth (m)	1,0
Sample Container	Plastic Bag
Condition of Sample	Good
Sample Size / Weight (g)	±10kg
Description of Sample	-
Colour	-
Type	-
Sampled By	Client
SANS 3001-GR1 and SANS 3001-GR3 (Hydrometer)	
Sieve Aperture Size (mm)	Percentage Passing Nearest 1%
100	100
75	100
63	100
50	100
37,5	100
28	100
20	100
14	100
5	98
2	95
1	93
0,425	91
0,250	88
0,150	84
0,075	80
0,039	70
0,019	66
0,012	62
0,006	59
0,002	49
SANS 3001-PR5	
Soil-mortar (%)	95,0
Coarse sand soil-mortar (%)	4,2
Fine sand soil-mortar (%)	11,6
Coarse fine sand soil-mortar (%)	3,2
Medium fine sand soil-mortar (%)	4,2
Fine fine sand soil-mortar (%)	4,2
Silt and clay soil-mortar (%)	84,2
Coarse sand ratio	0,0
Grading Modulus = GM	0,3
SANS 3001-GR10	
Liquid Limit (%)	64
Plastic Limit (%)	38
Plasticity Index (%)	26
Linear Shrinkage (%)	13,0
Overall Plasticity Index (%)	24
SANS 3001-GR20 and SANS 5844	
Moisture Content (%)	N/T
Relative Density (kg/m³)	N/T
SOIL CLASSIFICATIONS	
AASHTO (ASTM D3282)	A-7-5(20)
USCS (ASTM D2487)	MH

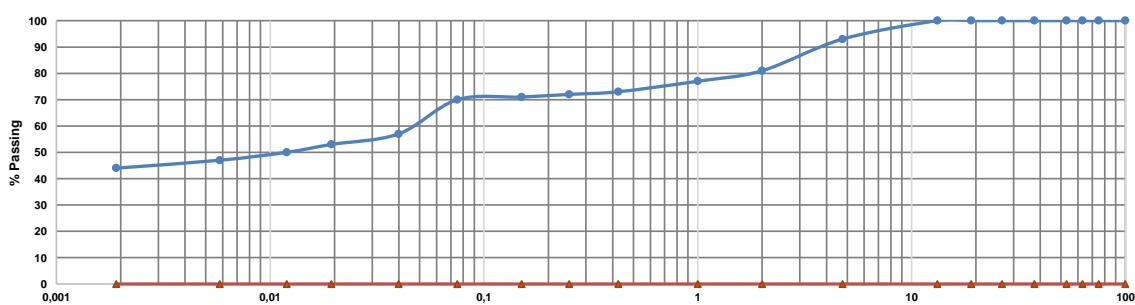


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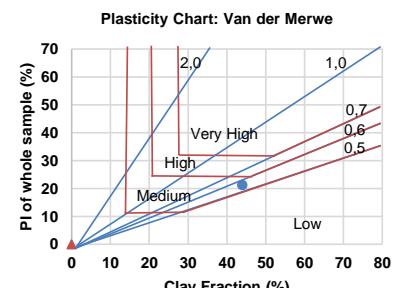
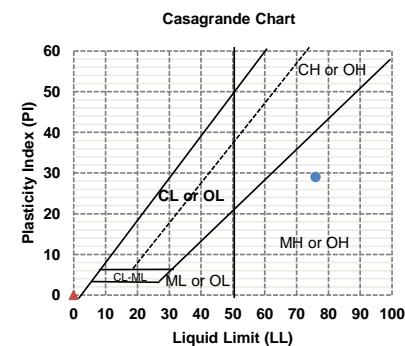
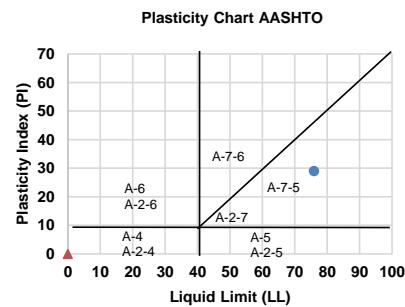


FOUNDATION INDICATOR TEST REPORT

Client : Geo Buro cc	Client Reference : N/A
Address : 187 Clover Avenue	Order Number : N/A
: ST Rosaneco Estate	
: Lyttleton AH, 0157	
Attention : Emuel Kok	Date Received : 25/10/2021
E-mail : geoburo@telkomsa.net	Date Tested : 25/10/2021 - 02/11/2021
Project : Portion 183 Zandfontein	Date Reported : 27/11/2021
Job Number : S1088	Report Status : Final
SAMPLE INFORMATION AND PROPERTIES	
Sample Number	1 067
Sample Position	TP 7
Client Marking	TP 7
Sample Depth (m)	2,0
Sample Container	Plastic Bag
Condition of Sample	Good
Sample Size / Weight (g)	±10kg
Description of Sample	-
Colour	-
Type	-
Sampled By	Client
SANS 3001-GR1 and SANS 3001-GR3 (Hydrometer)	
Sieve Aperture Size (mm)	Percentage Passing Nearest 1%
100	100
75	100
63	100
50	100
37,5	100
28	100
20	100
14	100
5	93
2	81
1	77
0,425	73
0,250	72
0,150	71
0,075	70
0,040	57
0,019	53
0,012	50
0,006	47
0,002	44
SANS 3001-PR5	
Soil-mortar (%)	81,0
Coarse sand soil-mortar (%)	9,9
Fine sand soil-mortar (%)	3,7
Coarse fine sand soil-mortar (%)	1,2
Medium fine sand soil-mortar (%)	1,2
Fine fine sand soil-mortar (%)	1,2
Silt and clay soil-mortar (%)	86,4
Coarse sand ratio	0,1
Grading Modulus = GM	0,8
SANS 3001-GR10	
Liquid Limit (%)	76
Plastic Limit (%)	47
Plasticity Index (%)	29
Linear Shrinkage (%)	13,5
Overall Plasticity Index (%)	21
SANS 3001-GR20 and SANS 5844	
Moisture Content (%)	N/T
Relative Density (kg/m³)	N/T
SOIL CLASSIFICATIONS	
AASHTO (ASTM D3282)	A-7-5(20)
USCS (ASTM D2487)	MH

