

GEOTECHNICAL INVESTIGATION REPORT

THE REHABILITATION OF ROAD D192 IN THE MOKGALAKWENA MUNICIPALITY

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Prepared By:

MAKHUMA CONSULTING (Pty) Ltd

Address: 1469 Lowveld Close

Rayton, Pretoria, 1001

Enquiries:

Hudson Mabelane *Pr.Sci.Nat*

Tel: +27 72 342 3563

Email: makhumac@gmail.com

Prepared For:

MORULA CONSULTING ENGINEERS CC

54A Dorp Street

Polokwane, 0699

H O Tsanwani *Pr.Tech.Eng*

+27 (0) 15 296 4461

admin@morulaconsulting.co.za

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EXECUTIVE SUMMARY

Makhuma Consulting (Pty) Ltd was approached and appointed by Morula Consulting Engineers to undertake a geotechnical investigation for the design and planning of the proposed rehabilitation of the 20.50 km D192 road.

The site (D192) for the proposed construction is situated approximately 40 km northwest of Mokopane within Mogalakwena Local Municipality, Waterberg District Municipality in the Limpopo Province. The proposed road specifically starts from Chainage 0.0 at the intersection with the regional road R518 to Chainage 20.50 at the end of Jakkalskuil Village.

The road D192 is regionally characterised by abundant Quaternary deposits with some parts underlain by weathered sandstone. Some dolerite intrusions of Jurassic Period are indicated along the road. The excavation of several test pits along the road revealed materials consistent with the geology of the region. The site is locally characterized by imported road fill underlain by transported soil, residual soil, traces of pedogenic material, and weathered sandstone, dolerite, or granite.

The tested soils encountered along the road centerline are generally graded as silty sand with little to no clay. The plasticity index for the material indicated slightly plastic (SP) to non-plastic (NP) character along the road with some low to medium plasticity; liquid limits ranged from 0 to 34%, linear shrinkage ranged from 0 to 11.5%, all indicating a very low potential expansiveness for the material encountered along the road.

The maximum dry density (MDD) for the tested soil ranged between 1750 kg/m³ and 2064 kg/m³ at an optimum moisture content (OMC) of between 5.3 and 17.5%. Furthermore, the CBR values for the material ranged from 2 – 16 at 90% compaction, 3 – 22 at 95% compaction, and a maximum CBR of 8 – 46 at 100% Compaction.

Soft excavation conditions in terms of the above standard are expected up to an average depth of 1.2 meters along the road. However, intermediate and hard rock excavation conditions are expected at the borrow pit locations.

The investigation revealed abundant sandy soils with minor gravel over the majority of the site which classified G8 to worse than G9 quality soil with some G6 to G7 from KM 0.0 to KM 6.5.

1 INTRODUCTION

1.1 TERMS OF REFERENCE

Makhuma Consulting (Pty) Ltd was approached and appointed by Morula Consulting Engineers to undertake a geotechnical investigation for the design and planning of the proposed rehabilitation of the 20.50 km D192 road. This report presents the findings of the undertaken geotechnical assessment and it is intended solely for the design of the specified road. The main purpose of this investigation is to assess the condition existing layer works along the road and to a certain extent, the prevailing regional geological constraining factors.

1.2 SCOPE OF WORK

The main objective of this investigation is to provide information suitable for use in the detailed pavement design of the roads proposed for construction. Recommendations will also be made regarding the suitability of materials for reuse in construction. By default, the following form part of geotechnical investigations:

- Specific geology of the site
- Potential geotechnical restraining factors
- Excavation conditions in terms of SANS 1200D
- Classification of materials according to the TRH14 classification system

The geotechnical investigation included the following key components:

- Desktop study and literature review
- Test pitting and soil sampling
- Dynamic Cone Penetration (DCP) tests and
- Laboratory testing
- Preparation of an interpretative geotechnical report

1.3 SOURCE OF INFORMATION

The following were studied prior to the investigation taking place:

- 1: 250 000 geological map sheet 2328 Petersburg, Copyright Geological Survey of South Africa (Council for Geosciences)
- Site Investigation Code of Practice, published by the South African Institution of Civil Engineering (Geotech Division)
- Google Earth Satellite Imagery, 2022
- Esri Satellite Imagery, 2022 (QGIS open source)

2 SITE LOCATION AND DESCRIPTION

2.1 SITE LOCALITY

The site (D192) for the proposed construction is situated approximately 40 km northwest of Mokopane within Mogalakwena Local Municipality, Waterberg District Municipality in the Limpopo Province, South Africa (refer Figure 2-1).

The proposed road specifically starts from Chainage 0.0 at the intersection with the regional road R518 to Chainage 20.50 at the end of Jakkalskuil Village. The proposed development is understood to be the reconstruction, widening, and resealing of the existing surfaced road as per the available preliminary drawing.

2.2 SITE ACCESS

The site is accessible with 2-wheel drive vehicles. Locally, the area is characterised by near horizontal natural slopes with an average slope of between 1% – 3.0 % along the road alignment. The current condition of the proposed access roads is shown in Plates 2-1 below.

2.3 CLIMATE AND WEATHERING OF ROCKS

Mogalakwena Local Municipality falls within the summer rainfall region of Limpopo, with the rainy season lasting from November to March. The average rainfall is 600 - 650 mm. The region generally experiences a hot semi-arid climate. Summer days are hot with temperatures varying between 28 - 34 °C in October to March. Summer night temperatures are hot to mild varying between 16 - 21 °C. The winter day temperatures are mild to warm varying between 19.6 - 25.2 °C in April to September. Winter nights are cold with temperatures of 4.3 - 12.1 °C.

According to the Thornthwaite's moisture index, the area falls in the region of 0 to - 20. This may be interpreted as a sub-humid condition. The Weinert N-value for the area is less than 5. This simply means decomposition is the dominant mode of weathering and physical disintegration of rock becomes insignificant (Ref.10).

2.4 VEGETATION

According to Acocks (1988), this site falls under *the mixed bushveld vegetation type* which comprises of *grasslands* and planted trees. Satellite images show that the area is mainly covered by grass with isolated slightly dense shrubs or forests mainly near the hills.





Plates 2-1: The current conditions of the road proposed for rehabilitation.

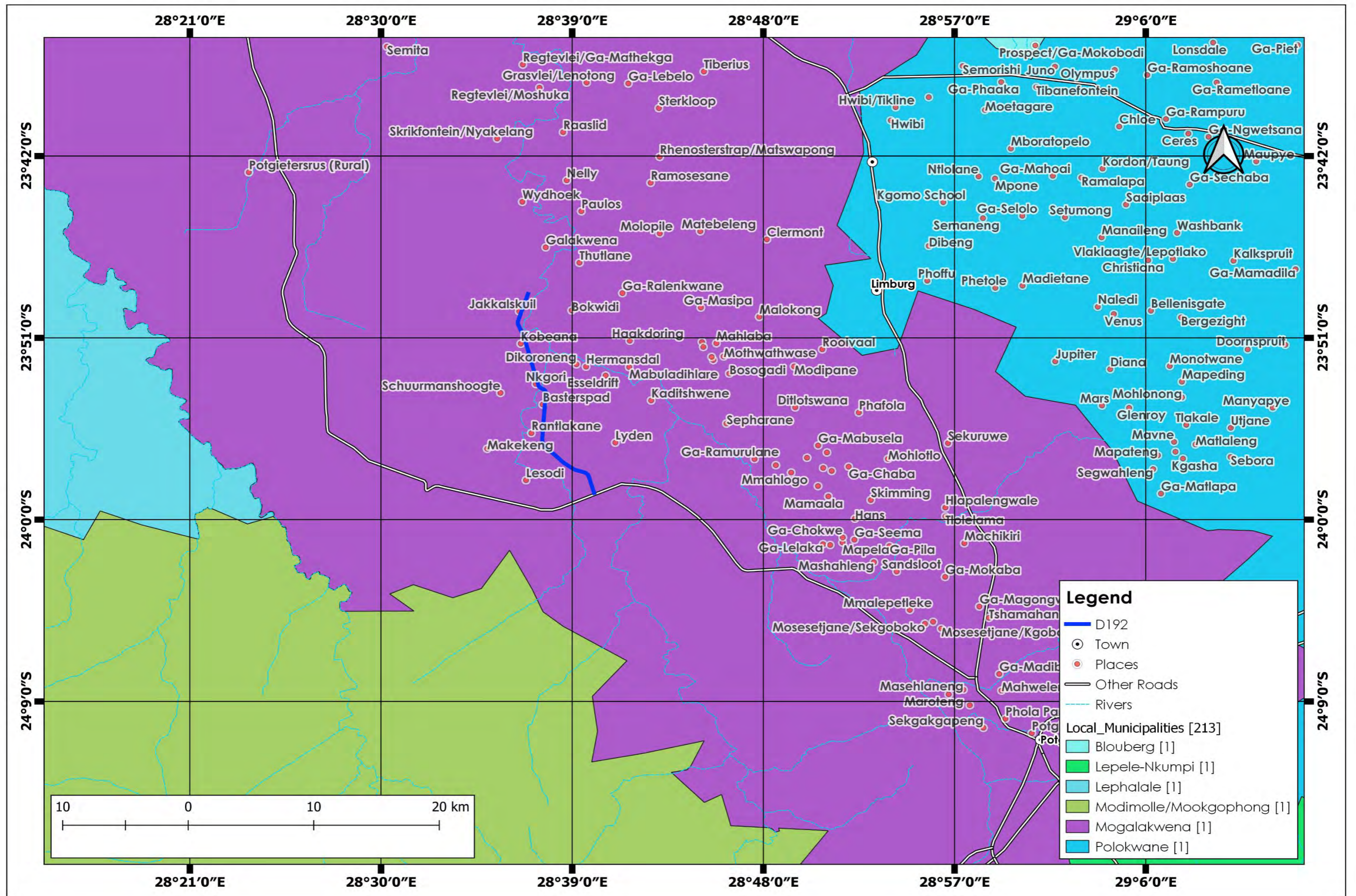


Figure 2-1: Site locality map showing the location of the regional road D192 within the Mogalakwena Local Municipality.

3 SITE GEOLOGY

3.1 REGIONAL GEOLOGY

According to the published 1:250 000 geological map sheet 2328 Pietersburg, the road D192 is regionally characterised by abundant Quaternary deposits with some parts underlain by weathered sandstone. Some dolerite intrusions of Jurassic Period are indicated along the road. Table 3-1 below shows the geological summary of the area, whereas Figure 3-1 shows the proposed road superimposed on the regional geological map.

3.2 LOCAL GEOLOGY

Based on the regional geology of the site and the undertaken site investigation, the road is underlain by abundant Quaternary transported soils comprising silty sand with portions of immature pedogenic ferricrete underlain by residual soils and sandstone or dolerite, respectively.

- Transported soils - These are soils which have been transported by a natural agent (wind-blown sand, hillwash, etc.) during relatively recent geological times and which have not undergone lithification into sedimentary rocks or cementation into a pedogenic material.
- Pedogenic Material - These are mixtures of the original host or parent material and the authigenic cement.
- Residual soils – Soils derived from the weathering of the underlying rock and have not moved from the place of origin as with transported soils.

Table 3-1: The geology of the proposed D192 road and surrounding areas

Era/Period	Stratigraphic Unit	Formation	Lithology
Quaternary	-	-	Sandy soil, pedogenic soils (Q)
Jurassic	-	-	Dolerite/diabase
Mokolian	Waterberg Group	Mogalakwena Formation	Coarse-grained, purplish brown sandstone, conglomerate
		Makgabeng Formation	Medium-grained, yellow, laminated sandstone
	Rustenburg Layered Suite	Nebo Granite	Coarse-grained red hornblende biotite granite

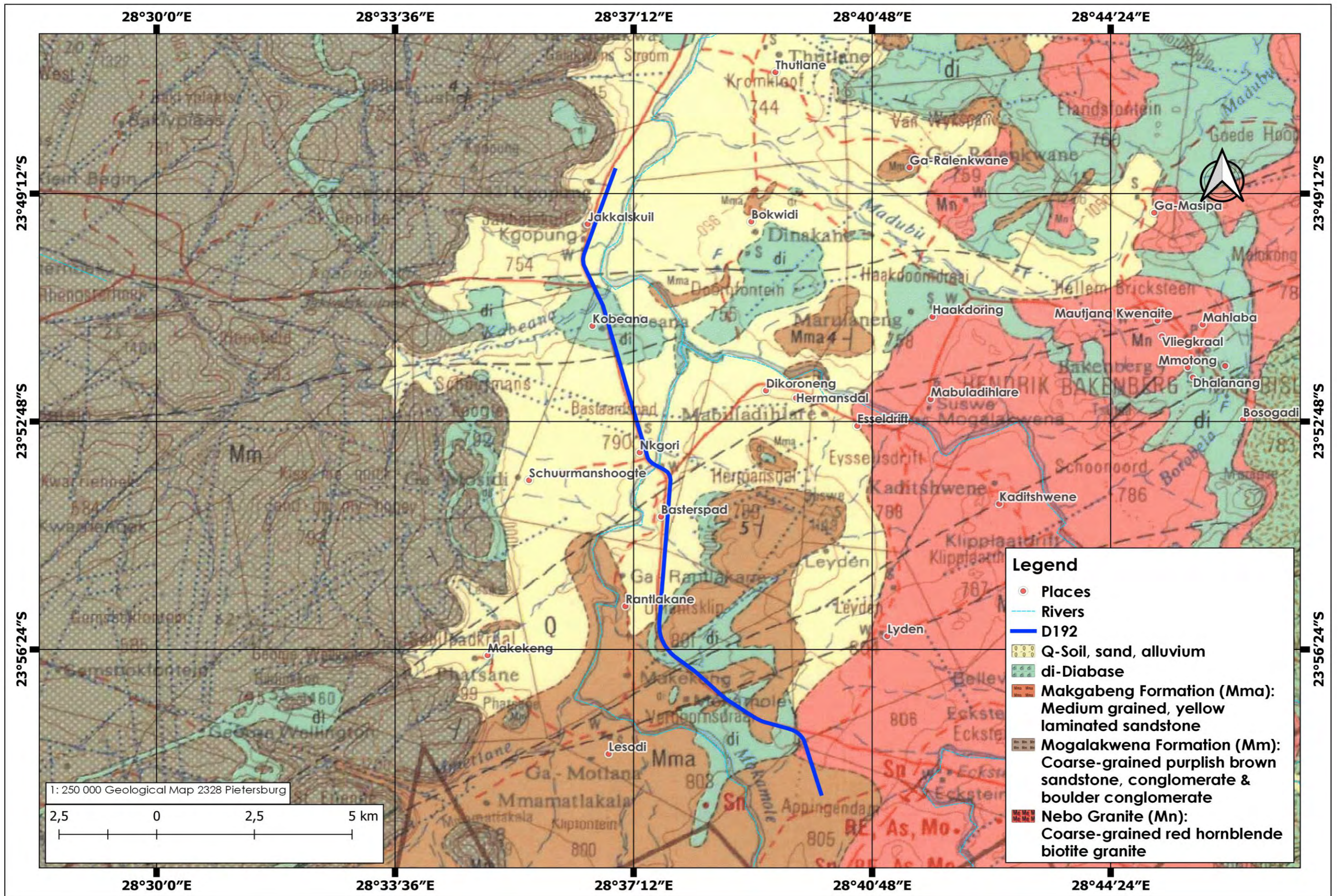


Figure 3-1: Site map showing the proposed access road superimposed on the regional geological map.

4 FIELDWORK RESULTS

The approach adopted was to plan the geotechnical site investigation in accordance with the published Site Investigation Code of Practice (2008), published by the Geotechnical Division of SAICE. The TRH14, COLTO, and the South African Pavement Manual (SAPEM) were also consulted.

4.1 SOIL PROFILE RESULTS

The shallow investigation fieldwork was conducted on the 4th of February 2022. A total of forty-nine (49) shallow test pits were excavated along the proposed road (D192) using a Backhoe TLB (APPENDIX A: SOIL PROFILES). Furthermore, thirty-one (31) test pits were undertaken at various locations within a reasonable range for potential sources of construction materials. The test pits were positioned using a handheld Garmin GPS on predetermined coordinate positions (Figure 4-1). The exposed soil horizons in each of the pits were identified and described comprehensively applying the MCCSSO method as advocated by Jennings *et. al.* (1973).

The excavation of several test pits along the road revealed materials consistent with the geology of the region. The site is locally characterized by imported road fill underlain by transported soil, residual soil, traces of pedogenic material, and weathered sandstone, dolerite, or granite (refer Plates 4-1). The following is a generalized sequence of soil horizons encountered on site:

4.1.1 Road Centerline Soil Profile

- *Slightly moist to moist, light orange brown, medium dense, intact, gravelly SAND. Imported road fill.*
- *Moist, light/yellowish brown, medium dense, intact, SILTY SAND. Hillwash.*
- *Coarse, sub-rounded, closely packed, GRAVEL in a matrix of dry light grey silty sand, the overall consistency is loose to medium dense. Pebble marker.*
- *Coarse, sub-rounded, closely packed, Gravel of ferricrete with a matrix of grey silty sand, light reddish-brown SILTY SAND. Pedogenic.*
- *Coarse, angular, loosely packed gravel of weathered sandstone with boulders of sandstone, minor moist, dark brown SILTY SAND. Residual soil.*

4.1.2 *Jakkalskuil Borrow Pit*

- Medium to coarse, sub rounded, closely packed, GRAVEL of sandstone in matrix of slightly moist, brown clayey sand. The overall consistency is dense. Hillwash.
- Coarse, angular, closely packed, GRAVEL of sandstone and quartzite in matrix of slightly moist, greyish brown silty sand. The overall consistency is very dense. Residual sandstone.

4.1.3 *Basterspad Borrow Pit*

- Medium to Coarse, sub rounded, closely packed, GRAVEL and boulders of sandstone in matrix of moist, dark brown silty sand. The overall consistency is medium dense. Colluvium.
- Coarse, angular, tightly packed, Gravel and minor boulders of weathered sandstone in matrix of moist, orange brown silty sand. The overall consistency is dense to very dense. Residual.

4.1.4 *Rantlakane Borrow Pit*

- Moist, reddish brown, loose, intact, silty sand. HILLWASH.
- Medium to coarse, angular, tightly packed, GRAVEL with boulders of weathered sandstone and quartzite in matrix of moist to very moist, reddish brown, black spotted silty sand. The overall consistency is medium dense. Residual.

4.1.5 *Lesodi Borrow Pit*

- Moist, reddish brown, medium dense, intact, silty sand. HILLWASH.
- Medium to coarse, sub rounded, tightly packed, GRAVEL and boulders of weathered sandstone and quartzite in a matrix of slightly moist, reddish brown, silty sand. The overall consistency is dense. Colluvium.
- Reddish brown, highly weathered, fractured, medium hard rock, SANDSTONE.

4.2 GROUNDWATER CONDITIONS

No significant groundwater seepage was encountered in any of the excavated test pits. However, a shallow perched water table may be expected in seasons of high rainfall, particularly at the interface between the transported soil and the pedogenic soil.

4.3 DYNAMIC CONE PENETROMETER RESULTS

A total of forty-seven (47) DCP tests were conducted adjacent to each test pit to obtain an indication of the *in-situ* CBR values for the subsoil. Measurements were taken at depths varying from the surface to 1.0 m below ground level. DCP data can only be taken up to 1.5 meters as results deeper than 1.5 m cannot be relied on due to increased frictional resistance on the testing rods. The results should however only be used by an experienced foundation designer who appreciates the limitations of the test, especially with respect to the moisture content of the material being tested.