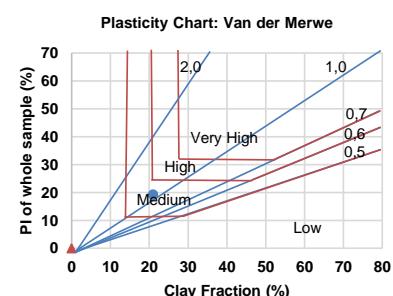
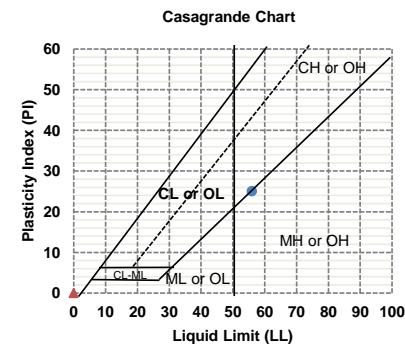
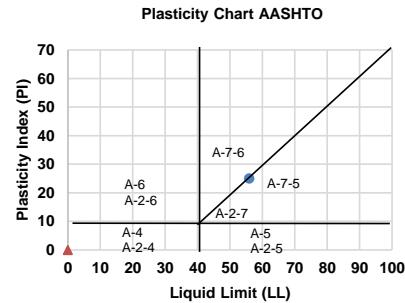
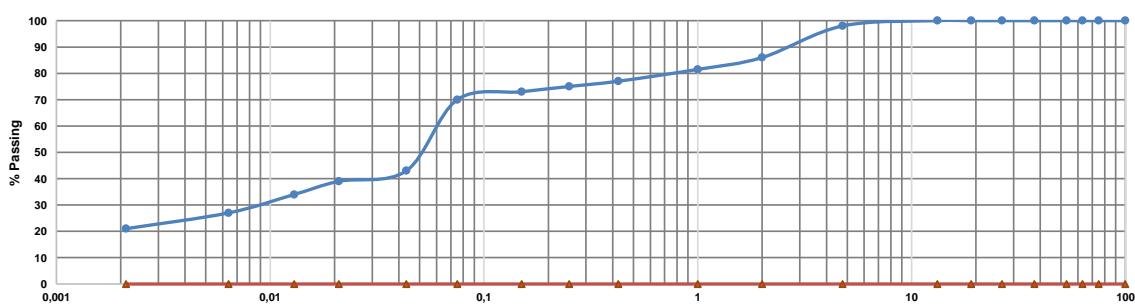


Remarks:



FOUNDATION INDICATOR TEST REPORT

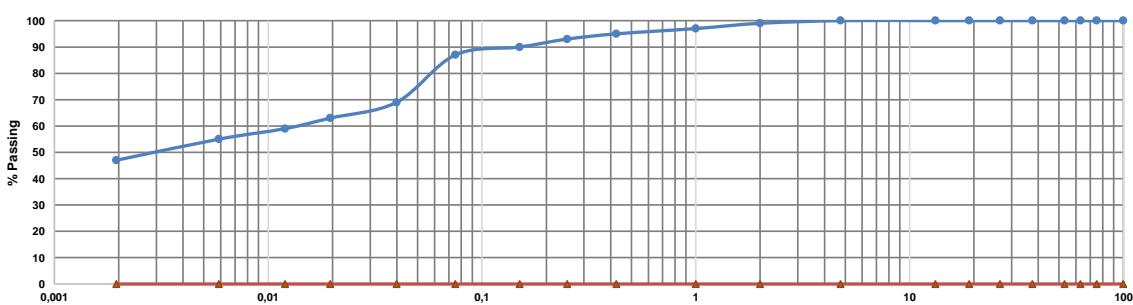
Client : Geo Buro cc	Client Reference : N/A
Address : 187 Clover Avenue	Order Number : N/A
: ST Rosaneco Estate	
: Lyttleton AH, 0157	
Attention : Emuel Kok	Date Received : 25/10/2021
E-mail : geoburo@telkomsa.net	Date Tested : 25/10/2021 - 02/11/2021
Project : Portion 183 Zandfontein	Date Reported : 27/11/2021
Job Number : S1088	Report Status : Final
SAMPLE INFORMATION AND PROPERTIES	
Sample Number	1 068
Sample Position	TP 8
Client Marking	TP 8
Sample Depth (m)	0,9
Sample Container	Plastic Bag
Condition of Sample	Good
Sample Size / Weight (g)	±10kg
Description of Sample	-
Colour	-
Type	-
Sampled By	Client
SANS 3001-GR1 and SANS 3001-GR3 (Hydrometer)	
Sieve Aperture Size (mm)	Percentage Passing Nearest 1%
100	100
75	100
63	100
50	100
37,5	100
28	100
20	100
14	100
5	98
2	86
1	82
0,425	77
0,250	75
0,150	73
0,075	70
0,043	43
0,021	39
0,013	34
0,006	27
0,002	21
SANS 3001-PR5	
Soil-mortar (%)	86,0
Coarse sand soil-mortar (%)	10,5
Fine sand soil-mortar (%)	8,1
Coarse fine sand soil-mortar (%)	2,3
Medium fine sand soil-mortar (%)	2,3
Fine fine sand soil-mortar (%)	3,5
Silt and clay soil-mortar (%)	81,4
Coarse sand ratio	0,1
Grading Modulus = GM	0,7
SANS 3001-GR10	
Liquid Limit (%)	56
Plastic Limit (%)	31
Plasticity Index (%)	25
Linear Shrinkage (%)	12,5
Overall Plasticity Index (%)	19
SANS 3001-GR20 and SANS 5844	
Moisture Content (%)	N/T
Relative Density (kg/m³)	N/T
SOIL CLASSIFICATIONS	
AASHTO (ASTM D3282)	A-7-5(18)
USCS (ASTM D2487)	MH