In terms of bearing capacity, the DCP tests conducted along the centerline of the investigated road revealed that the site soils can accommodate loads in excess of 100 kPa, particularly the imported road fill layer. Medium dense to very dense conditions best describe material consistency as tested on site. The detailed DCP reports are presented in APPENDIX D: DYNAMIC CONE PENETROMETER RESULTS.

The probes confirmed soil profiling boundary interpretations made during test pitting. These results also indicated that the stiffness of the material tested to be relatively variable. Figure 4-1 below shows sampling location along the roads.

Table 4-1: Summary of dynamic cone penetrometer test results

		DCP TEST POSITIONS														
		DCP1	DCP2	DCP3	DCP4	DCP5	DCP6	DCP7	DCP8	DCP9	DCP10	DCP11	DCP12	DCP13	DCP14	DCP15
Insitu C.B.R at following depths in mm	1-150	74	81	59	50	81	68		94	76						
	151-300	115	52	72	81	94	94		127							
	301-450	115	54	47	59	40	61		50							
	451-600	67	159	31	65	52	40		110							
	601-750	37	72	26	159	193			106							
	751-900								46							
	901-1050															
Max. Pen.		880	830	850	810	830	730	45	955	270	60	140	10	90	60	40
		DCP TEST POSITIONS														
		DCP16	DCP17	DCP18	DCP19	DCP20	DCP21	DCP22	DCP23	DCP24	DCP25	DCP26	DCP27	DCP28	DCP29	DCP30
Insitu C.B.R at following depths in mm	1-150			40			44		118				49	64	51	51
	151-300			27			59		87				18	98	38	46
	301-450			34			35		104				27	49	19	33
	451-600			51			8		103				27	43	12	20
	601-750			59			4		64				29	20	13	9
	751-900															
	901-1050															
Max. Pen.		30	50	870	90	80	880	155	870	15	10	32	875	870	825	860

		DCP TEST POSITIONS														
		DCP31	DCP32	DCP33	DCP34	DCP35	DCP36	DCP37	DCP38	DCP39	DCP40	DCP41	DCP42	DCP43	DCP44	DCP45
Insitu C.B.R at following depths in mm	1-150	117	19	36	28	73		73	61	62		13	31	24	71	23
	151-300	27	25	11	20	37		19	48	38		23	40	44	48	46
	301-450	10	18	5	13	23		30	46	39		15	15	17	14	46
	451-600	10	11	6	7	13		29	33	22		6	10	4	5	42
	601-750	6	4	5	5	10		27		48		4	8	3	4	32
	751-900									34						
	901-1050															
Max. Pen.		860	870	875	890	865	40	870	610	940	100	870	870	870	850	870
		DCP TEST POSITIONS														
		DCP46	DCP47													
Insitu C.B.R at following depths in mm	1-150	30	16													
	151-300		33													
	301-450		39													
	451-600		28													
	601-750		11													
	751-900															
	901-1050															
Max. Pen.		220	850													





Plates 4-1: A pictorial view of materials encountered along the proposed access roads

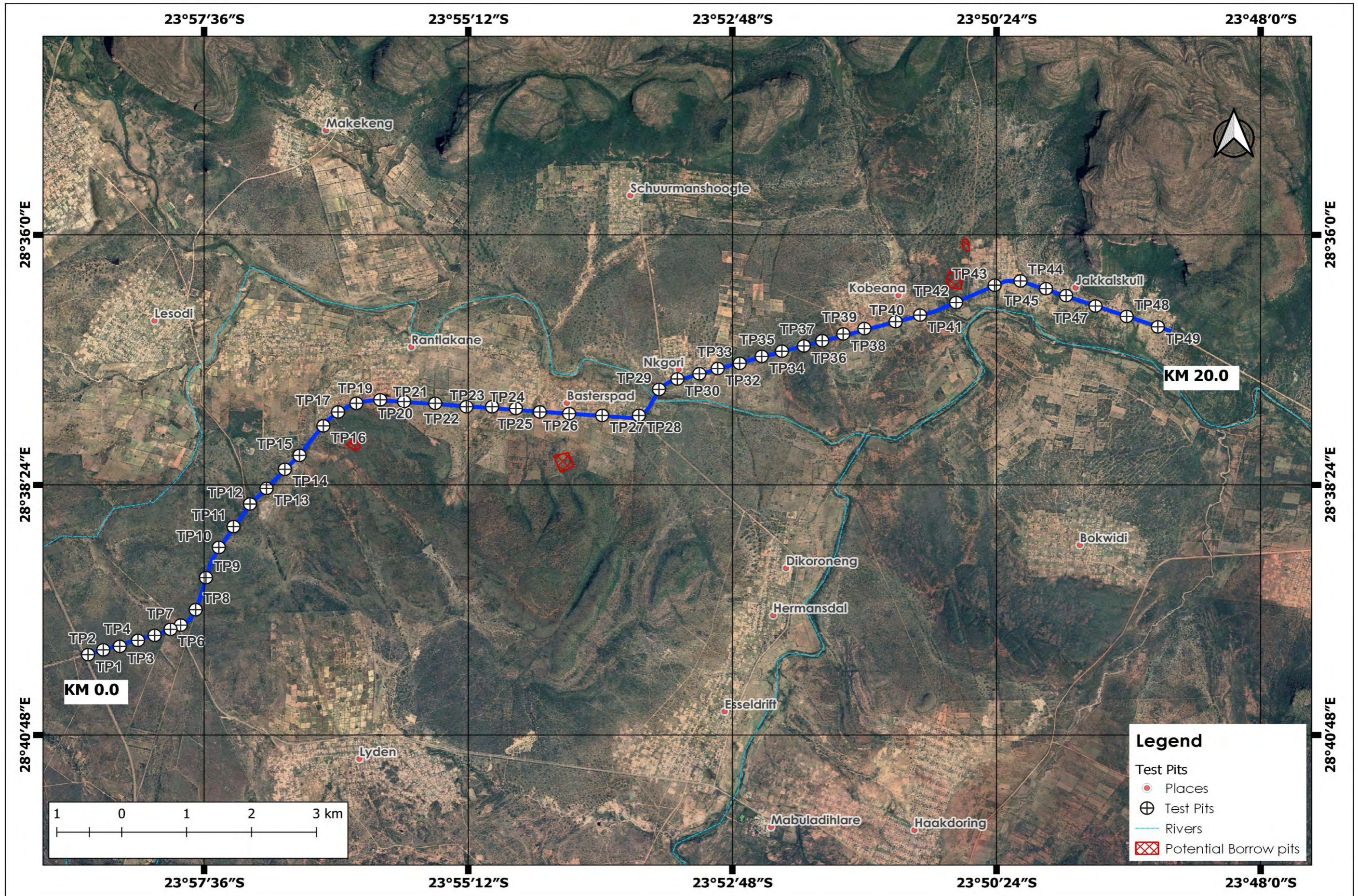


Figure 4-1: A view of test pit locations and DCP tests undertaken along the approximately 20 km long road.

5 LABORATORY TESTING

Disturbed bulk soil samples were collected from selected test pits along the road alignment for further analysis. A total of forty-two (42) disturbed samples were recovered from representative soil horizon in various test pits and were submitted to MS Mabuya Civil Laboratory for classification (APPENDIX C: LABORATORY TEST RESULTS). The following tests were undertaken:

- Road Indicator Tests (Atterberg limits) - used to establish the soil type, its potential for heave, and give an indication of its suitability for use in pavement layers.
- Compaction Tests (CBR & MOD) - used to assess the potential for materials to be used in pavement layers.

In general, the road surface is characterised by tar, underlain by road fill, loose to medium dense transported soil, and residual soil. The tested soils encountered along the road centerline are generally graded as silty sand with little to no clay. The plasticity index for the material indicated slightly plastic (SP) to non-plastic (NP) character along the road with some low to medium plasticity; liquid limits ranged from 0 to 34%, linear shrinkage ranged from 0 to 11.5%, all indicating a very low potential expansiveness for the material encountered along the road.

The maximum dry density (MDD) for the tested soil ranged between 1750 kg/m³ and 2064 kg/m³ at an optimum moisture content (OMC) of between 5.3 and 17.5%. Furthermore, the CBR values for the material ranged from 2 – 16 at 90% compaction, 3 – 22 at 95% compaction, and a maximum CBR of 8 – 46 at 100% Compaction. In terms of the COLTO classification, the material tested was classified as G6 to worse than G9 quality soil mixtures. Note that several samples extracted from the hillwash could not be compacted for CBR/MDD tests due to its uniform grading (e.g. sandy). Thus, only the grading analysis and Atterberg limits were undertaken for those samples.

Table 5-1 below shows the summary of laboratory test results.

Table 5-1: Summary of laboratory test results

Test	Sample Depth	Road Indicator Test						MDR		CBR at % Mod. AASHTO			COLTO Class	USCS
		Atterberg Limits				Passing 0.425	GM	MDD	OMC	100%	95%	93%		
		wPI	PI (%)	LL (%)	LS (%)									
TP1	0.3-0.7	NP	NP	NP	0.0	83	0.97	2064	6.6	46	22	16	G7	SM(d)
TP2	0.0-0.4	NP	NP	NP	0.0	64	1.34	-	-	-	-	-	-	SM(d)
TP3	0.0-0.3	SP	SP	SP	1.0	38	1.84	2103	6,2	62	31	20	G6	SM(d)
TP4	0.05-0.55	NP	NP	NP	0.0	83	0.97	-	-	-	-	-	-	SM(d)
TP5	0.3-0.9	NP	NP	NP	0.0	84	0.98	-	-	-	-	-	-	SM(d)
TP6	0.0-0.3	NP	NP	NP	0.0	53	1.58	-	-	-	-	-	-	SM(d)
TP7	0.2-0.8	NP	NP	NP	0.0	47	1.72	2124	5.3	68	26	17	G6	SM(d)
TP8	0.0-0.5	SP	SP	SP	1.0	55	1.54	-	-	-	-	-	-	SM(d)
TP9	0.3-1.3	2	5	20	0.0	37	1.96	2074	8.1	25	20	15	G7	sp/sm/sc
TP10	0.75-1.4	NP	NP	NP	0.0	35	2.08	-	-	-	-	-	-	sp/sm/sc
TP12	0.0-0.7	4	5	20	2.5	79	0.9	2078	8.5	24	12	11	G8	sm/sc
TP13	0.2-1.4	NP	NP	NP	0,0	74	1.06	-	-	-	-	-	-	SM(d)
TP14	0.1-1.1	NP	NP	NP	0,0	69	1.19	-	-	-	-	-	-	SM(d)
TP16	1.0-1.3	NP	NP	NP	0,0	89	1.0	-	-	-	-	-	-	sp/sm
TP17	0.3-1.2	NP	NP	NP	0,0	54	1.72	-	-	-	-	-	-	SM(d)

Test	Sample Depth	Road Indicator Test						MDR		CBR at % Mod. AASHTO			COLTO Class	USCS
		Atterberg Limits				Passing 0.425	GM	MDD	OMC	100%	95%	93%		
		wPI	PI (%)	LL (%)	LS (%)									
TP18	0.4-1.0	4	6	21	2.5	64	1.3	-	-	-	-	-	-	sm/sc
TP20	0.6-1.7	11	12	23	6.0	93	0.78	-	-	-	-	-	-	SC
TP21	0.4-1.3	NP	NP	NP	0.0	87	0.84	2086	7.5	44	15	13	G8	SM(d)
TP22	0.2-1.8	NP	NP	NP	0.0	91	0.9	-	-	-	-	-	-	SM(d)
TP23	0.1-0.9	6	7	17	2.5	91	0.78	-	-	-	-	-	-	sm/sc
TP24	0.1-1.3	NP	NP	NP	0.0	83	0.99	1837	9.2	20	6	4	<G9	SM(d)
TP25	0.15-0.8	4	5	20	2.0	85	0.84	-	-	-	-	-	-	sm/sc
TP27	0.2-1.3	12	13	30	7.0	95	0.54	1750	13.1	8	3	2	<G9	CL
TP28	0.3-1.6	NP	NP	NP	0.0	90	0.88	-	-	-	-	-	-	SM(d)
TP29	0.5-1.9	NP	NP	NP	0.0	89	0.88	-	-	-	-	-	-	SM(d)
TP31	0.1-1.3	NP	NP	NP	0.0	85	1.03	-	-	-	-	-	-	SM(d)
TP32	0.3-0.7	14	17	24	3.5	85	1.15	-	-	-	-	-	-	sp/sc
TP34	0.1-1.4	NP	NP	NP	0.0	86	1.01	-	-	-	-	-	-	SM(d)
TP35	0.3-1.8	NP	NP	NP	0.0	87	0.99	-	-	-	-	-	-	SM(d)
TP37	0.1-1.1	16	18	32	8.5	90	0.67	-	-	-	-	-	-	SC

Test	Sample Depth	Road Indicator Test						MDR		CBR at % Mod. AASHTO			COLTO Class	USCS
		Atterberg Limits				Passing 0.425	GM	MDD	OMC	100%	95%	93%		
		wPI	PI (%)	LL (%)	LS (%)									
TP39	0.1-0.9	20	22	34	11.5	92	0.52	1760	17.4	4	2	1	<G9	CL
TP41	0.3-0.9	NP	NP	NP	0.0	60	1.52	2090	8.2	23	14	10	G8	SM(d)
TP42	0.1-1.4	NP	NP	NP	0.0	78	0.97	-	-	-	-	-	-	SM(d)
TP43	0.4-2.1	NP	NP	NP	0.0	68	1.22	-	-	-	-	-	-	SM(d)
TP44	0.4-1.4	NP	NP	NP	0.0	70	1.13	2010	7.8	41	19	15	G7	SM(d)
TP45	0.2-1.7	NP	NP	NP	0.0	68	1.2	-	-	-	-	-	-	SM(d)
TP46	0.4-1.5	NP	NP	NP	0.0	48	1.6	-	-	-	-	-	-	sp/sm
TP47	0.3-1.7	NP	NP	NP	0.0	78	1.1	-	-	-	-	-	-	SM(d)
TP48	0.4-1.2	NP	NP	NP	0.0	66	1.1	-	-	-	-	-	-	SM(d)
TP49	0.4-1.9	NP	NP	NP	0.0	75	1.09	-	-	-	-	-	-	SM(d)

PI – Plasticity Index, LL – Liquid Limit, LS – Linear Shrinkage, GM – Grading Modulus

MDR – Moisture-Density Relationship, MDD – Maximum Dry Density, OMC – Optimum Moisture Content

CBR – California Bearing Ratio, AASHTO – American Association of State Highways and Transport Officials, TRH – Technical Recommendation for Highways

6 RECOMMENDATIONS

6.1 SITE ACCESS

At the time of the investigation, the entire road was accessible with 2-wheel drive vehicles. However, the borrow pit areas were not easily accessible, therefore, access roads may be required.

6.2 SITE DRAINAGE

The control of surface and potential sub-surface seepage is required to protect layer works from ingress of water leading to continued weathering of material and consequently, settlement of layer works. It is, therefore, recommended that surface drainage is such that it directs water away from the road reserve and collected in open or piped drains and several culverts are required at various locations along the road.

6.3 EXCAVATABILITY

The excavatability of materials along the road and the borrow pit location has been evaluated according to the South African Bureau of Standards' Standardized Specification for Civil Engineering Construction classification for earthworks. Soft excavation conditions in terms of the above standard are expected up to an average depth of 1.2 meters along the road. However, intermediate and hard rock excavation conditions are expected at the borrow pit locations. Therefore, it is recommended that a larger excavator other than a TLB be used for material excavations at the borrow pits.

- Soft excavation: Material which can be efficiently removed by a back-acting excavator of flywheel power $> 0,10$ kW for each mm of tined-bucket width.
- Intermediate excavation: Material which can be removed by a back-acting excavator having flywheel power $> 0,10$ kW for each mm of tined-bucket width or with the use of pneumatic tools before removal by a machine capable of removing soft material.
- Hard excavation: Material that cannot be removed without blasting or wedging and splitting.

6.4 GROUNDWATER SEEPAGE

No notable groundwater seepage into excavation was not encountered.

6.5 STABILITY OF EXCAVATION

It is recommended that all excavations in soils be adequately battered to safe angles and/or shored in order to safeguard construction personnel working in trenches. A slightly steeper batter angle of 1 vertical: 2.5 horizontal could be accommodated in the sand horizon and 1 vertical: 4 horizontal. All the test pits excavated along the road remained stable during the time of the investigation.

6.6 EARTHWORKS

It is recommended that all earthworks are carried out in accordance with SANS 1200 D. All topsoil and fill should be cleared from the areas that will be subject to earthworks and the topsoil stockpiled for later site rehabilitation.

Layerworks should be designed following an analysis of the expected volume and type of traffic that will use the roads. However, for costing purposes considering light to medium traffic, the following design would be applicable for surfaced roads:

- Construct the engineered fill layer using G5 or better-quality material in 150 mm thick layers and compacted to 93% of Modified AASHTO maximum dry density at +/- 2% OMC.
- Rip the *in-situ* formation to a depth of at least 300 mm and wet to -1 to +1 of optimum moisture content and compact to a density of at least 90% Mod AASHTO to form the subgrade. Solids larger than 2/3 of the final layer thickness after compaction should not be included in the material.
- Place layer works at 150 mm layers as described above using the *in-situ* material or suitable imported materials for sub-grade and sub-base layers or to design engineer's specification. The design engineer to decide/modified the above layer thicknesses.
- In addition, basic access roads normally carry light traffic, the final desired pavement structure should be designed and constructed only after the infrastructure development is completed to avoid damage by construction traffic.

6.7 MATERIAL CLASSIFICATION AND USAGE

Materials along the road may be classified in terms of their suitability for use in earthworks and road construction fill on the basis of field observations and laboratory testing. The investigation revealed abundant sandy soils with minor gravel over the

majority of the site which classified G8 to worse than G9 quality soil with some G6 to G7 from KM 0.0 to KM 6.5 (Ref.4). The subgrade should be compacted to at least 93% Mod AASHTO density, but preferably to refusal density.

Once the foundation of the subbase has a CBR of at least 7 (i.e. at least G9), material of G6 or better quality should be used for the subbase. Therefore, it is recommended that better quality material for pavement layers be sourced from a borrow pit. The following are the recommended pavement layers:

- Subbase : Minimum CBR of 25 at OMC and field compaction from a minimum of 95 Mod AASHTO density
- Selected Layers: Minimum CBR of 7 at OMC and 90% Mod AASHTO compaction; and minimum field compaction of 95 Mod AASHTO

Additionally, CBR test should be carried out in a standard manner and the recommended method is that all oversize material (>19.0 mm) is discarded. This practice is considered to result in a slightly conservative CBR as the larger material would generally produce more interlock and shear resistance.

Moreover, every soil with a dry density of less than 1600kg/m³ must be suspected of being collapsible. It is important to destroy the collapsible grain structure of the soil to the depth of about 1.0 m, which is possible by using the correct equipment and rolling technique. The achievement of such deep compaction of the soil may pose problems and such compaction is best done during the rainy season.