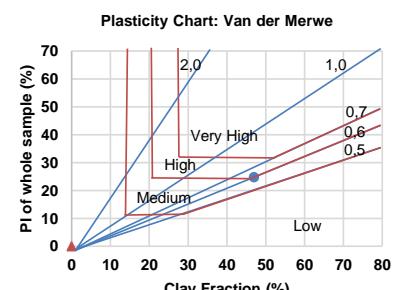
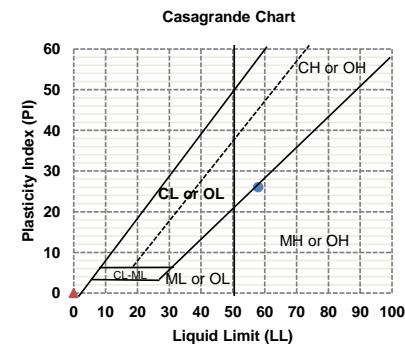
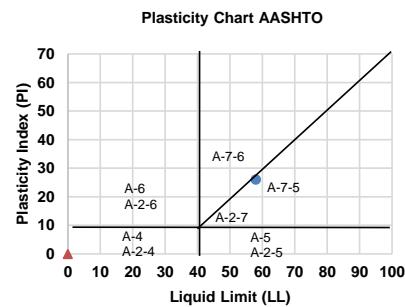
Remarks:

FOUNDATION INDICATOR TEST REPORT

Client : Geo Buro cc	Client Reference : N/A
Address : 187 Clover Avenue	Order Number : N/A
: ST Rosaneco Estate	
: Lyttleton AH, 0157	
Attention : Emuel Kok	Date Received : 25/10/2021
E-mail : geoburo@telkomsa.net	Date Tested : 25/10/2021 - 02/11/2021
Project : Portion 183 Zandfontein	Date Reported : 27/11/2021
Job Number : S1088	Report Status : Final
SAMPLE INFORMATION AND PROPERTIES	
Sample Number	1 069
Sample Position	TP 8
Client Marking	TP 8
Sample Depth (m)	2,2
Sample Container	Plastic Bag
Condition of Sample	Good
Sample Size / Weight (g)	±10kg
Description of Sample	-
Colour	-
Type	-
Sampled By	Client
SANS 3001-GR1 and SANS 3001-GR3 (Hydrometer)	
Sieve Aperture Size (mm)	Percentage Passing Nearest 1%
100	100
75	100
63	100
50	100
37,5	100
28	100
20	100
14	100
5	100
2	99
1	97
0,425	95
0,250	93
0,150	90
0,075	87
0,040	69
0,020	63
0,012	59
0,006	55
0,002	47
SANS 3001-PR5	
Soil-mortar (%)	99,0
Coarse sand soil-mortar (%)	4,0
Fine sand soil-mortar (%)	8,1
Coarse fine sand soil-mortar (%)	2,0
Medium fine sand soil-mortar (%)	3,0
Fine fine sand soil-mortar (%)	3,0
Silt and clay soil-mortar (%)	87,9
Coarse sand ratio	0,0
Grading Modulus = GM	0,2
SANS 3001-GR10	
Liquid Limit (%)	58
Plastic Limit (%)	32
Plasticity Index (%)	26
Linear Shrinkage (%)	13,5
Overall Plasticity Index (%)	25
SANS 3001-GR20 and SANS 5844	
Moisture Content (%)	N/T
Relative Density (kg/m³)	N/T
SOIL CLASSIFICATIONS	
AASHTO (ASTM D3282)	A-7-5(20)
USCS (ASTM D2487)	MH

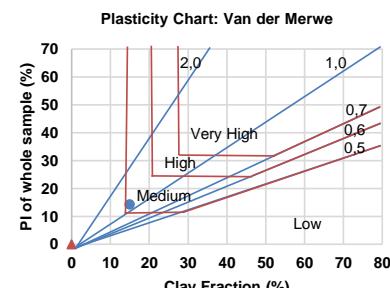
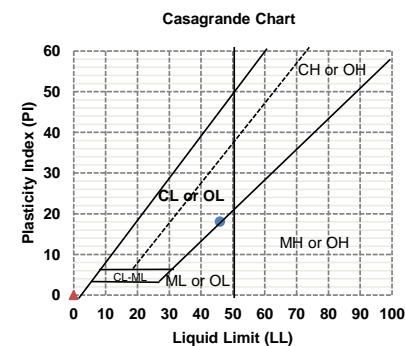
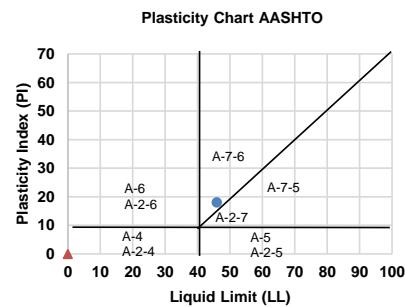


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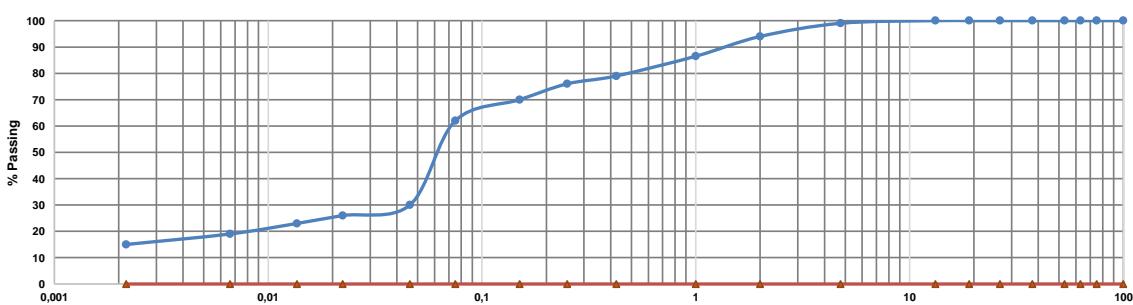


FOUNDATION INDICATOR TEST REPORT

Client : Geo Buro cc	Client Reference : N/A
Address : 187 Clover Avenue	Order Number : N/A
: ST Rosaneco Estate	
: Lyttleton AH, 0157	
Attention : Emuel Kok	Date Received : 25/10/2021
E-mail : geoburo@telkomsa.net	Date Tested : 25/10/2021 - 02/11/2021
Project : Portion 183 Zandfontein	Date Reported : 27/11/2021
Job Number : S1088	Report Status : Final
SAMPLE INFORMATION AND PROPERTIES	
Sample Number	1 070
Sample Position	TP 9
Client Marking	TP 9
Sample Depth (m)	1,5
Sample Container	Plastic Bag
Condition of Sample	Good
Sample Size / Weight (g)	±10kg
Description of Sample	-
Colour	-
Type	-
Sampled By	Client
SANS 3001-GR1 and SANS 3001-GR3 (Hydrometer)	
Sieve Aperture Size (mm)	Percentage Passing Nearest 1%
100	100
75	100
63	100
50	100
37,5	100
28	100
20	100
14	100
5	99
2	94
1	87
0,425	79
0,250	76
0,150	70
0,075	62
0,046	30
0,022	26
0,014	23
0,007	19
0,002	15
SANS 3001-PR5	
Soil-mortar (%)	94,0
Coarse sand soil-mortar (%)	16,0
Fine sand soil-mortar (%)	18,1
Coarse fine sand soil-mortar (%)	3,2
Medium fine sand soil-mortar (%)	6,4
Fine fine sand soil-mortar (%)	8,5
Silt and clay soil-mortar (%)	66,0
Coarse sand ratio	0,2
Grading Modulus = GM	0,7
SANS 3001-GR10	
Liquid Limit (%)	46
Plastic Limit (%)	28
Plasticity Index (%)	18
Linear Shrinkage (%)	9,0
Overall Plasticity Index (%)	14
SANS 3001-GR20 and SANS 5844	
Moisture Content (%)	N/T
Relative Density (kg/m³)	N/T
SOIL CLASSIFICATIONS	
AASHTO (ASTM D3282)	A-7-6(10)
USCS (ASTM D2487)	ML



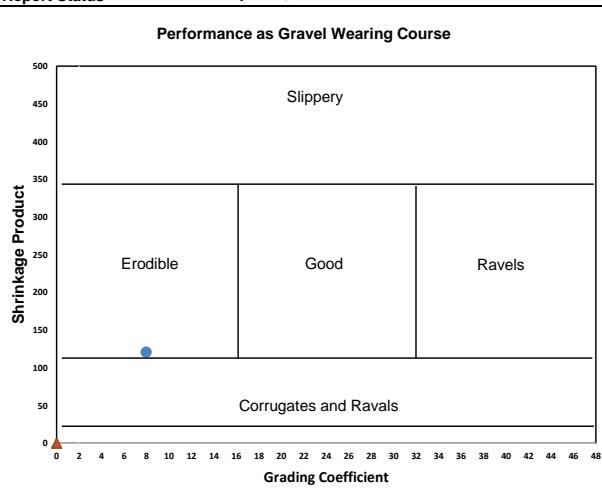
Remarks:



ROAD INDICATOR TEST REPORT

Client	:	Geo Buro cc	Client Reference	:	N/A
Address	:	187 Clover Avenue	Order Number	:	N/A
	:	ST Rosaneco Estate			
	:	Lyttleton AH, 0157			
Attention	:	Emuel Kok	Date Received	:	28/10/2021
E-mail	:	geoburo@telkomsa.net	Date Tested	:	28/10/2021 - 02/11/2021
Project	:	Portion 183 Zandfontein	Date Reported	:	27/11/2021
Job Number	:	S1088	Report Status	:	Final

SAMPLE INFORMATION AND PROPERTIES		
Sample Number	1 061	▲
Sample Position	CBR 2	
Client Marking	CBR 2	
Sample Depth (mm)	0,5-2,0	
Sample Container	Plastic Bags	
Condition of Sample	Good	
Sample Size / Weight (g)	±80kg	
Description of Sample	-	
Colour	-	
Type	-	
Sampled By	Client	
SANS 3001-GR1		
Sieve Aperture Size	Percentage Passing Nearest 1%	
100	91	
75	88	
63	78	
50	71	
37,5	69	
28	57	
20	42	
14	36	
5	19	
2	15	
0,425	11	
0,250	11	
0,150	11	
0,075	10	
SANS 3001-PR5		
Soil-mortar (%)	15,0	
Coarse sand soil-mortar (%)	26,7	
Fine sand soil-mortar (%)	6,7	
Coarse fine sand soil-mortar (%)	0,0	
Medium fine sand soil-mortar (%)	0,0	
Fine fine sand soil-mortar (%)	6,7	
Silt and clay soil-mortar (%)	66,7	
Coarse sand ratio	0,3	
Grading Modules	2,6	
SANS 3001-GR10		
Liquid Limit (%)	47	
Plastic Limit (%)	24	
Plasticity Index (%)	22	
Linear Shrinkage (%)	11,0	



SANS 3001-GR30		

| **SANS 3001-GR40** | | |

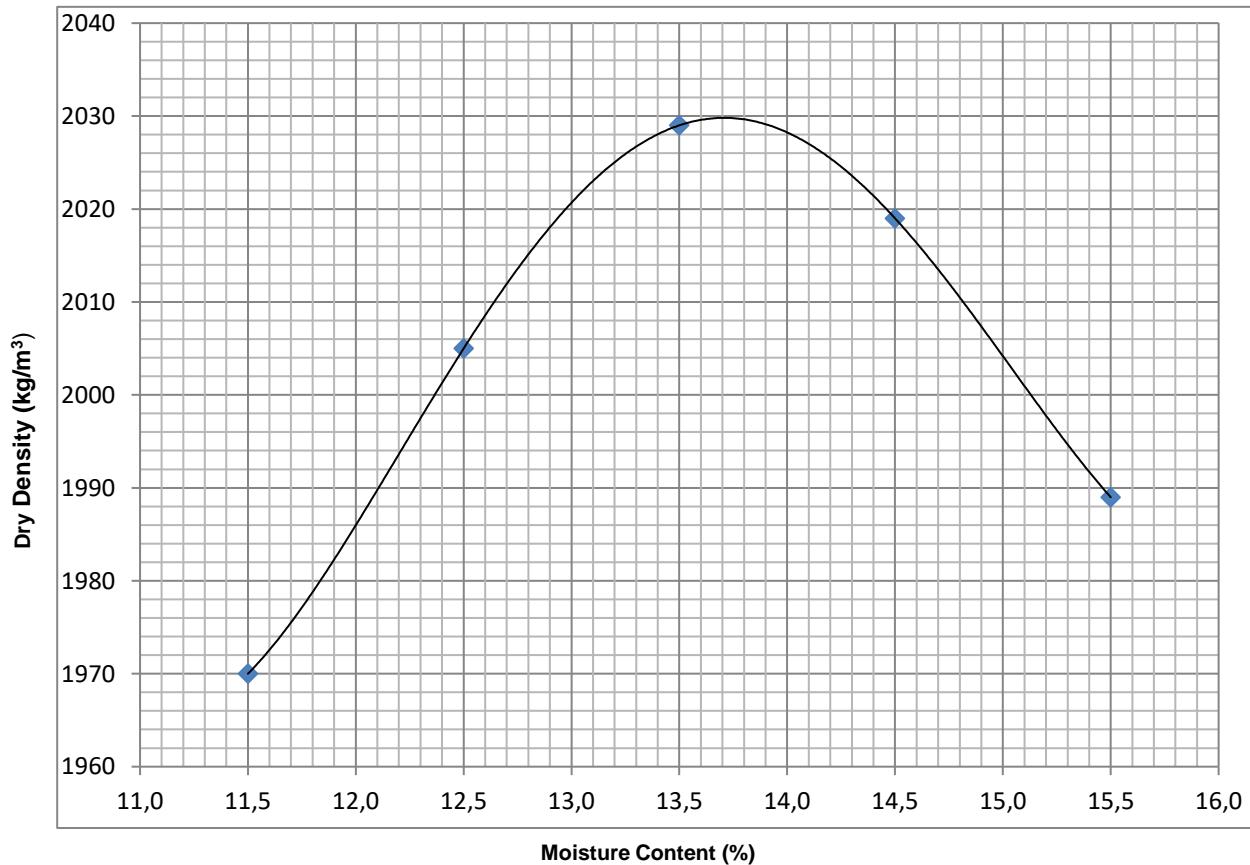
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TEST REPORT

Client	:	Geo Buro cc	Client Reference	:	N/A
	:	187 Clover Avenue	Order Number	:	N/A
	:	ST Rosaneco Estate			
	:	Lyttleton AH, Centurion			
	:	0157			
Attention	:	Emuel Kok	Date Received	:	28/10/2021
E-mail	:	geoburo@telkomsa.net	Date Tested	:	28/10/2021 - 02/11/2021
Project	:	Portion 183 Zandfontein	Date Reported	:	27/11/2021
Job Number	:	S1088	Report Status	:	Final

SANS 3001-GR30: Maximum Dry Density and Optimum Moisture Content

Sample Number:	1061		Field Reference:	CBR 2			
Depth (mm):	0,5-2,0						
Description:	CBR 2						
Compaction Effort:	Modified AASHTO						
Dry Density (kg/m ³):	1970	2005	2029	2019	1989		
Moisture Content (%)	11,5	12,5	13,5	14,5	15,5		
Maximum Dry Density (kg/m ³):	2030		Optimum Moisture Content (%):	13,7			



Remarks: The samples were subjected to analysis according to test method SANS 3001 GR30. The results reported relate only to the samples tested. Documents may only be reproduced or published in their full context.



du Plessis
Civil Engineering

Reg. No: cc 200004833323

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0181

PO Box 26272
Monument Park
0105

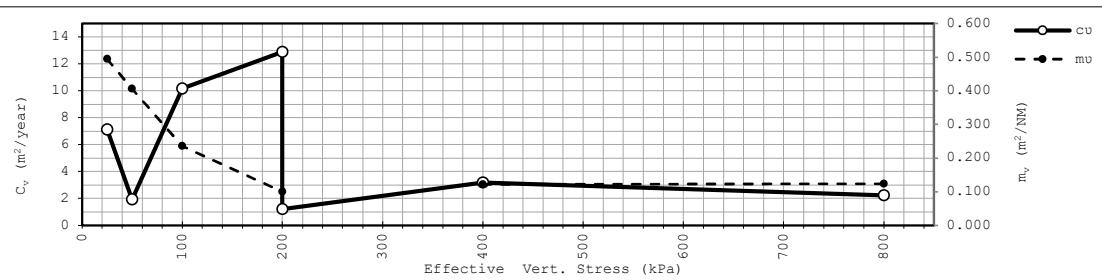
Tel/Fax 012 346 7586
Cell: 082 375 3003
bennie@geotesting.co.za

Project:	Zandfontien
Sample Number:	TP8
Sample Position:	1.0m
Test:	Oedometer Collapse Potential
Sample Receive Date:	29-Nov-21
Lab Number:	21/237
Test Date:	Page 1 of 2 10-Nov-21

Specimen condition:	Undisturbed		
Ring Diameter :	74.94	mm	
Height of Ring :	19.73	mm	
Weight of Ring :	116.61	g	
Initial Weight of Ring & Soil :	270.79	g	
Initial Volume :	87.065	cm ³	
Initial Mass :	154.18	g	
Dry mass :	120.60	g	
Initial Water Content :	27.8	%	
Initial Dry Density :	1.385	Mg/m ³	
Particle Density (Assumed) :	(Assumed)	2.65	Mg/m ³
Initial Void Ratio :	0.913		
Final Water Content :	32.1	%	
Final Dry Density (800kPa) :	1.545	Mg/m ³	

Coefficient of Consolidation and Volume Compressibility

Pressure (kPa)	t ₅₀ (min.)	H (mm)	\bar{H} (mm) (H ₁ +H ₂) / 2	c _v 0.026 * H ² / t ₅₀ ² (m ² /year)	δe	δp (kN/m ²)	1 + e ₁	m ₀ (δe / δp) * 1000 / (1+e ₁) (m ² /MN)
0	-	-	-	-				
12.5	-	19.73	-	-				
25	1.4	19.56	19.65	7.1189	0.012	12.5	1.913	0.495
50	5.1	19.41	19.49	1.9416	0.019	25	1.901	0.406
100	1.0	19.18	19.30	10.1794	0.022	50	1.882	0.236
200	0.7	18.99	19.09	12.8929	0.019	100	1.860	0.100
200	7.7	18.82	18.90	1.2024			Collapsed	
400	2.8	18.25	18.53	3.1863	0.045	200	1.825	0.122
800	3.8	17.45	18.13	2.2387	0.088	400	1.780	0.124





du Plessis
Civil Engineering

Reg. No: cc 200004833323

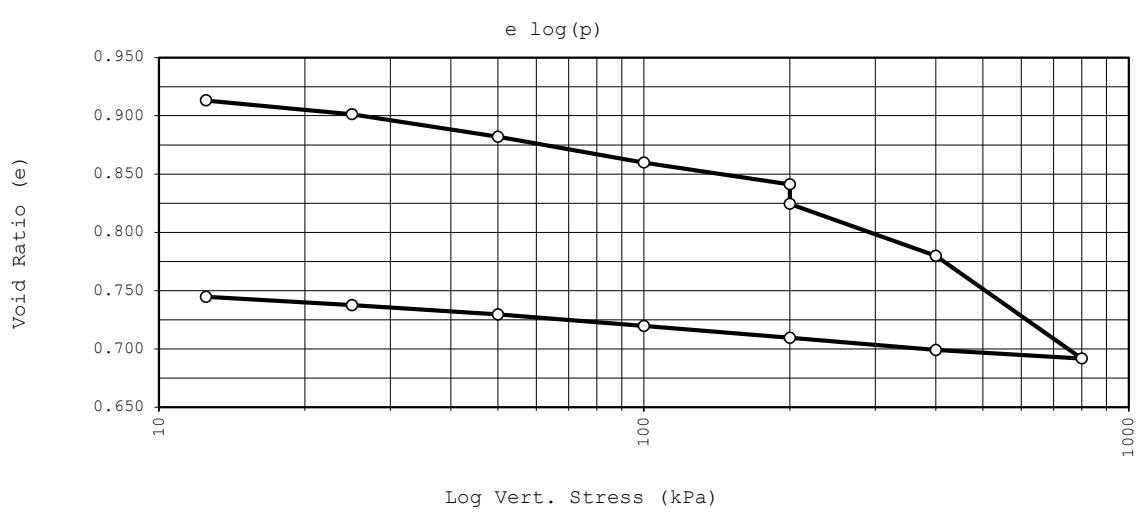
250 ORION Ave
Monument Park
0181

PO Box 26272
Monument Park
0105

Tel/Fax 012 346 7586
Cell: 082 375 3003
bennie@geotesting.co.za

Project:	Zandfontien
Sample Number:	TP8
Sample Position:	1.0m
Test:	Oedometer Collapse Potential
Sample Receive Date:	29-Nov-21
Lab Number:	21/237
Test Date:	Page 2 of 2 10-Nov-21

	Verticle Stress (kPa)		Vert. Strain (%)		Void Ratio
Load	12.5	Water	0.000		0.913
	25		0.618		0.901
	50		1.627		0.882
	100		2.787		0.860
	200		3.761		0.841
	200		4.632		0.825
	400		6.959		0.780
	800		11.571		0.692
Un-Load	400		11.191		0.699
	200		10.643		0.710
	100		10.106		0.720
	50		9.599		0.730
	25		9.184		0.737
	12.5		8.798		0.745



Appendix C: Drawings

Geo Buro

Geotechnical Surveys

S P Kok
Engineering Geologist
Cell: 083 556 0968
spkok@telkomsa.net



Client:

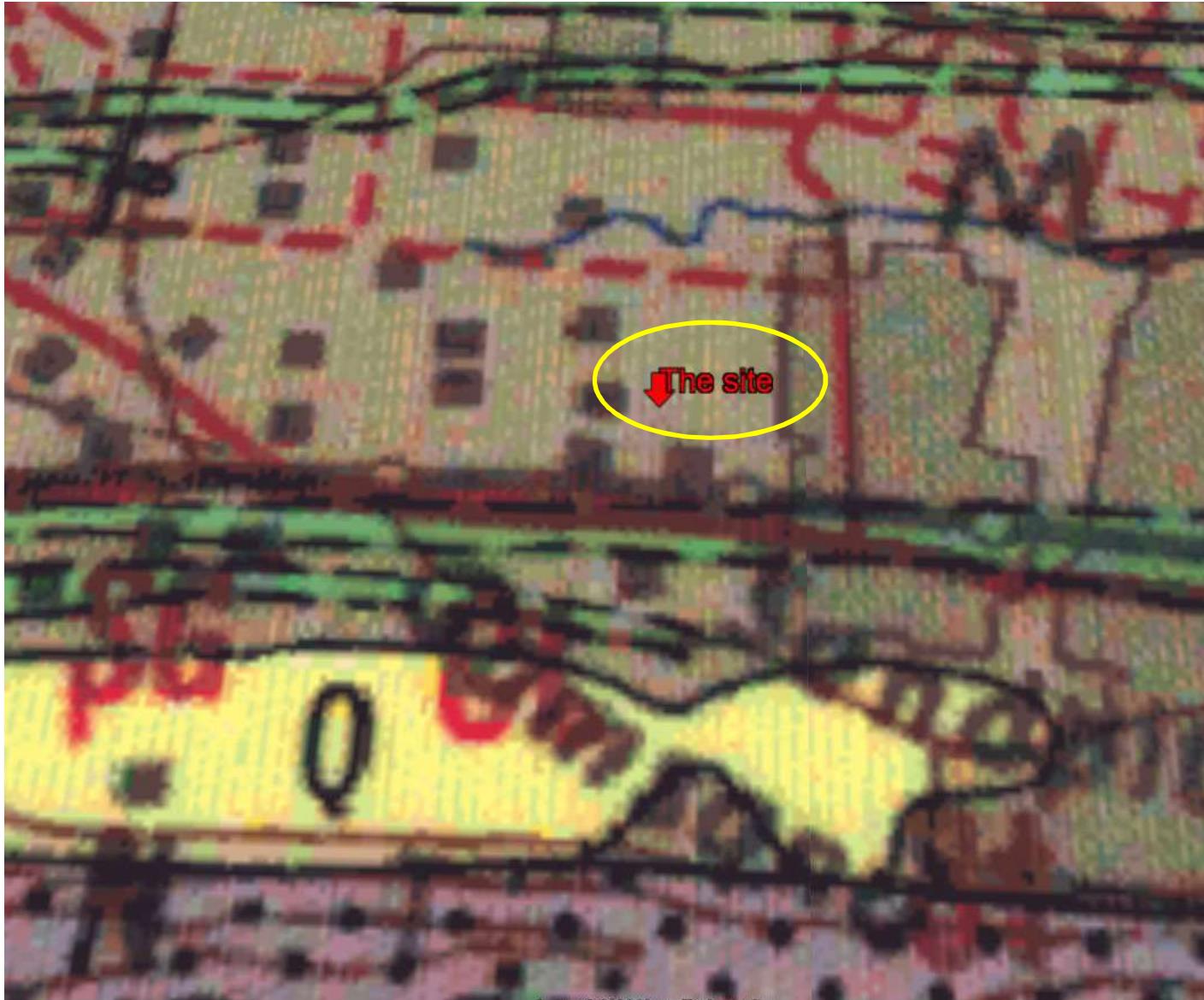
Cosmopolitan
Projects

Site:
Portion 183
of the farm
Zandfontein 317 JR

Drawing No.
9884 -01:
Locality Map



The Site



Geo Buro

Geotechnical Surveys

S P Kok
Engineering Geologist
Cell: 083 556 0968
spkok@telkomsa.net



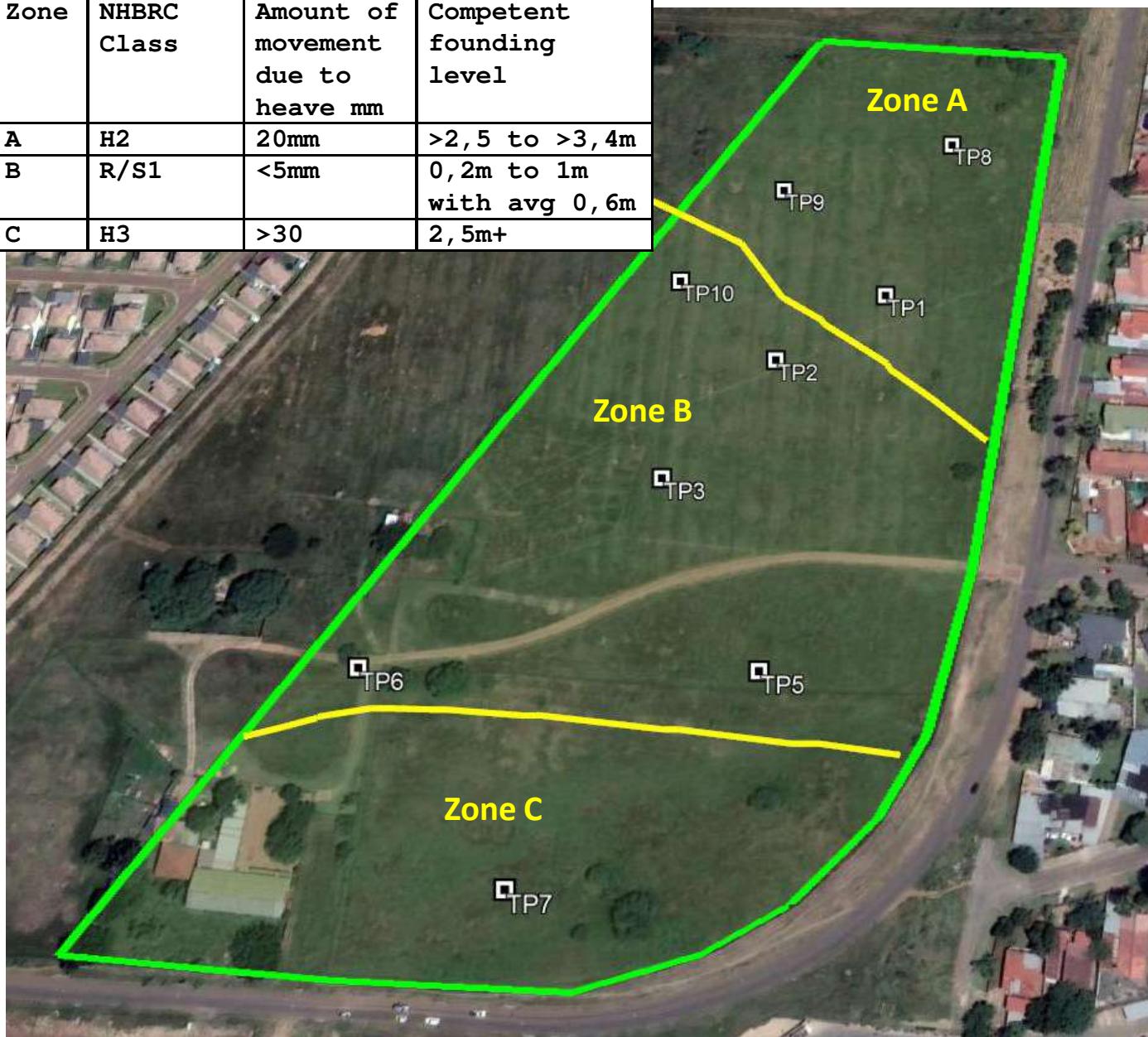
Client:

Cosmopolitan
Projects

Site:
Portion 183
of the farm
Zandfontein 317 JR

Drawing No.
9884 -02:
Geology Map

Zone	NHBRC Class	Amount of movement due to heave mm	Competent founding level
A	H2	20mm	>2,5 to >3,4m
B	R/S1	<5mm	0,2m to 1m with avg 0,6m
C	H3	>30	2,5m+



Geo Buro
Geotechnical Surveys

S P Kok
Engineering Geologist
Cell: 083 556 0968
spkok@telkomsa.net



Client:
Cosmopolitan
Projects

Site:
Portion 183
of the farm
Zandfontein 317 JR

Drawing No.
9884 -03:
Zonation
Map