The material containing organic material and vegetation, including roots, seeds and/or termites shall be stripped, usually by bull-dozing, and stockpiled alongside the borrow pit for later use during rehabilitation of the borrow pit.

Stockpiles should be of limited height to avoid excessively anaerobic conditions and deterioration of potential seeds and rhizomes, which are necessary to encourage later re-vegetation. Oversize material may need to be handled in the borrow pit to minimize the haulage of unsuitable material likely to be spoiled during construction.

6.8 CEMENT STABILIZATION

Unconfined Compression Strength (UCS) and Indirect Tensile Strength (ITS) tests were performed on several bulk samples to evaluate the strength of stabilized materials after 7 days. Detailed results are presented in Appendix C. Lafarge 42.5N cement was recommended due to its availability in the area.

According to COLTO specifications, the minimum limits for the indirect tensile strength of cemented materials are 200 kPa for C4 and 250 kPa for C3 materials at 100 per cent Mod AASHO density. Both the TRH14 and the COLTO specifications require materials to be of minimum G6 quality before stabilisation to achieve C3 and C4 quality after stabilisation (SAPEM, 2013).

Based on the laboratory tests, materials evaluated would be regarded as suitable for stabilization to a C3 or C4 class of material for use as a subbase (C3) and selected subgrade (C4) for a heavy traffic road and as a base (C3) for a low volume road.

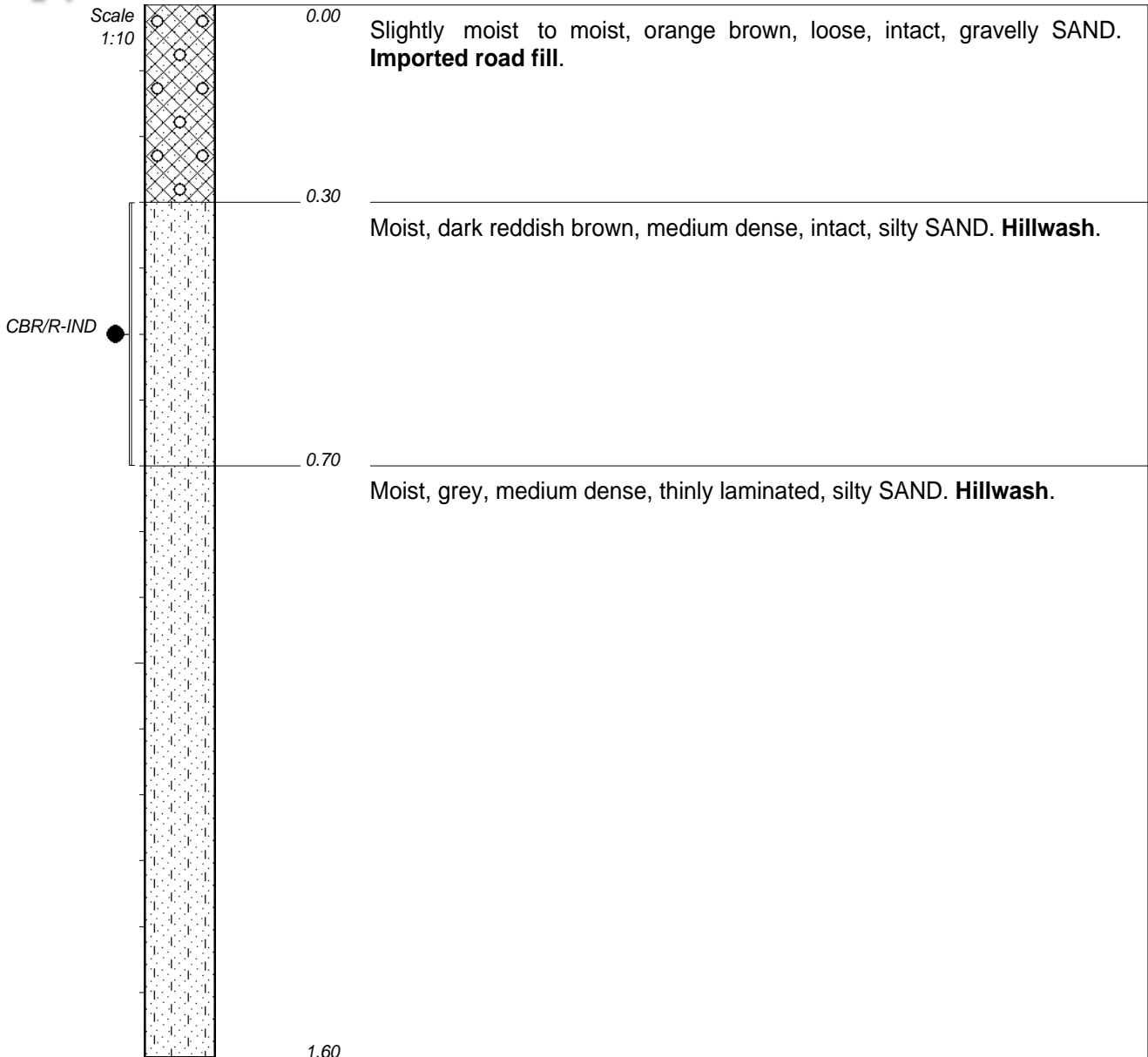
6.9 SUGGESTED FOLLOW-UP WORK

About 5 borrow pits including existing borrow pits were sampled within a reasonable distance from the road. Although the material is of the required quality, the quantity of the material may be insufficient for layerworks across the entire 20 km road. It is therefore recommended that a geologist or civil engineer be responsible for the location identification of additional borrow pits.

7 REFERECNCES

- 1) ACOCKS, J.P.H (1988) Veld types of SA, 3rd edition. Memoirs of Botanical Survey of South. Africa. No. 57: 1-146.
- 2) BRINK, ABA AND BRUIN RMH (2002). Guidelines for soil and rock logging in South Africa, 2nd impression, 2002.
- 3) COMMITTEE OF LAND TRANSPORT OFFICIALS (COLTO), Draft TRH4:1996 Structural Design of Flexible Pavements for Interurban and Rural Roads, South Africa pp 1-101
- 4) COMMITTEE OF STATE ROAD AUTHORITIES, TRH 14:1985 Guidelines for Road Construction Materials, South Africa pp 1-57
- 5) JENNINGS, JE., BRINK, AAB. AND WILLIAMS, A.A.B. 1973. Revised guide to soil profiling for civil engineering purposes in South Africa. The Civil Engineer in South Africa, Vol. 15, 1973, pp. 3-12.
- 6) JOHNSON, M.R., ANHAEUSSER, C.R. (Eds.) (2006). The geology of South Africa. Geological Society of South Africa. Johannesburg/Council for Geosciences, Pretoria. 691 pp.
- 7) SOUTH AFRICAN BUREAU OF STANDARDS, SANS 1200D. Standardised specification for civil engineering construction Section D: Earthworks. Pretoria 2002.
- 8) SOUTH AFRICAN INSTITUTION OF CIVIL ENGINEERING (SAICE) - Geotechnical Division, (2010). Site Investigation Code of Practice, 1st Edition.
- 9) THE SOUTH AFRICA NATIONAL ROADS AGENCY (SANRAL), 2013. South African Pavement Engineering Manual. Materials Utilisation and Design, Chapter 8.
- 10) WEINERT, H.H. 1980. The Natural Road Construction Materials of Southern Africa. H & R Academia Publ., Pretoria, 298 pp.

APPENDIX A: SOIL PROFILES
(ROAD CENTERLINE)



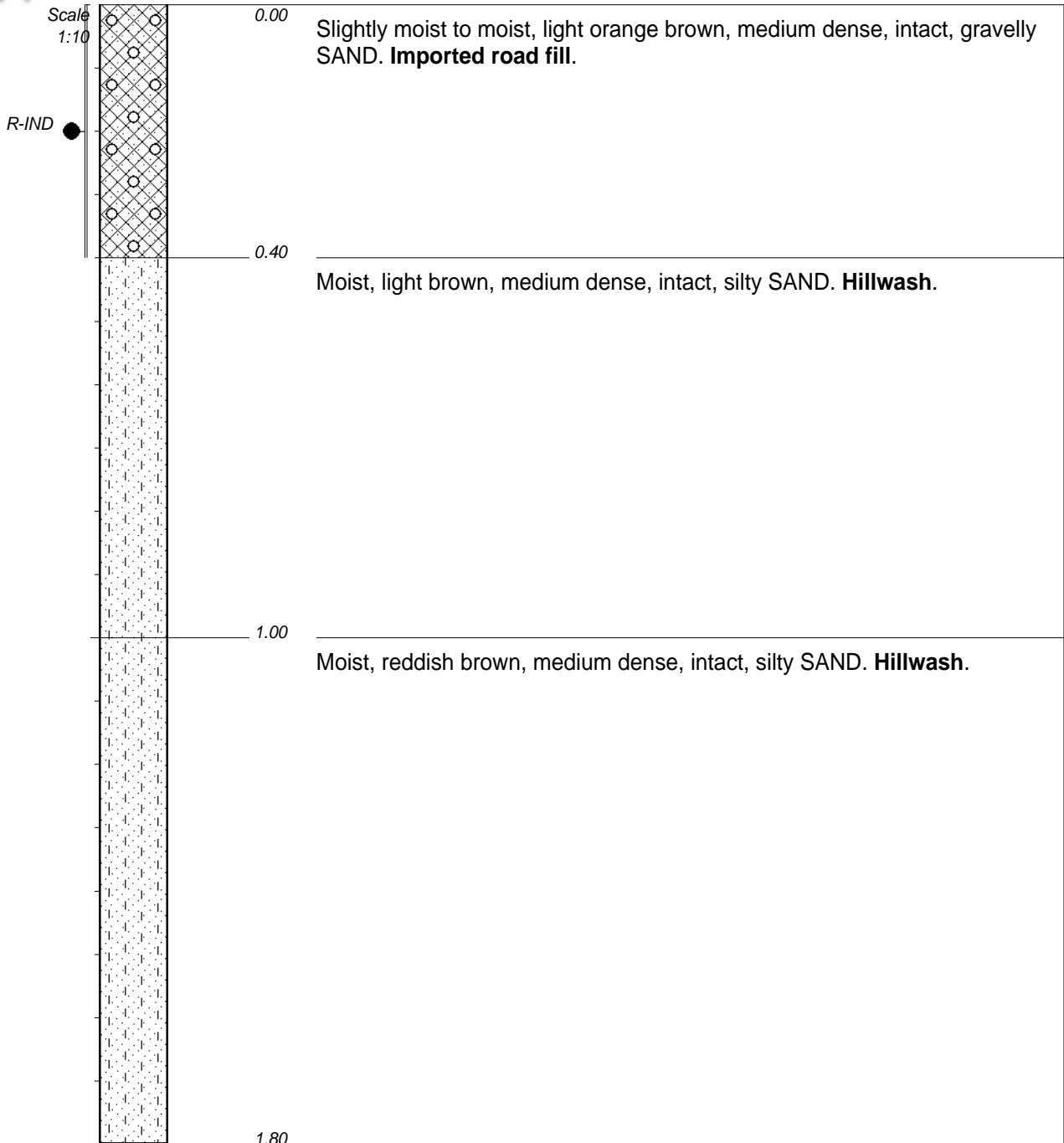
NOTES

- 1) Terminated due to the required depth.
- 2) No ground water seepage.
- 3) Side wall stable.
- 4) Disturbed sample at 0.3--0.7 m: CBR/R-IND.

CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya
 TYPE SET BY : Fumani Vukeya
 SETUP FILE : STANDARD.SET

INCLINATION :
 DIAM :
 DATE : 03/02/2022
 DATE : 03/02/2022
 DATE : 09/03/2022 14:05
 TEXT : ..dixASoilProfilesD192.txt

ELEVATION : 1050 m
 X-COORD : 28°40'2"E
 Y-COORD : 23°58'38"S



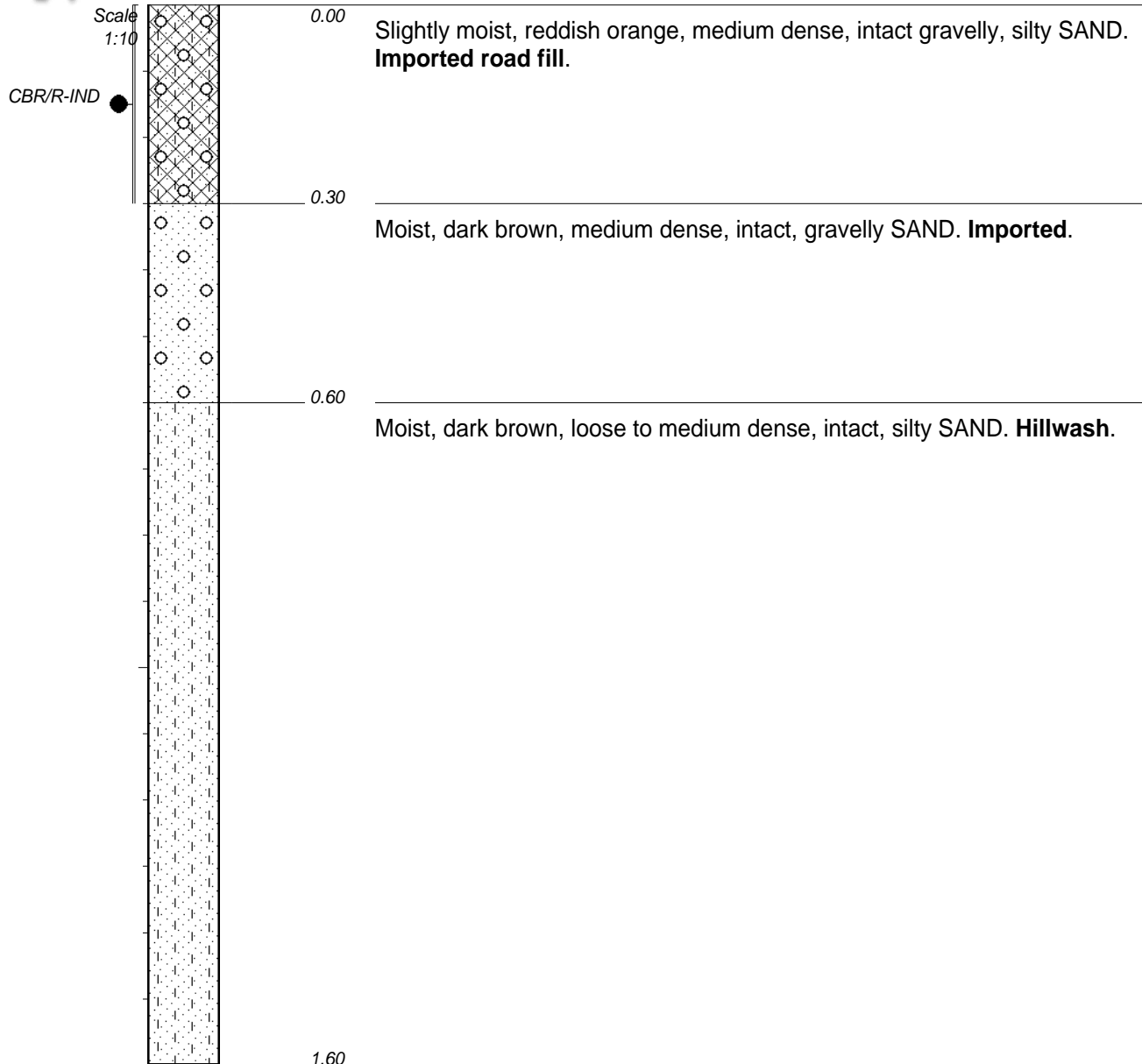
NOTES

- 1) Terminated due to the required depth.
- 2) No ground water seepage.
- 3) Side wall stable.
- 4) Disturbed sample at 0.0--0.4 m: R-IND

CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya
 TYPE SET BY : Fumani Vukeya
 SETUP FILE : STANDARD.SET

INCLINATION :
 DIAM :
 DATE : 03/02/2022
 DATE : 03/02/2022
 DATE : 09/03/2022 14:05
 TEXT : ..dixASoilProfilesD192.txt

ELEVATION : 1050m
 X-COORD : 28°39'59"E
 Y-COORD : 23°58'31"S



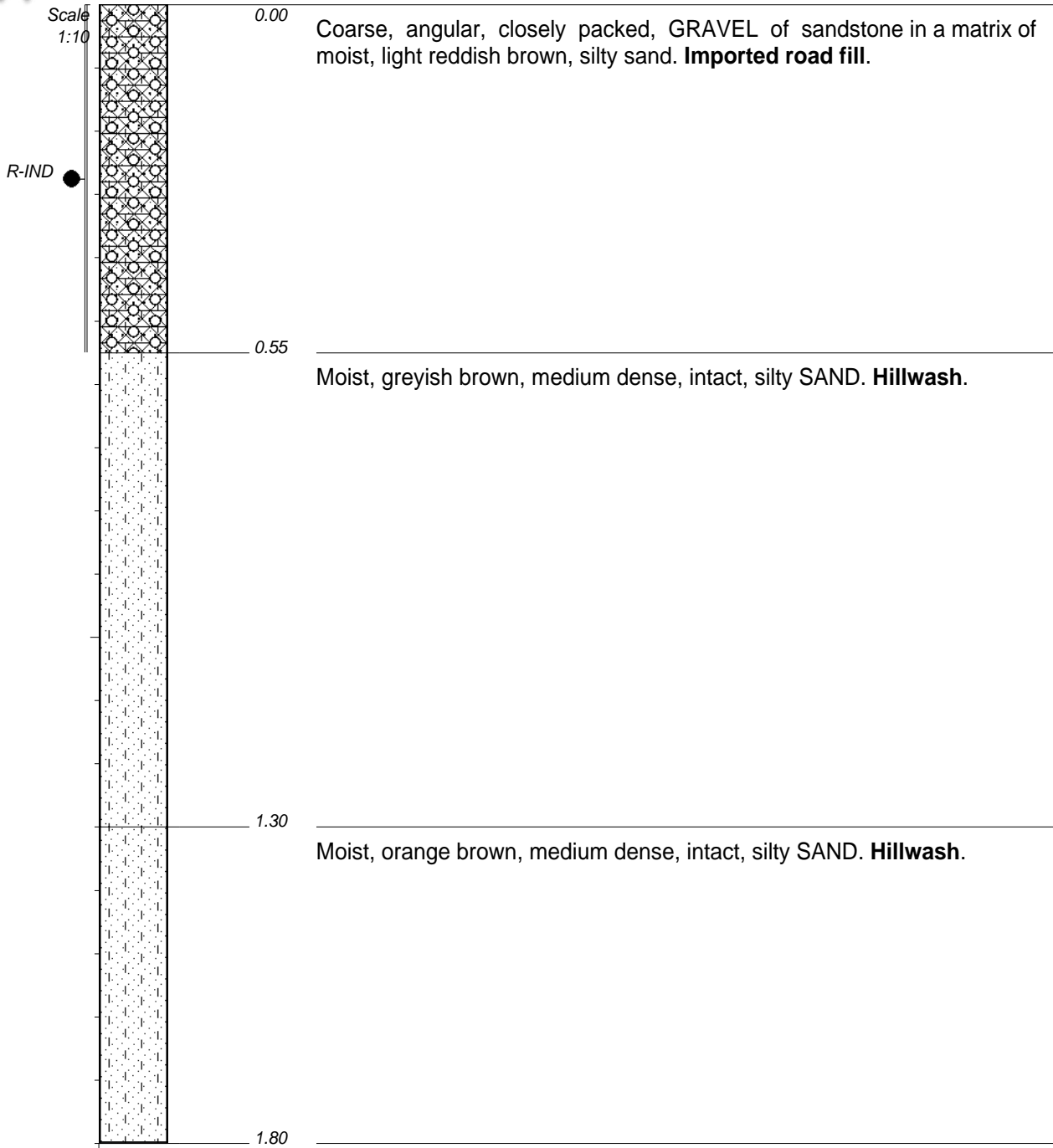
NOTES

- 1) Terminated due to the required depth.
- 2) No ground water seepage.
- 3) Side wall stable.
- 4) Disturbed sample at 0.0--0.3 m: CBR/R-IND.

CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya
 TYPE SET BY : Fumani Vukeya
 SETUP FILE : STANDARD.SET

INCLINATION :
 DIAM :
 DATE : 03/02/2022
 DATE : 03/02/2022
 DATE : 09/03/2022 14:05
 TEXT : ..dixASoilProfilesD192.txt

ELEVATION : 1050 m
 X-COORD : 28°39'57"E
 Y-COORD : 23°58'22"S



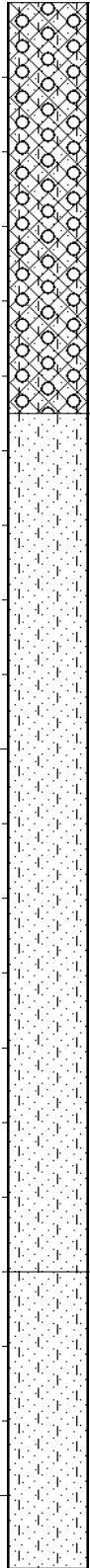
- NOTES**
- 1) Terminated due to the required depth.
 - 2) No groundwater seepage.
 - 3) Side wall stable.
 - 4) Disturbed sample at 0.0--0.55 m: R-IND.

CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya
 TYPE SET BY : Fumani Vukeya
 SETUP FILE : STANDARD.SET

INCLINATION :
 DIAM :
 DATE : 03/02/2022
 DATE : 03/02/2022
 DATE : 09/03/2022 14:05
 TEXT : ..dixASoilProfilesD192.txt

ELEVATION : 1050 m
 X-COORD : 28°39'57"E
 Y-COORD : 23°58'22"S

Scale
1:10



0.00

Coarse, angular, closely packed, GRAVEL with matrix of moist, orange brown, silty sand. **Imported road fill.**

0.55

Moist, dark brown, medium dense, intact, silty SAND. **Hillwash.**

1.70

Moist, orange brown, Medium dense, intact, silty SAND. **Hillwash.**

2.10

NOTES

- 1) Terminated due to the required depth.
- 2) No ground water seepage.
- 3) Side wall stable.

CONTRACTOR : MR BLUE PROJECTS
MACHINE : TLB
DRILLED BY : MR BLUE PROJECTS
PROFILED BY : Fumani Vukeya

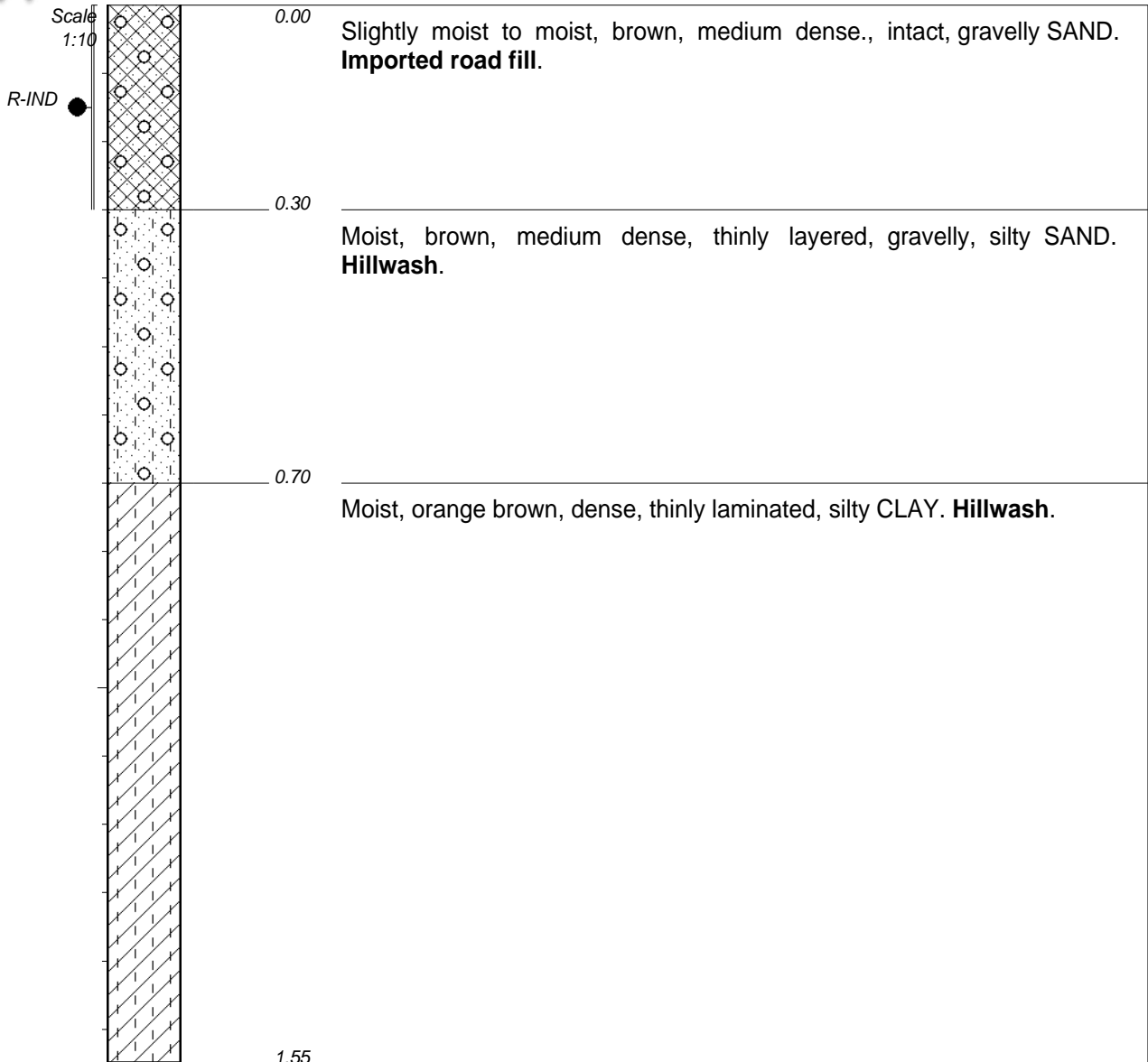
INCLINATION :
DIAM :
DATE : 03/02/2022
DATE : 03/02/2022

ELEVATION : 1050 m
X-COORD : 28°39'51"E
Y-COORD : 23°58'0"S

TYPE SET BY : Fumani Vukeya
SETUP FILE : STANDARD.SET

DATE : 09/03/2022 14:05
TEXT : ..dixASoilProfilesD192.txt

HOLE No: TP5



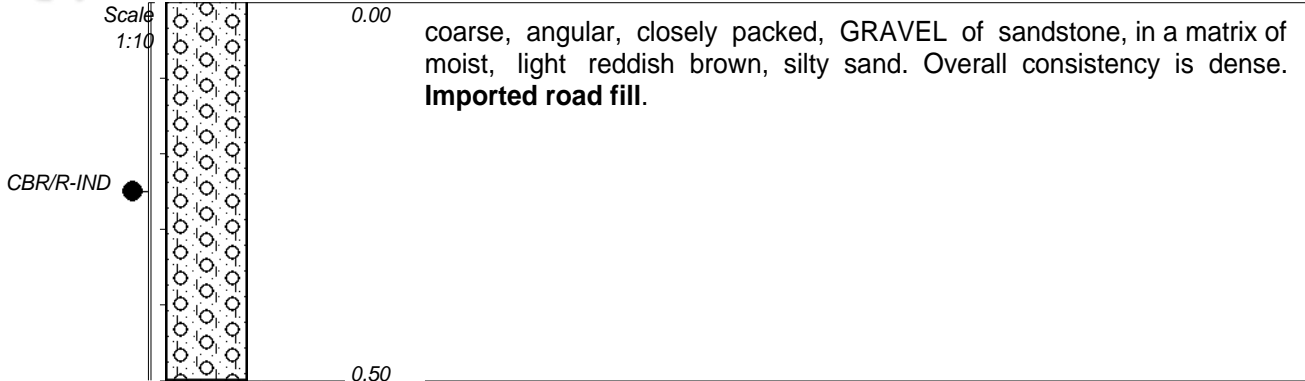
NOTES

- 1) Terminated due to the required depth.
- 2) No ground water seepage.
- 3) Side wall stable.
- 4) Disturbed sample at 0.0--0.3 m: R-IND.

CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya
 TYPE SET BY : Fumani Vukeya
 SETUP FILE : STANDARD.SET

INCLINATION :
 DIAM :
 DATE : 03/02/2022
 DATE : 03/02/2022
 DATE : 09/03/2022 14:05
 TEXT : ..dixASoilProfilesD192.txt

ELEVATION : 1060 m
 X-COORD : 28°39'49"E
 Y-COORD : 23°57'60"S



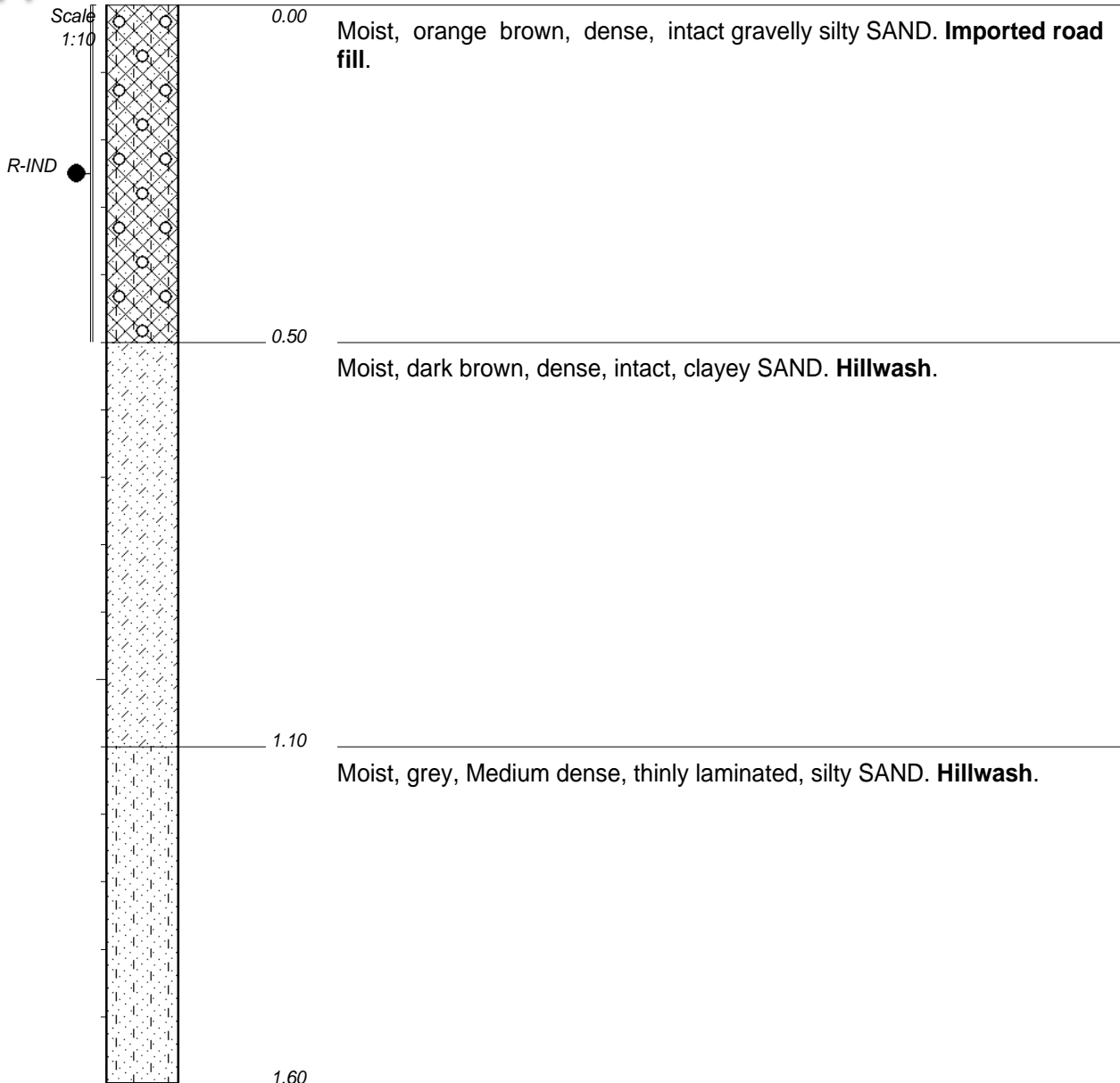
NOTES

- 1) at 0.5 m on weathered granite.
- 2) No ground water seepage
- 3) Side wall stable.
- 4) Disturbed sample at 0.0--0.5 m: CBR/R-IND.

CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya
 TYPE SET BY : Fumani Vukeya
 SETUP FILE : STANDARD.SET

INCLINATION :
 DIAM :
 DATE : 03/02/2022
 DATE : 03/02/2022
 DATE : 09/03/2022 14:05
 TEXT : ..dixASoilProfilesD192.txt

ELEVATION : 1060 m
 X-COORD : 28°39'36"E
 Y-COORD : 23°57'42"S



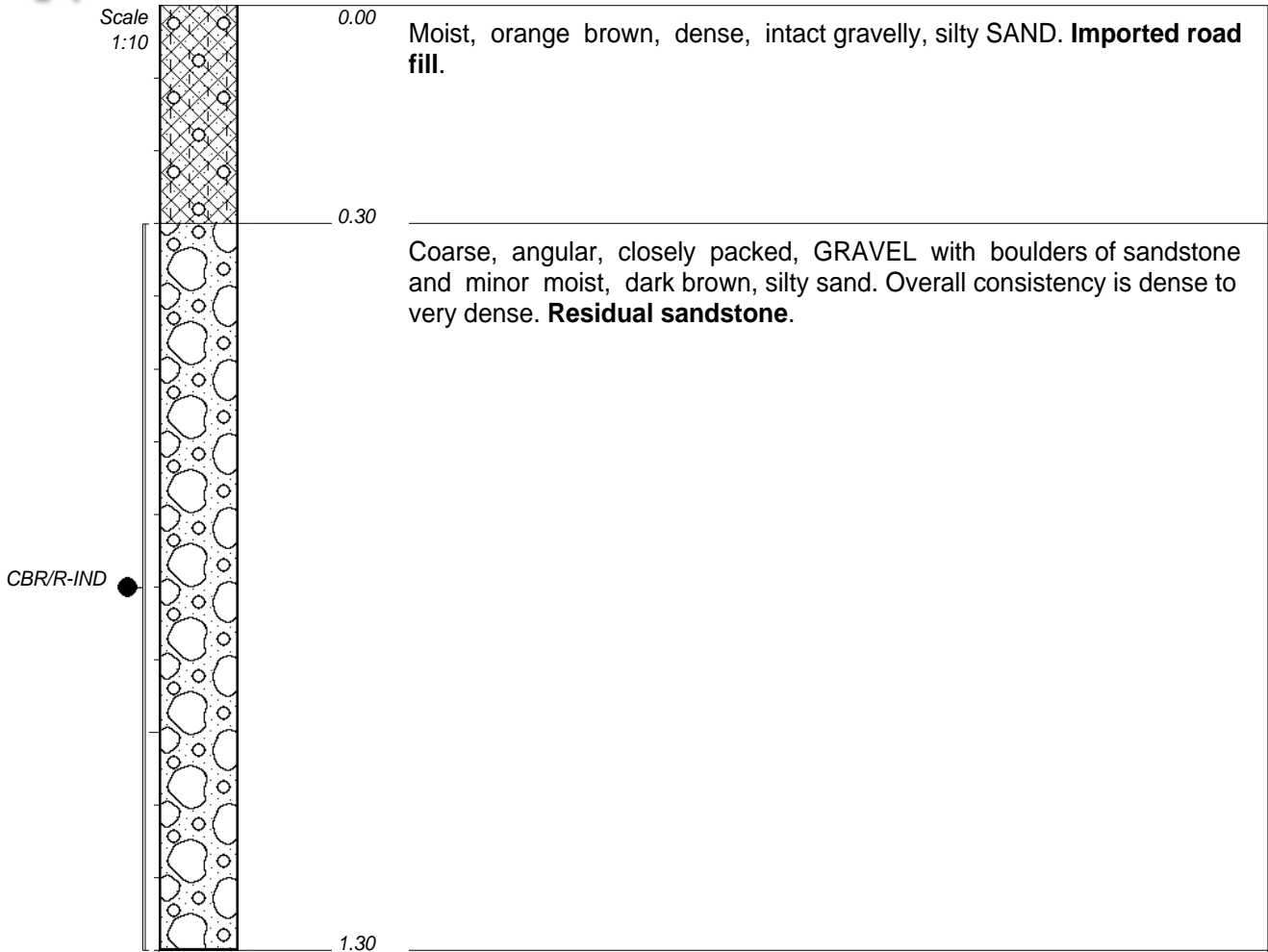
NOTES

- 1) Terminated due to the required depth.
- 2) No ground water seepage.
- 3) Side wall stable.
- 4) Disturbed sample at 0.0--0.5 m: R-IND.

CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya
 TYPE SET BY : Fumani Vukeya
 SETUP FILE : STANDARD.SET

INCLINATION :
 DIAM :
 DATE : 03/02/2022
 DATE : 03/02/2022
 DATE : 09/03/2022 14:05
 TEXT : ..dixASoilProfilesD192.txt

ELEVATION : 1060 m
 X-COORD : 28°39'36"E
 Y-COORD : 23°57'42"S



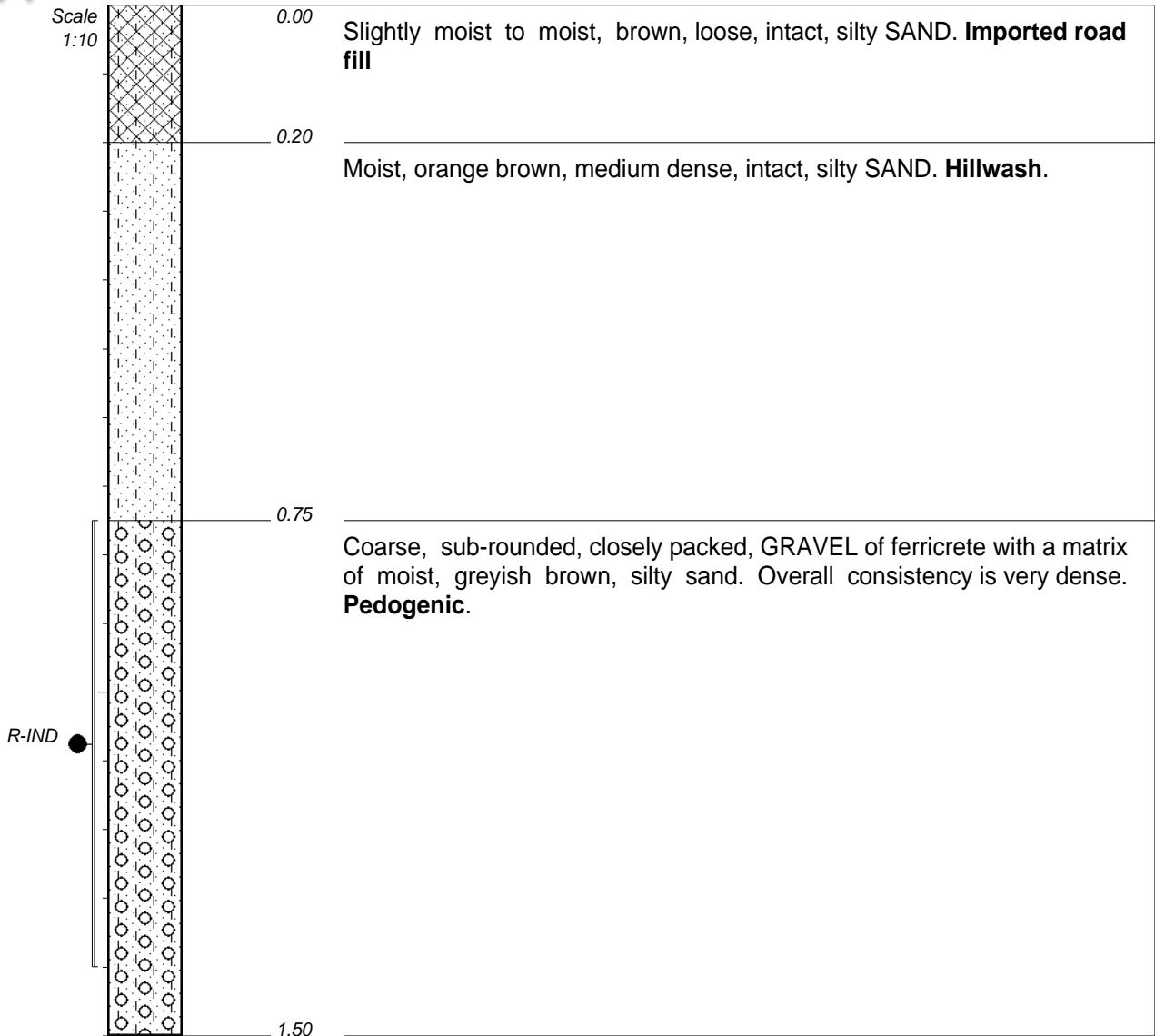
NOTES

- 1) Refusal at 1.3m.
- 2) No ground water seepage
- 3) Side wall stable.
- 4) Disturbed sample at 0.3--1.3 m: CBR/R-IND.

CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya

INCLINATION :
 DIAM :
 DATE : 03/02/2022
 DATE : 03/02/2022
 DATE : 09/03/2022 14:05
 TEXT : ..dixASoilProfilesD192.txt

ELEVATION : 1050 m
 X-COORD : 28°39'17"E
 Y-COORD : 23°57'36"S



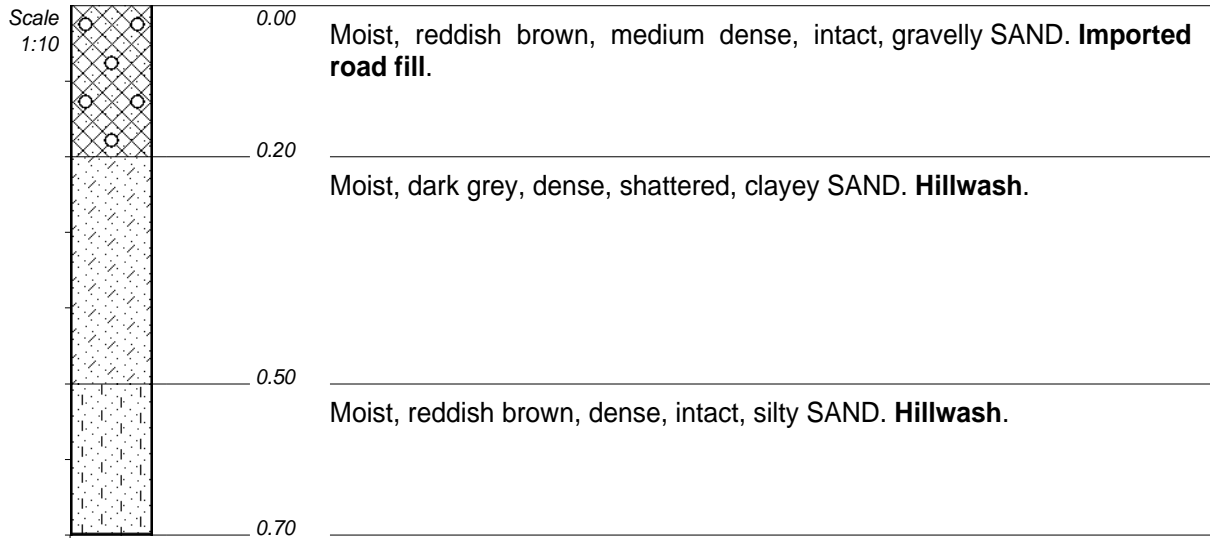
NOTES

- 1) Refusal at 1.5m on hardpan ferricrete.
- 2) No ground water seepage.
- 3) Side wall stable.
- 4) Disturbed sample at 0.75--1.4 m: R-IND.

CONTRACTOR : MR BLUE PROJECTS
MACHINE : TLB
DRILLED BY : MR BLUE PROJECTS
PROFILED BY : Fumani Vukeya
TYPE SET BY : Fumani Vukeya
SETUP FILE : STANDARD.SET

INCLINATION :
DIAM :
DATE : 03/02/2022
DATE : 03/02/2022
DATE : 09/03/2022 14:05
TEXT : ..dixASoilProfilesD192.txt

ELEVATION : 1020 m
X-COORD : 28°39'0"E
Y-COORD : 23°57'28"S



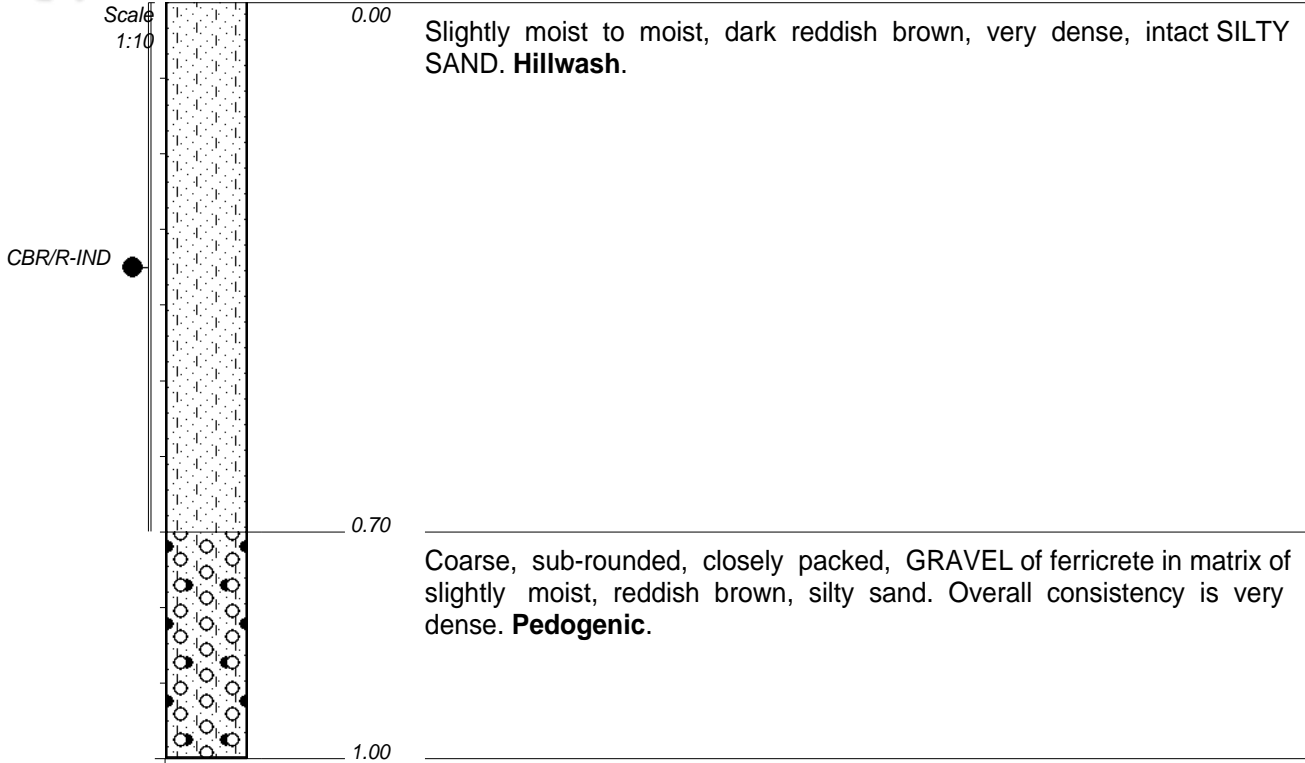
NOTES

- 1) Terminated due to the required depth.
- 2) No ground water seepage.
- 3) Side wall stable.

CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya

INCLINATION :
 DIAM :
 DATE : 03/02/2022
 DATE : 03/02/2022
 DATE : 09/03/2022 14:05
 TEXT : ..dixASoilProfilesD192.txt

ELEVATION : 1030 m
 X-COORD : 28°38'48"E
 Y-COORD : 23°57'20"S



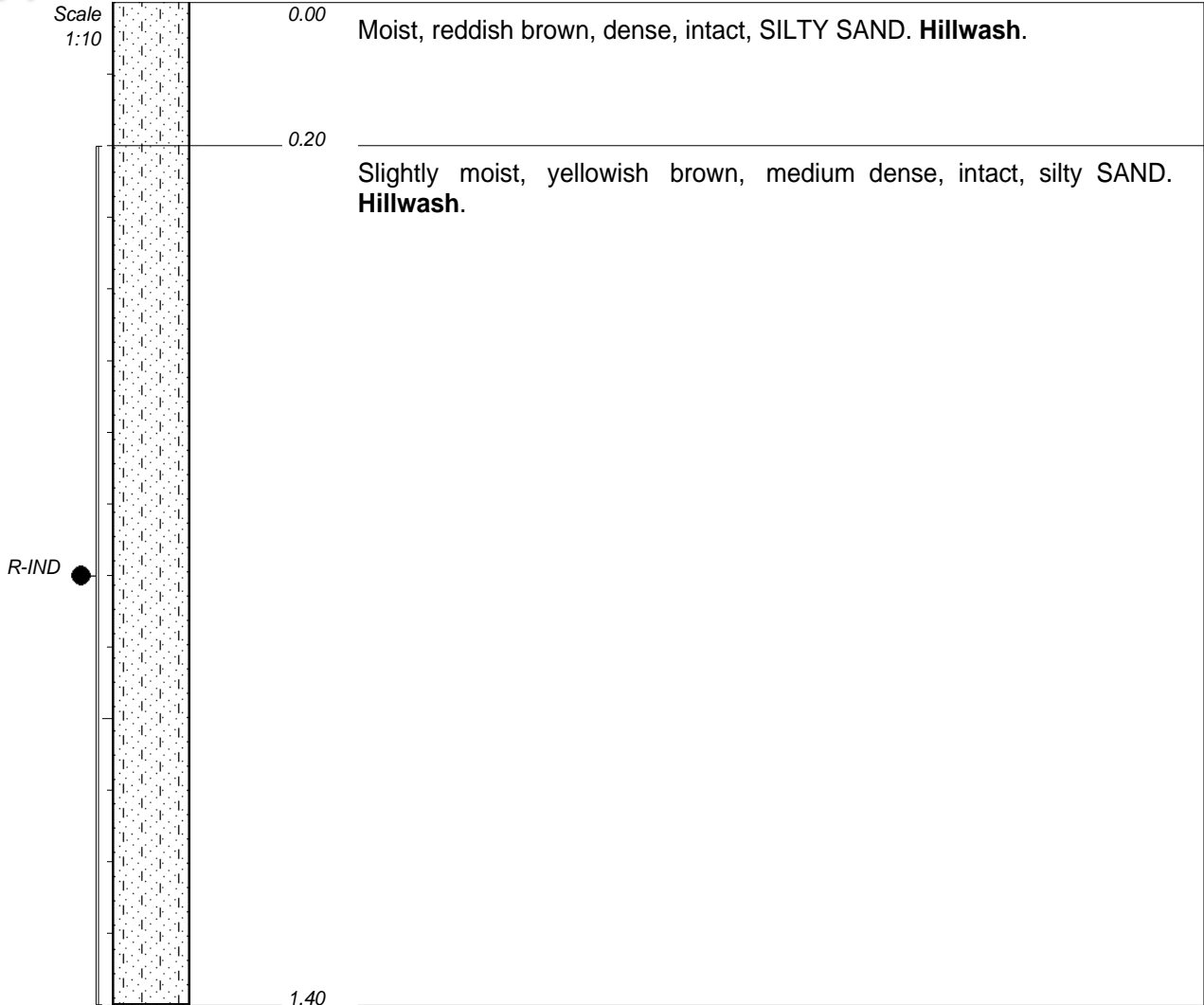
NOTES

- 1) Refusal at 1.0m on hardpan ferricrete.
- 2) No ground water seepage.
- 3) Side wall stable.
- 4) Disturbed sample at 0.0--0.7 m: CBR/R-IND.

CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya
 TYPE SET BY : Fumani Vukeya
 SETUP FILE : STANDARD.SET

INCLINATION :
 DIAM :
 DATE : 03/02/2022
 DATE : 03/02/2022
 DATE : 09/03/2022 14:05
 TEXT : ..dixASoilProfilesD192.txt

ELEVATION : 1000 m
 X-COORD : 28°38'35"E
 Y-COORD : 23°57'11"S



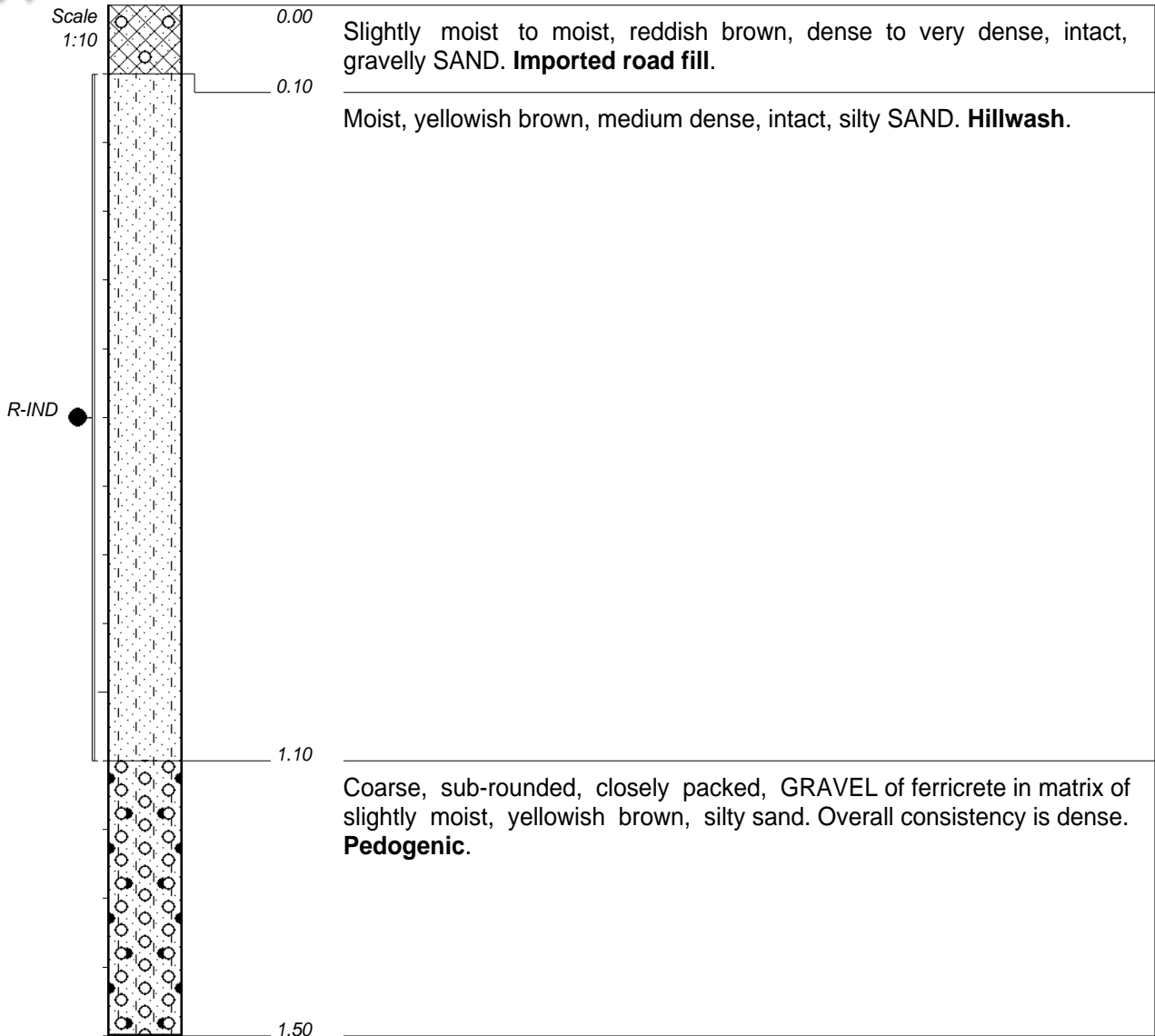
NOTES

- 1) Terminated due to required depth.
- 2) No ground water seepage.
- 3) Disturbed sample at 0.2--1.4 m: R-IND.

CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya

INCLINATION :
 DIAM :
 DATE : 03/02/2022
 DATE : 03/02/2022
 DATE : 09/03/2022 14:05
 TEXT : ..dixASoilProfilesD192.txt

ELEVATION : 1000 m
 X-COORD : 28°38'26"E
 Y-COORD : 23°57'2"S



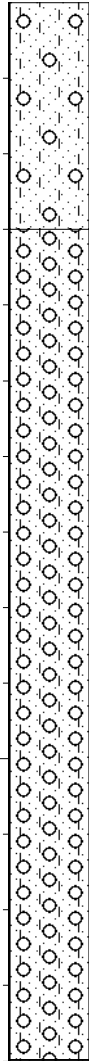
- NOTES**
- 1) Terminated due to required depth.
 - 2) No ground water seepage.
 - 3) Side wall stable.
 - 4) Disturbed sample at 0.1--1.1 m: R-IND.

CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya
 TYPE SET BY : Fumani Vukeya
 SETUP FILE : STANDARD.SET

INCLINATION :
 DIAM :
 DATE : 03/02/2022
 DATE : 03/02/2022
 DATE : 09/03/2022 14:05
 TEXT : ..dixASoilProfilesD192.txt

ELEVATION : 990 m
 X-COORD : 28°38'15"E
 Y-COORD : 23°56'52"S

Scale
1:10



0.00

Moist, dark reddish brown, dense, intact, gravelly silty SAND. **Hillwash.**

0.30

Coarse, sub-rounded, closely packed, GRAVEL of sandstone in matrix of moist, yellowish brown, silty sand. Overall consistency is medium dense to dense. **Residual sandstone.**

1.40

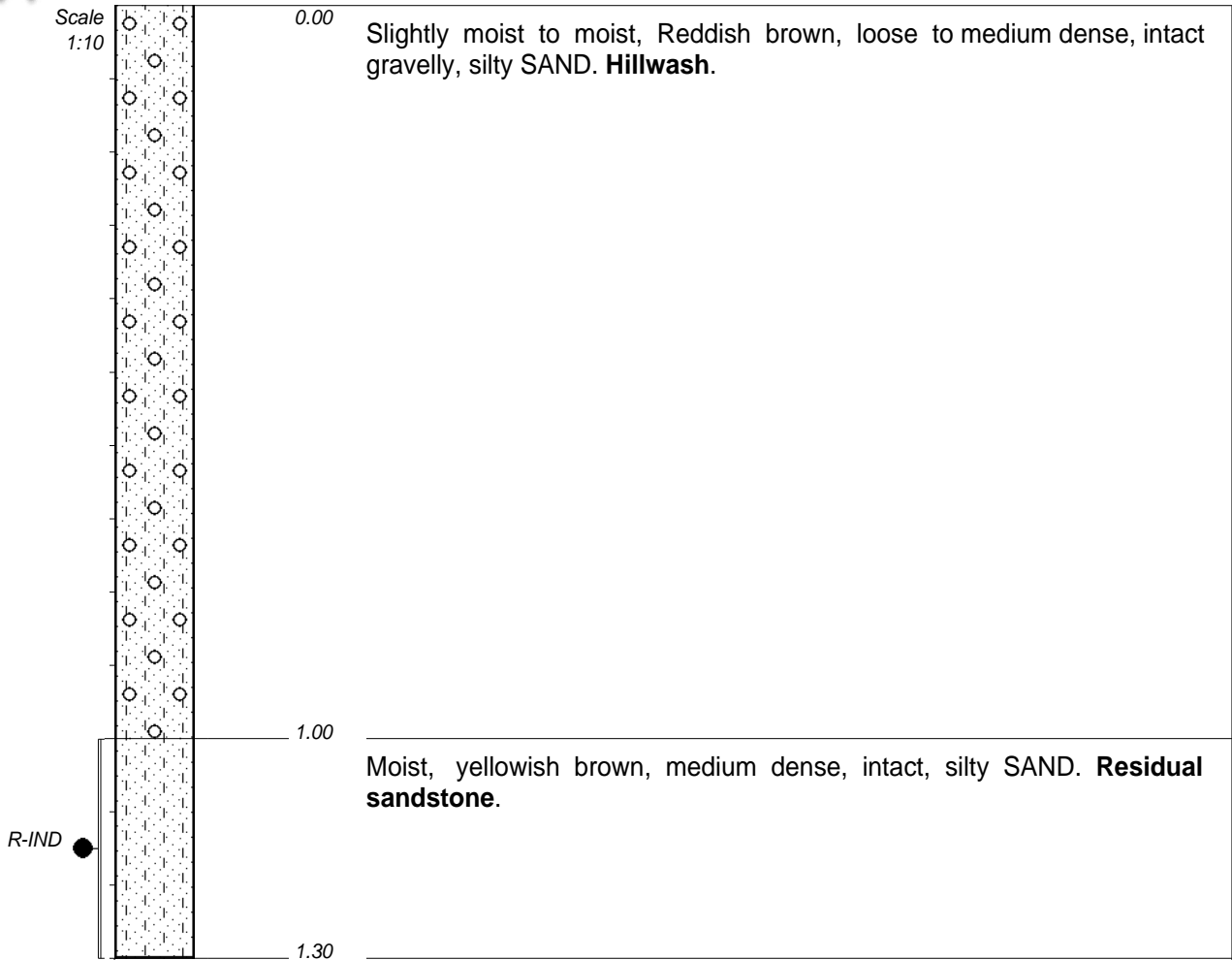
NOTES

- 1) Terminated due to required depth.
- 2) No ground water seepage.
- 3) Side wall stable.

CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya

INCLINATION :
 DIAM :
 DATE : 03/02/2022
 DATE : 03/02/2022
 DATE : 09/03/2022 14:05
 TEXT : ..dixASoilProfilesD192.txt

ELEVATION : 980 m
 X-COORD : 28°38'7"E
 Y-COORD : 23°56'44"S



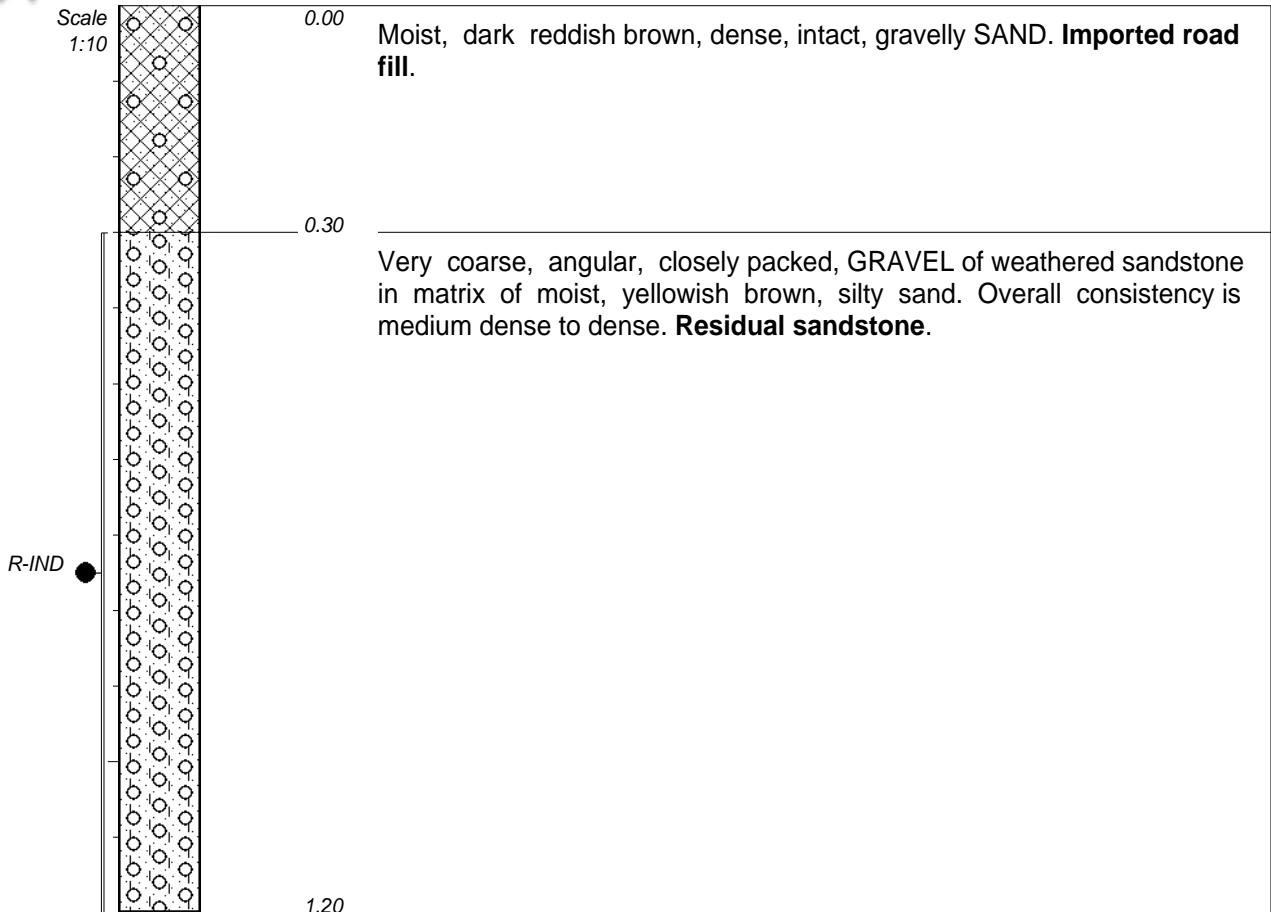
NOTES

- 1) Terminated due to required depth.
- 2) No ground water seepage.
- 3) Sidewall stable.
- 4) Disturbed sample at 1.0--1.3 m: R-IND.

CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya

INCLINATION :
 DIAM :
 DATE : 03/02/2022
 DATE : 03/02/2022
 DATE : 09/03/2022 14:05
 TEXT : ..dixASoilProfilesD192.txt

ELEVATION : 980 m
 X-COORD : 28°37'50"E
 Y-COORD : 23°56'31"S



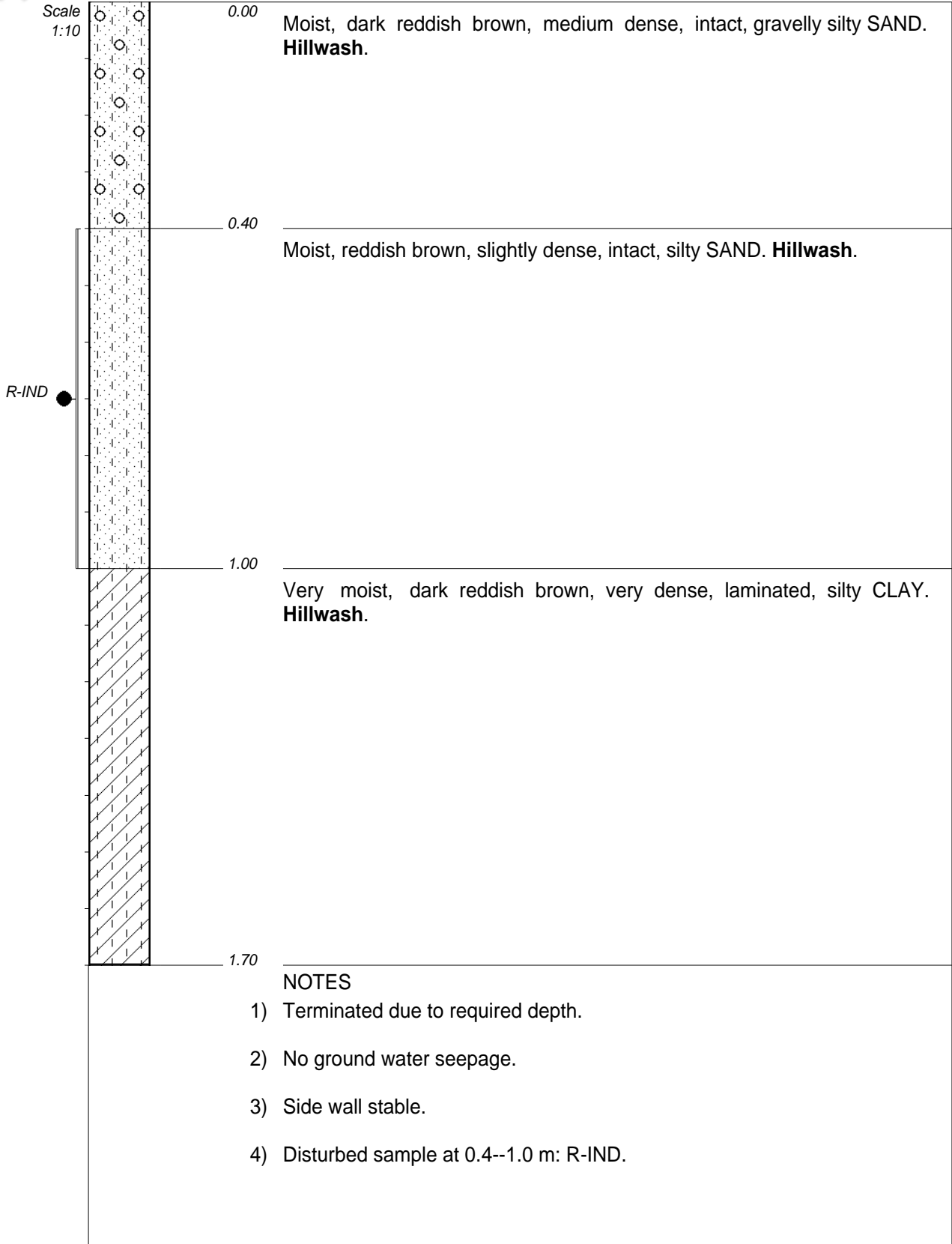
NOTES

- 1) Refusal on sandstone boulders at 1.2m.
- 2) No ground water seepage.
- 3) Side wall stable.
- 4) Disturbed sample at 0.3--1.2 m: R-IND.

CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya
 TYPE SET BY : Fumani Vukeya
 SETUP FILE : STANDARD.SET

INCLINATION :
 DIAM :
 DATE : 03/02/2022
 DATE : 03/02/2022
 DATE : 09/03/2022 14:05
 TEXT : ..dixASoilProfilesD192.txt

ELEVATION : 980 m
 X-COORD : 28°37'42"E
 Y-COORD : 23°56'23"S

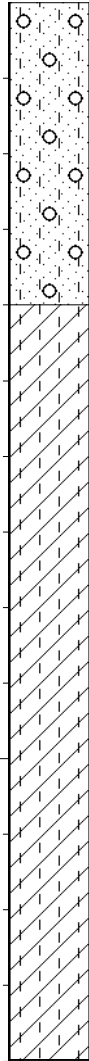


CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya
 TYPE SET BY : Fumani Vukeya
 SETUP FILE : STANDARD.SET

INCLINATION :
 DIAM :
 DATE : 03/02/2022
 DATE : 03/02/2022
 DATE : 09/03/2022 14:05
 TEXT : ..dixASoilProfilesD192.txt

ELEVATION : 970 m
 X-COORD : 28°37'37"E
 Y-COORD : 23°56'13"S

Scale
1:10



0.00

Slightly moist, dark reddish brown, medium dense, intact, gravelly silty SAND. **Hillwash.**

0.40

Moist, reddish brown, dense, intact, silty CLAY. **Hillwash.**

1.40

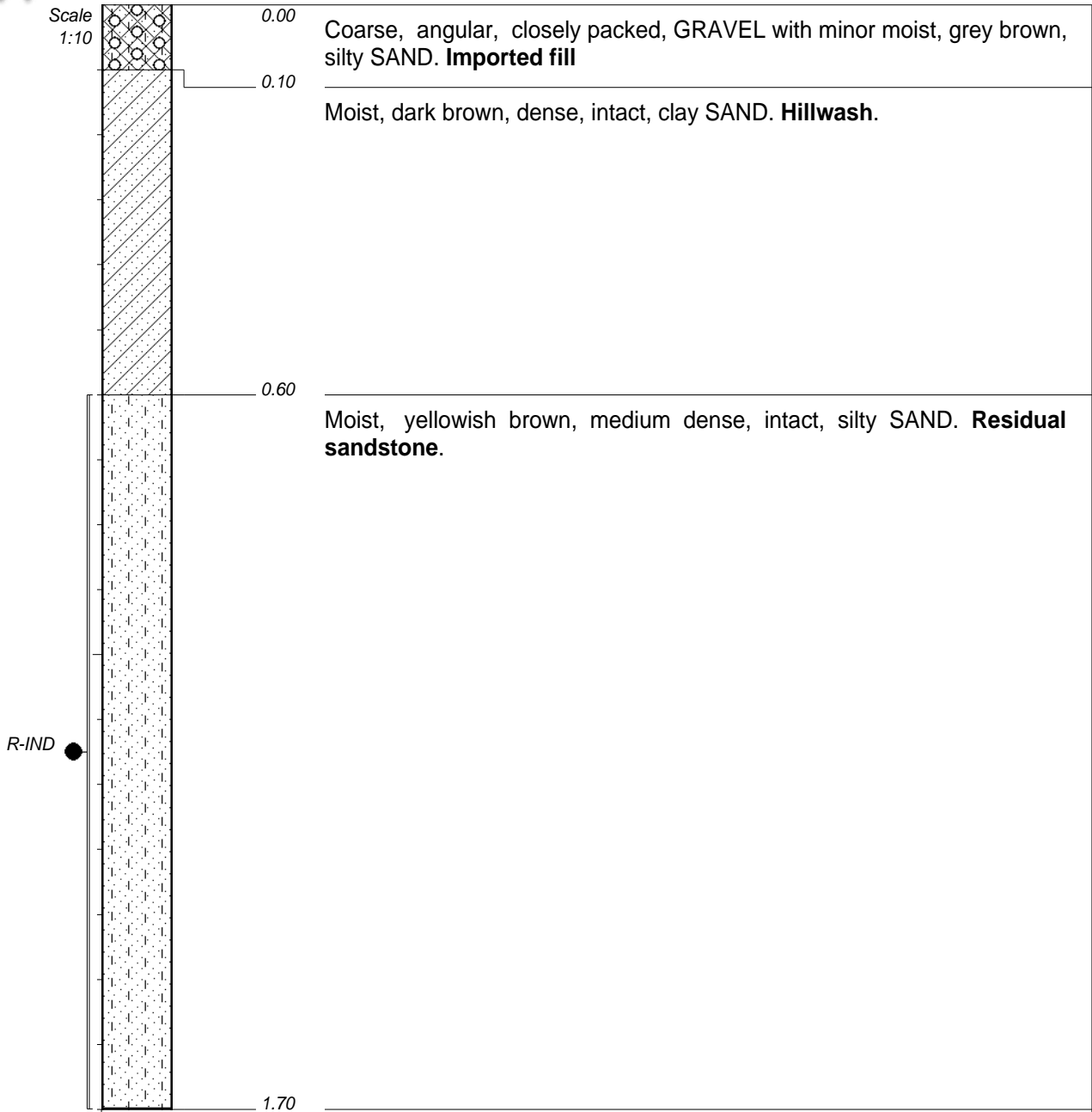
NOTES

- 1) Terminated due to required depth.
- 2) No ground water seepage.

CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya

INCLINATION :
 DIAM :
 DATE : 03/02/2022
 DATE : 03/02/2022
 DATE : 09/03/2022 14:05
 TEXT : ..dixASoilProfilesD192.txt

ELEVATION : 970 m
 X-COORD : 28°37'35"E
 Y-COORD : 23°55'60"S



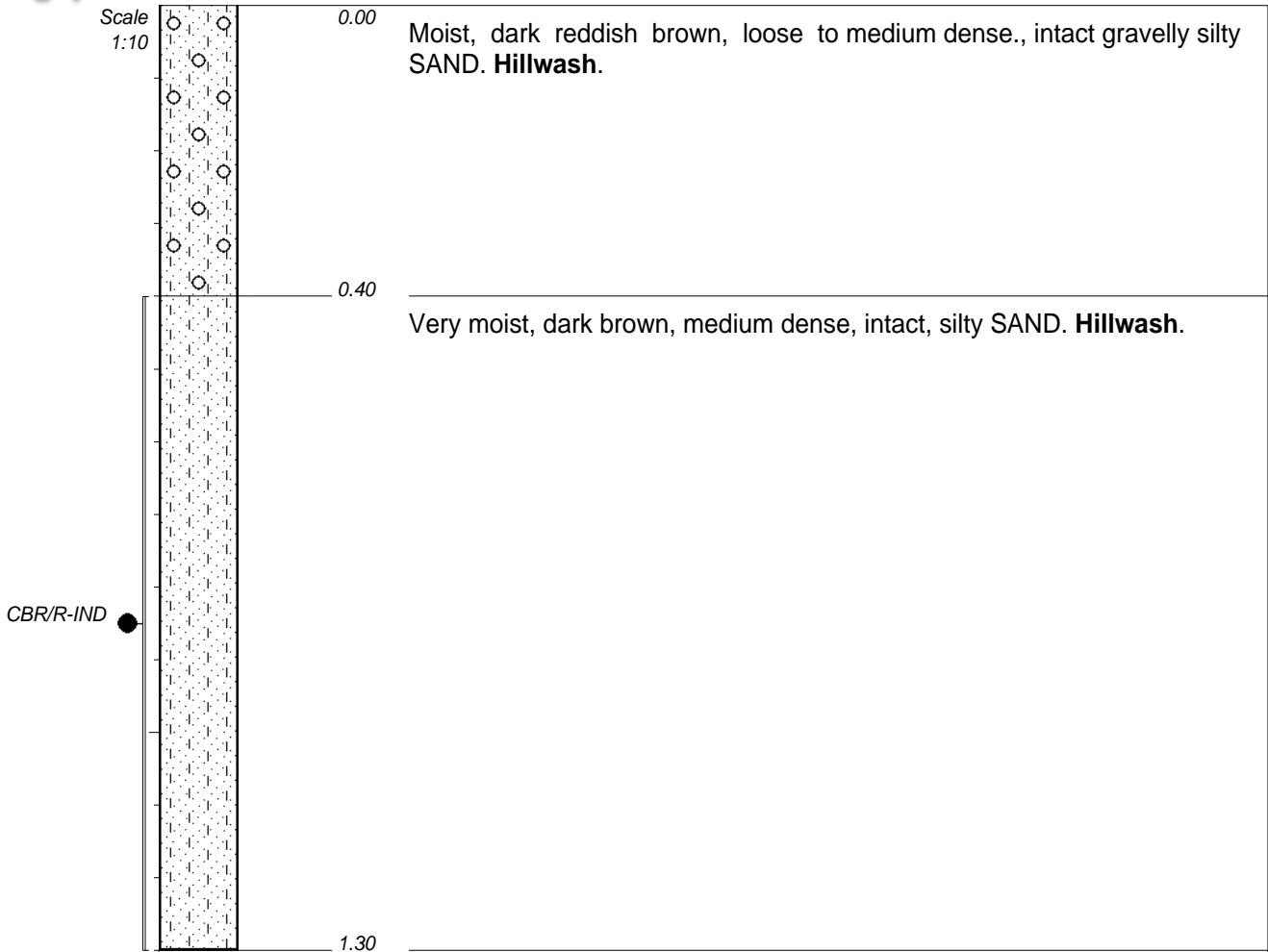
NOTES

- 1) Terminated due to required depth.
- 2) No ground water seepage.
- 3) Side wall stable.
- 4) Disturbed sample at 0.6--1.7 m: R-IND.

CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya

INCLINATION :
 DIAM :
 DATE : 03/02/2022
 DATE : 03/02/2022
 DATE : 09/03/2022 14:05
 TEXT : ..dixASoilProfilesD192.txt

ELEVATION : 970 m
 X-COORD : 28°37'36"E
 Y-COORD : 23°55'47"S



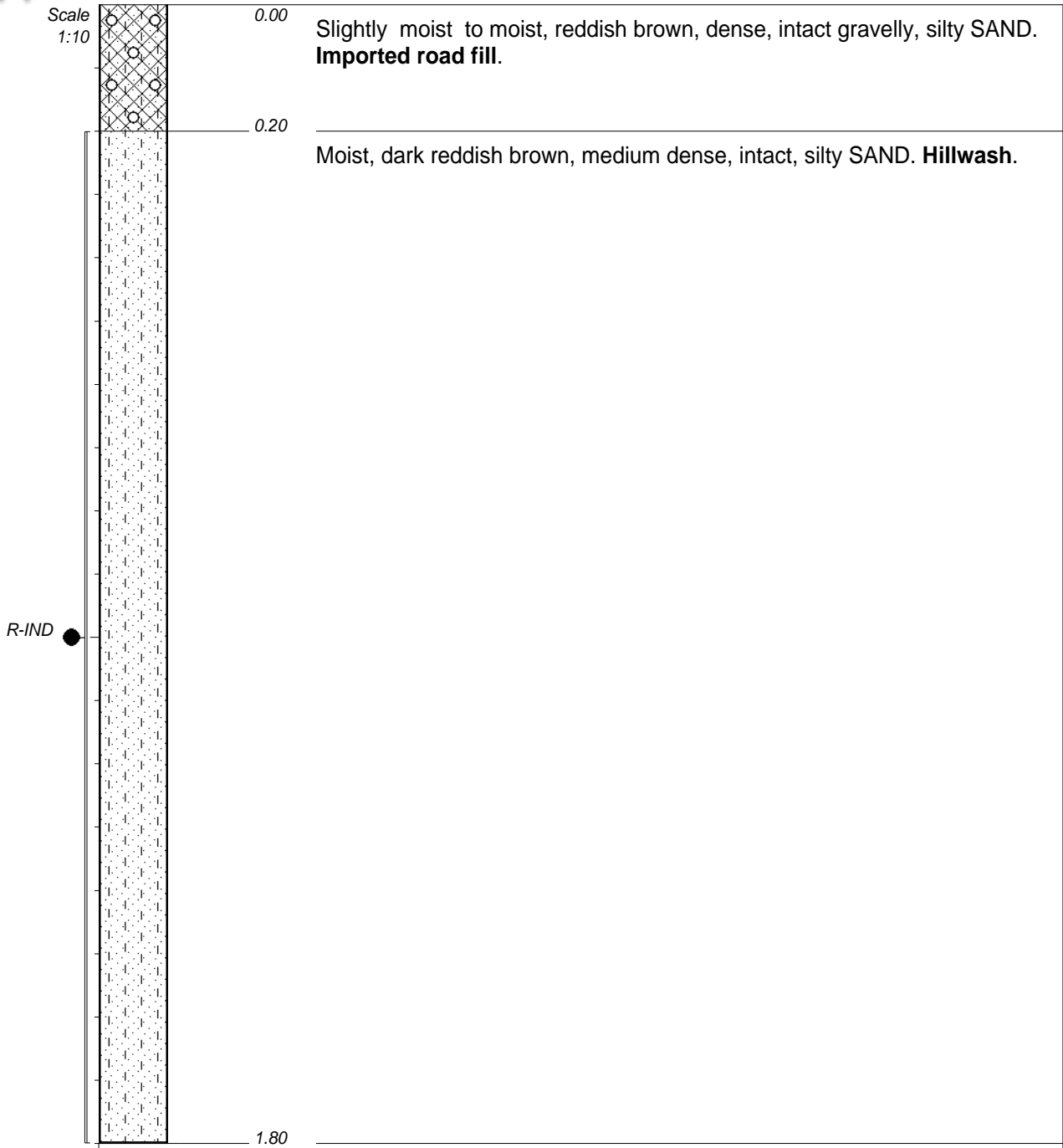
NOTES

- 1) Terminated due to required depth.
- 2) No ground water seepage.
- 3) Side wall stable.
- 4) Disturbed sample at 0.4--1.3 m: CBR/R-IND.

CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya
 TYPE SET BY : Fumani Vukeya
 SETUP FILE : STANDARD.SET

INCLINATION :
 DIAM :
 DATE : 03/02/2022
 DATE : 03/02/2022
 DATE : 09/03/2022 14:05
 TEXT : ..dixASoilProfilesD192.txt

ELEVATION : 970 m
 X-COORD : 28°37'37"E
 Y-COORD : 23°55'30"S



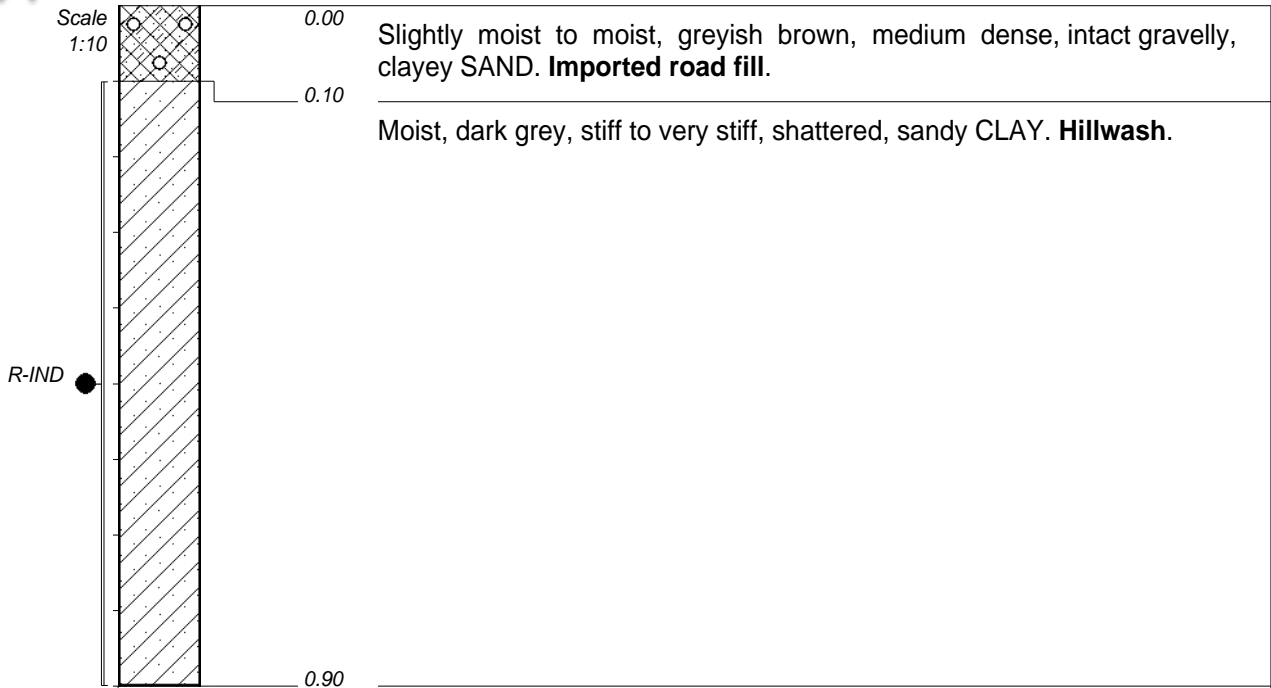
NOTES

- 1) Terminated due to required depth.
- 2) No ground water seepage.
- 3) Side wall stable.
- 4) Disturbed sample at 0.2--1.8 m: R-IND.

CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya
 TYPE SET BY : Fumani Vukeya
 SETUP FILE : STANDARD.SET

INCLINATION :
 DIAM :
 DATE : 03/02/2022
 DATE : 03/02/2022
 DATE : 09/03/2022 14:05
 TEXT : ..dixASoilProfilesD192.txt

ELEVATION : 970 m
 X-COORD : 28°37'39"E
 Y-COORD : 23°55'13"S



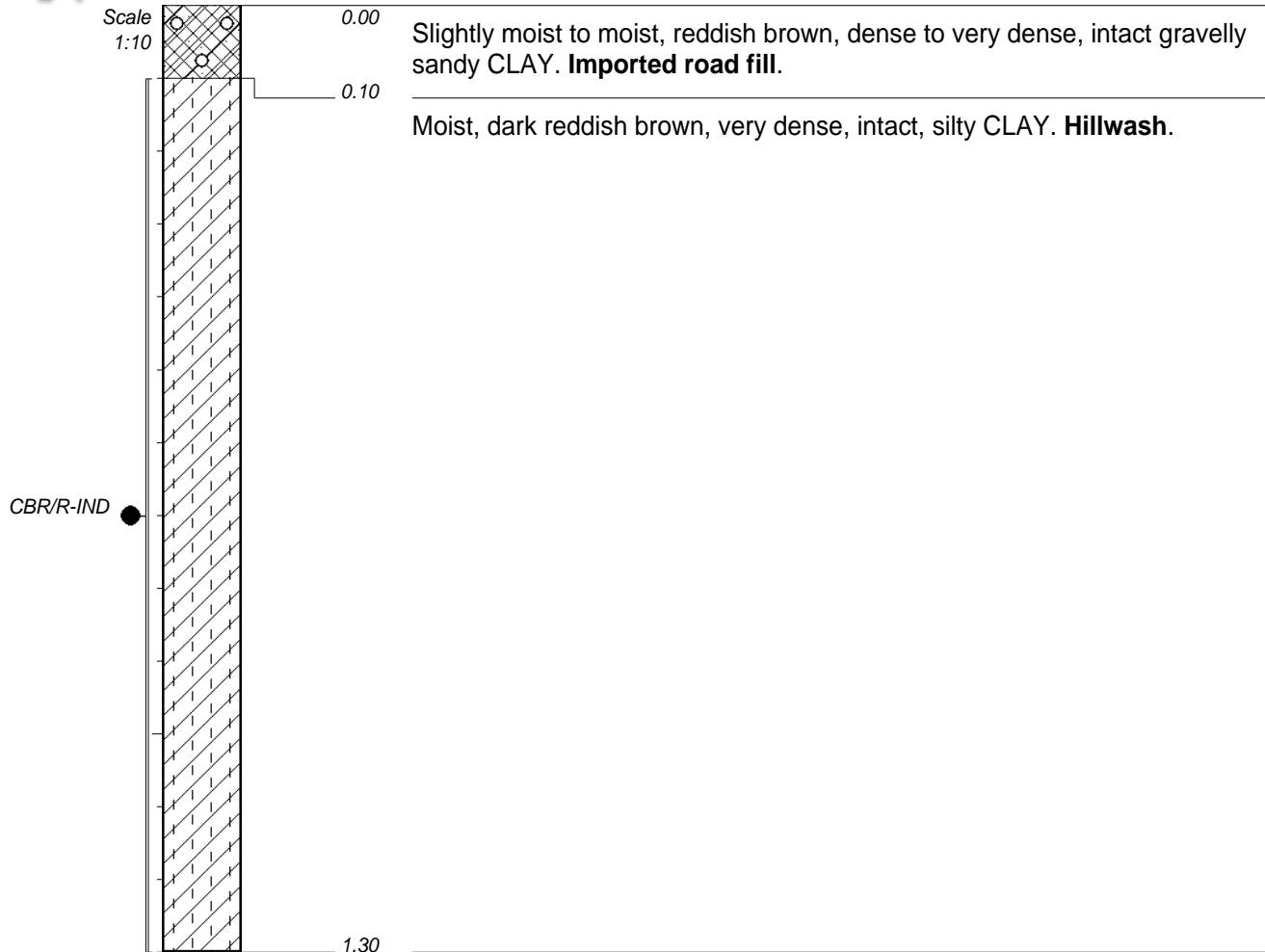
NOTES

- 1) Terminated due to slow progress.
- 2) No ground water seepage.
- 3) Side wall stable.
- 4) Disturbed sample at 0.1--0.9 m: R-IND.

CONTRACTOR : MR BLUE PROJECTS
MACHINE : TLB
DRILLED BY : MR BLUE PROJECTS
PROFILED BY : Fumani Vukeya
TYPE SET BY : Fumani Vukeya
SETUP FILE : STANDARD.SET

INCLINATION :
DIAM :
DATE : 03/02/2022
DATE : 03/02/2022
DATE : 09/03/2022 14:05
TEXT : ..dixASoilProfilesD192.txt

ELEVATION : 970 m
X-COORD : 28°37'39"E
Y-COORD : 23°54'59"S



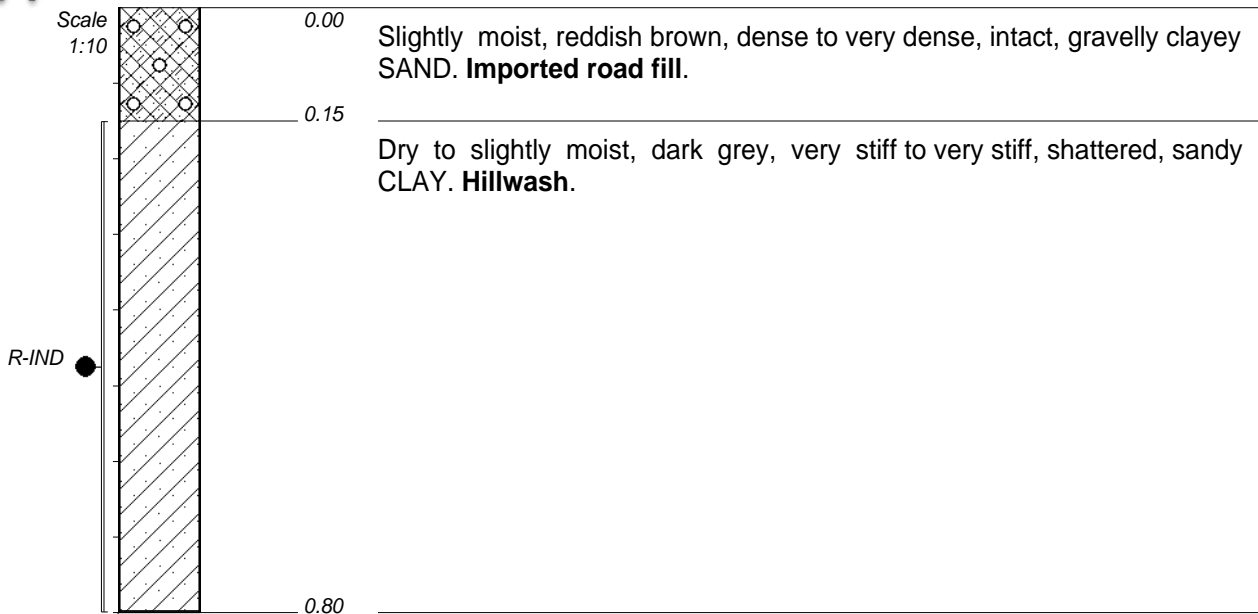
NOTES

- 1) Terminated due to required depth.
- 2) No ground water seepage.
- 3) Side wall stable.
- 4) Disturbed sample at 0.1--1.3. m: CBR/R-IND.

CONTRACTOR : MR BLUE PROJECTS
MACHINE : TLB
DRILLED BY : MR BLUE PROJECTS
PROFILED BY : Fumani Vukeya

INCLINATION :
DIAM :
DATE : 03/02/2022
DATE : 03/02/2022
DATE : 09/03/2022 14:05
TEXT : ..dixASoilProfilesD192.txt

ELEVATION : 960 m
X-COORD : 28°37'40"E
Y-COORD : 23°54'46"S



NOTES

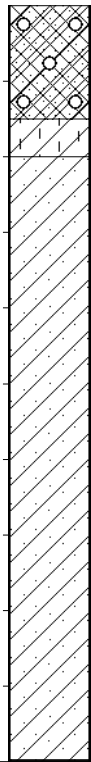
- 1) Terminated due to slow progress
- 2) No ground water seepage.
- 3) Disturbed sample at 0.15--0.8 m: R-IND.

CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya

INCLINATION :
 DIAM :
 DATE : 03/02/2022
 DATE : 03/02/2022
 DATE : 09/03/2022 14:05
 TEXT : ..dixASoilProfilesD192.txt

ELEVATION : 960 m
 X-COORD : 28°37'42"E
 Y-COORD : 23°54'33"S

Scale
1:10



0.00

Slightly moist, reddish brown, dense to very dense, intact gravelly, clay SAND. **Imported road fill.**

0.15

Slightly moist, dark reddish brown, stiff, intact, silty CLAY. **Hillwash.**

0.20

Moist, dark reddish brown, stiff, intact, sandy CLAY. **Hillwash.**

1.00

NOTES

- 1) Terminated due to slow progress.
- 2) No ground water seepage.

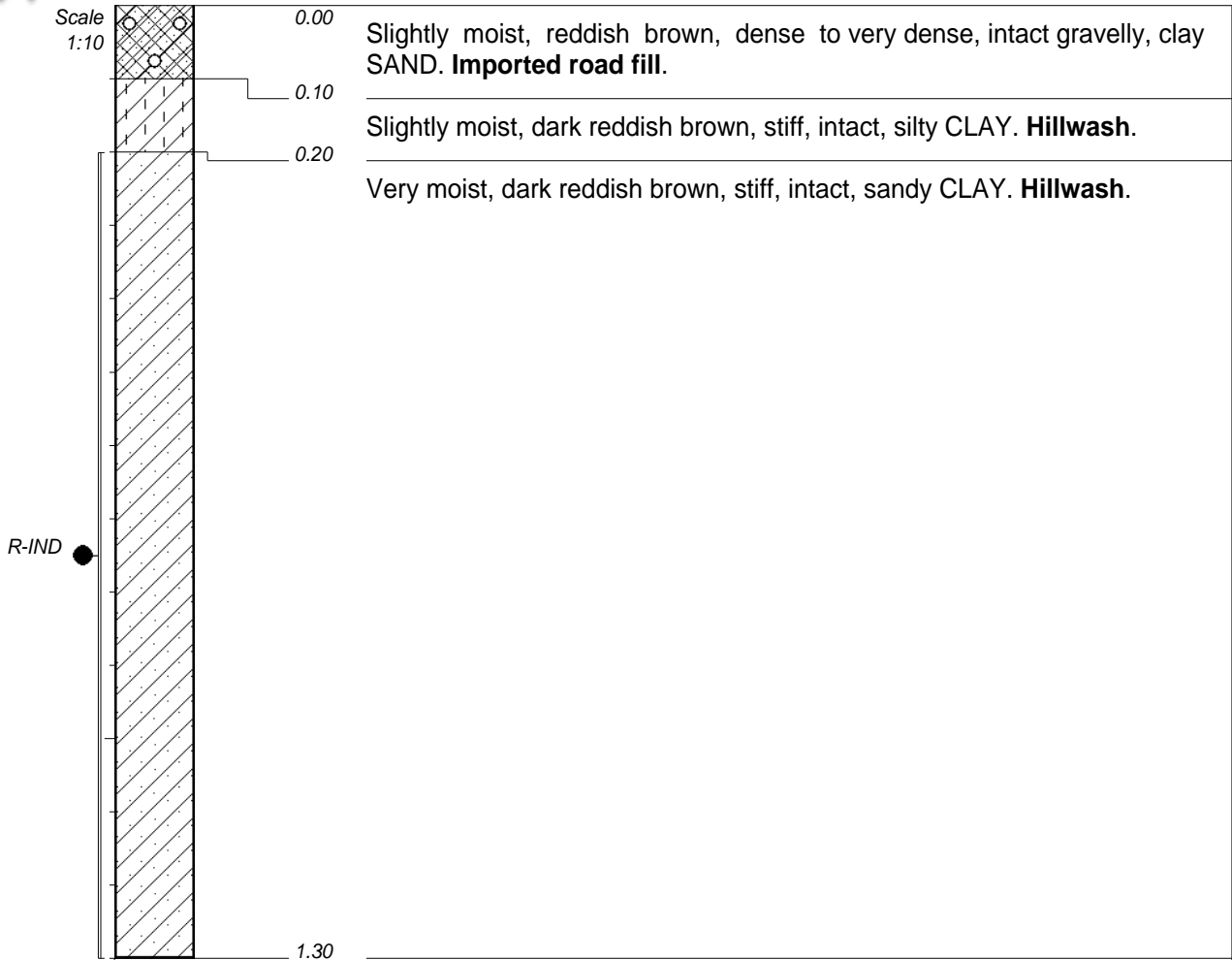
CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya

INCLINATION :
 DIAM :
 DATE : 03/02/2022
 DATE : 03/02/2022

ELEVATION : 950 m
 X-COORD : 28°37'43"E
 Y-COORD : 23°54'17"S

TYPE SET BY : Fumani Vukeya
 SETUP FILE : STANDARD.SET

DATE : 09/03/2022 14:05
 TEXT : ..dixASoilProfilesD192.txt



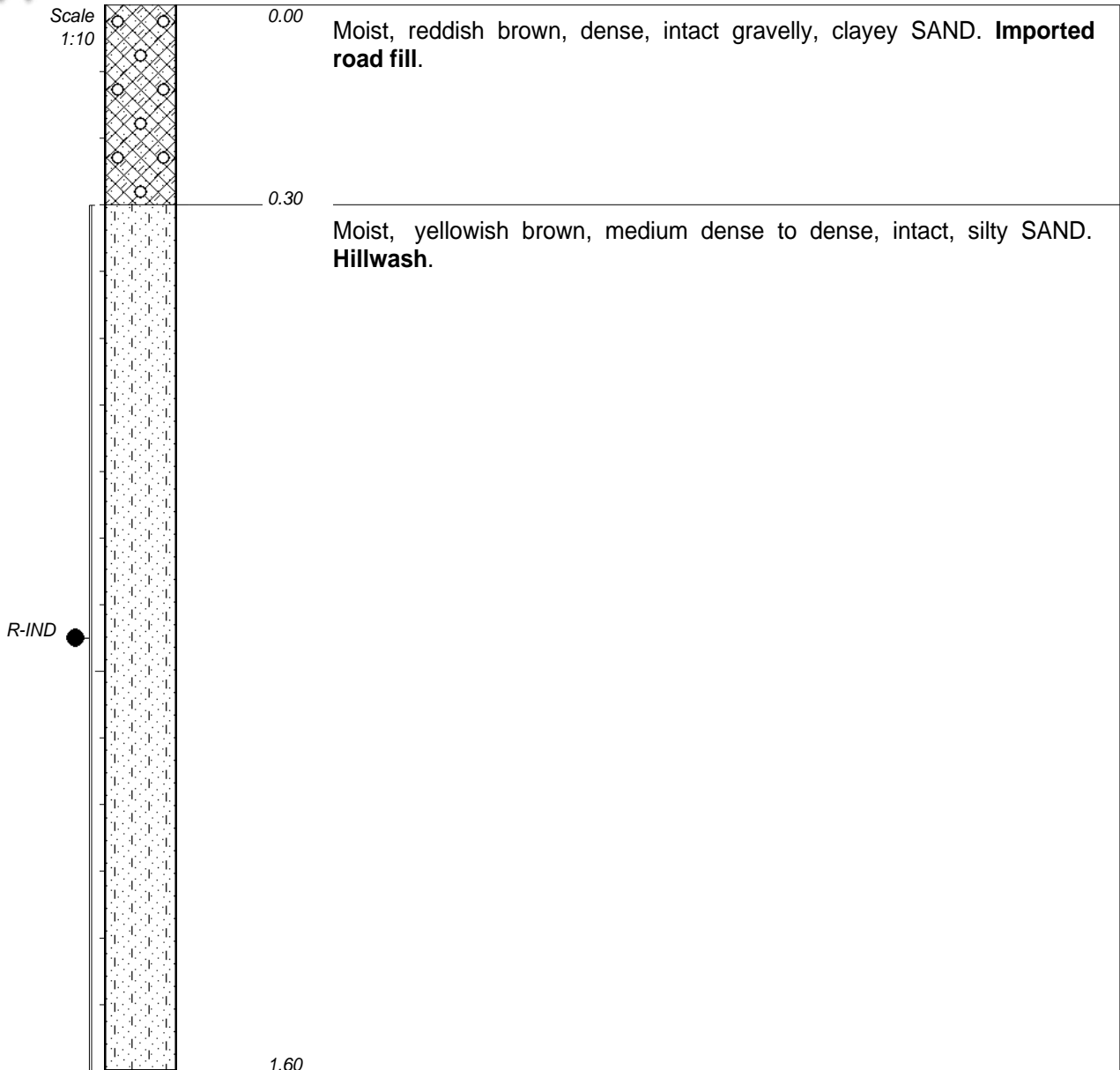
NOTES

- 1) Terminated due to required depth.
- 2) No ground water seepage.
- 3) Disturbed sample at 0.2--1.3 m: R-IND.

CONTRACTOR : MR BLUE PROJECTS
MACHINE : TLB
DRILLED BY : MR BLUE PROJECTS
PROFILED BY : Fumani Vukeya
TYPE SET BY : Fumani Vukeya
SETUP FILE : STANDARD.SET

INCLINATION :
DIAM :
DATE : 03/02/2022
DATE : 03/02/2022
DATE : 09/03/2022 14:05
TEXT : ..dixASoilProfilesD192.txt

ELEVATION : 950 m
X-COORD : 28°37'44"E
Y-COORD : 23°53'59"S



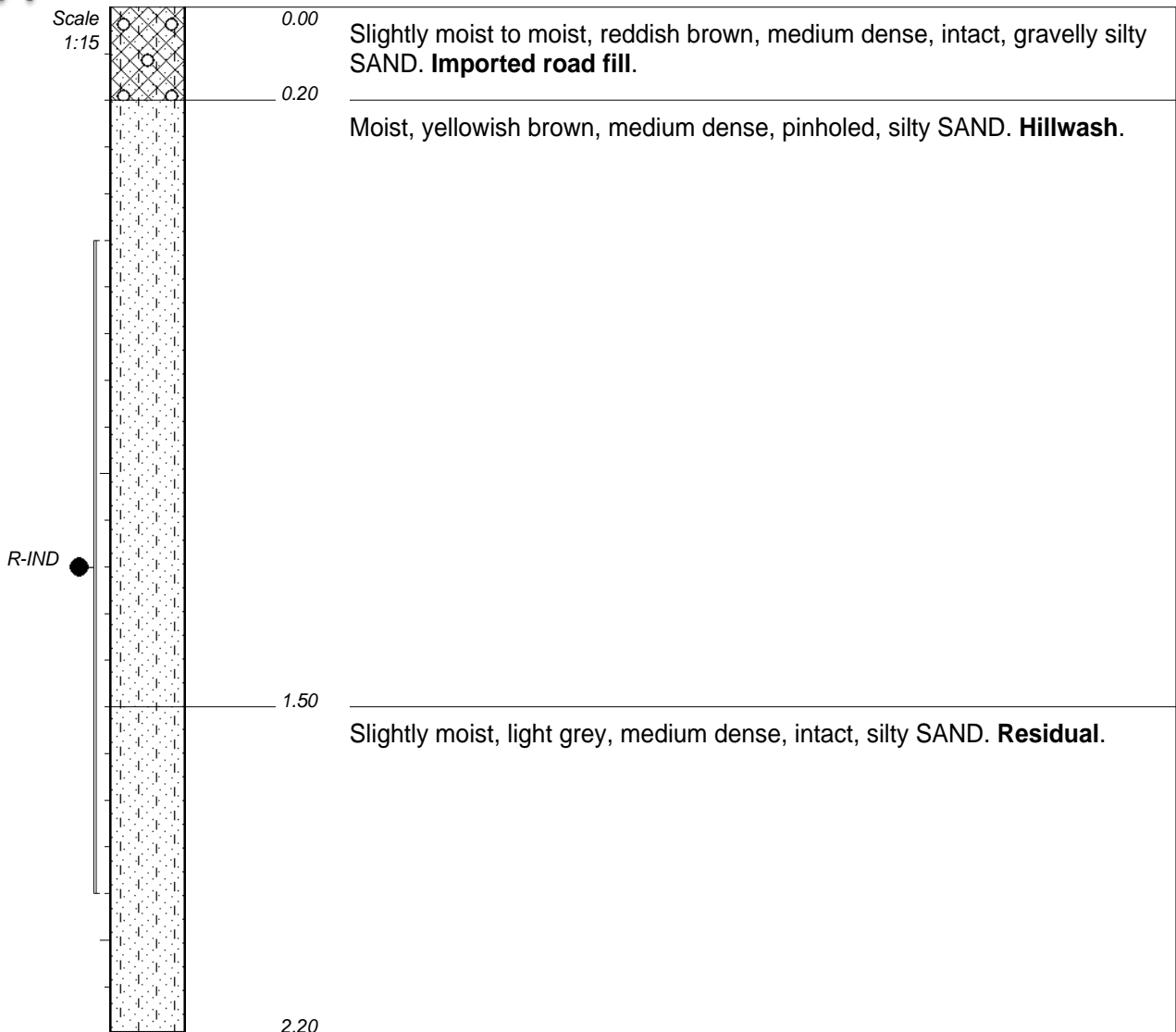
NOTES

- 1) Terminated due to required depth.
- 2) No ground water seepage.
- 3) Side wall stable.
- 4) Disturbed sample at 0.3--1.6 m: R-IND.

CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya
 TYPE SET BY : Fumani Vukeya
 SETUP FILE : STANDARD.SET

INCLINATION :
 DIAM :
 DATE : 03/02/2022
 DATE : 03/02/2022
 DATE : 09/03/2022 14:05
 TEXT : ..dixASoilProfilesD192.txt

ELEVATION : 940 m
 X-COORD : 28°37'44"E
 Y-COORD : 23°53'39"S



NOTES

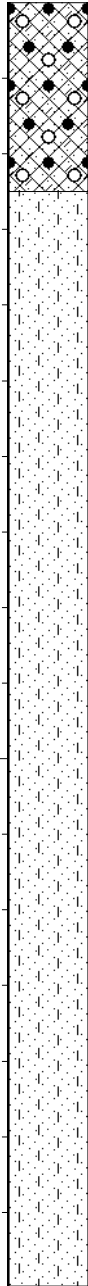
- 1) Terminated due to required depth.
- 2) No ground water seepage.
- 3) Disturbed sample at 0.5--1.9 m: R-IND.

CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya
 TYPE SET BY : Fumani Vukeya
 SETUP FILE : STANDARD.SET

INCLINATION :
 DIAM :
 DATE : 03/02/2022
 DATE : 03/02/2022
 DATE : 09/03/2022 14:05
 TEXT : ..dixASoilProfilesD192.txt

ELEVATION : 940 m
 X-COORD : 28°37'29"E
 Y-COORD : 23°53'28"S

Scale
1:10



0.00

Slightly moist to moist, reddish brown, medium dense, intact gravelly, clayey SAND with traces of ferricrete. **Imported road fill.**

0.25

Moist, yellowish brown, medium dense, pinholed, silty SAND. **Hillwash.**

1.70

NOTES

- 1) Terminated due to required depth.
- 2) No ground water seepage.

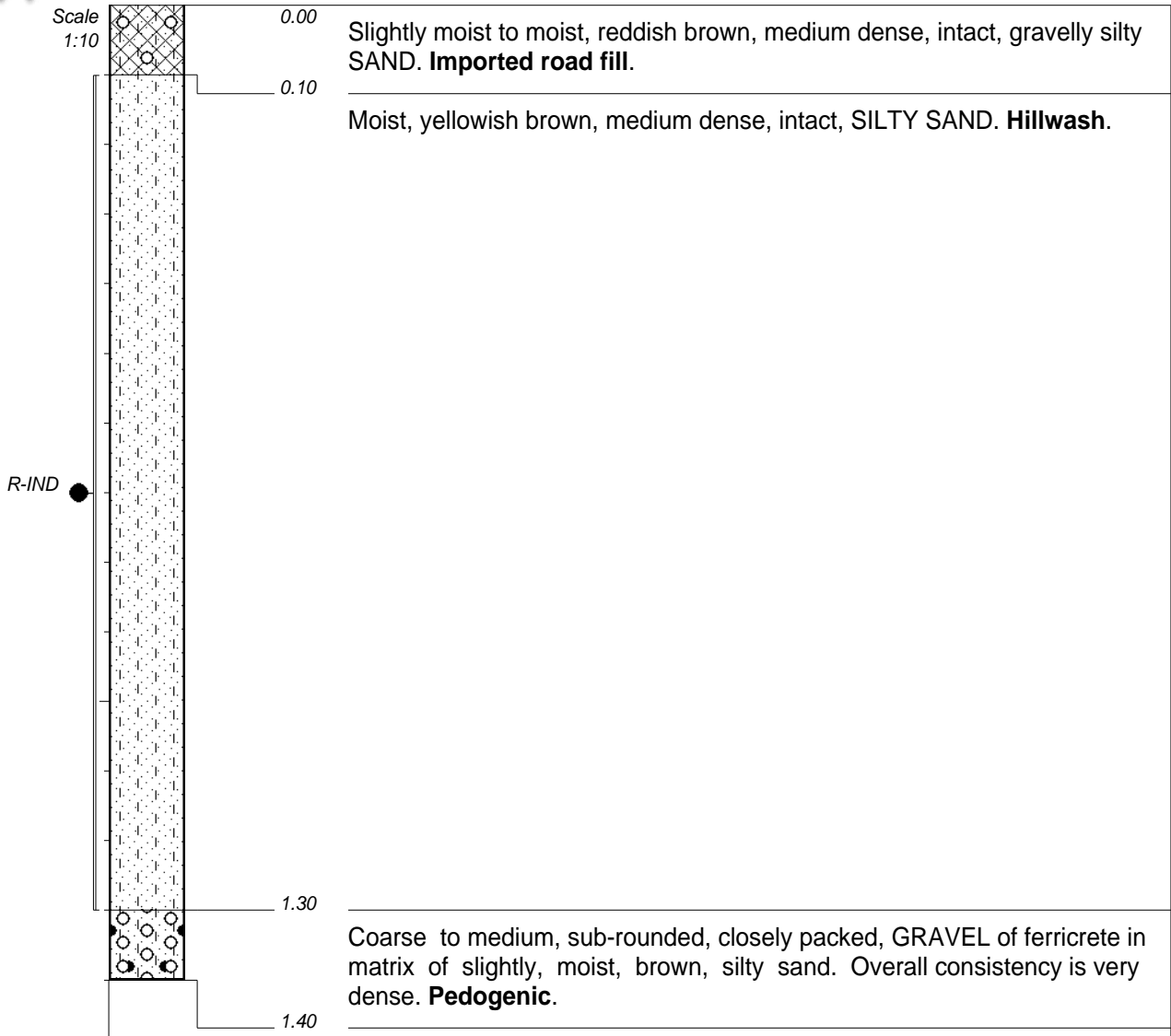
CONTRACTOR : MR BLUE PROJECTS
MACHINE : TLB
DRILLED BY : MR BLUE PROJECTS
PROFILED BY : Fumani Vukeya

INCLINATION :
DIAM :
DATE : 03/02/2022
DATE : 03/02/2022

ELEVATION : 940 m
X-COORD : 28°37'23"E
Y-COORD : 23°53'18"S

TYPE SET BY : Fumani Vukeya
SETUP FILE : STANDARD.SET

DATE : 09/03/2022 14:05
TEXT : ..dixASoilProfilesD192.txt

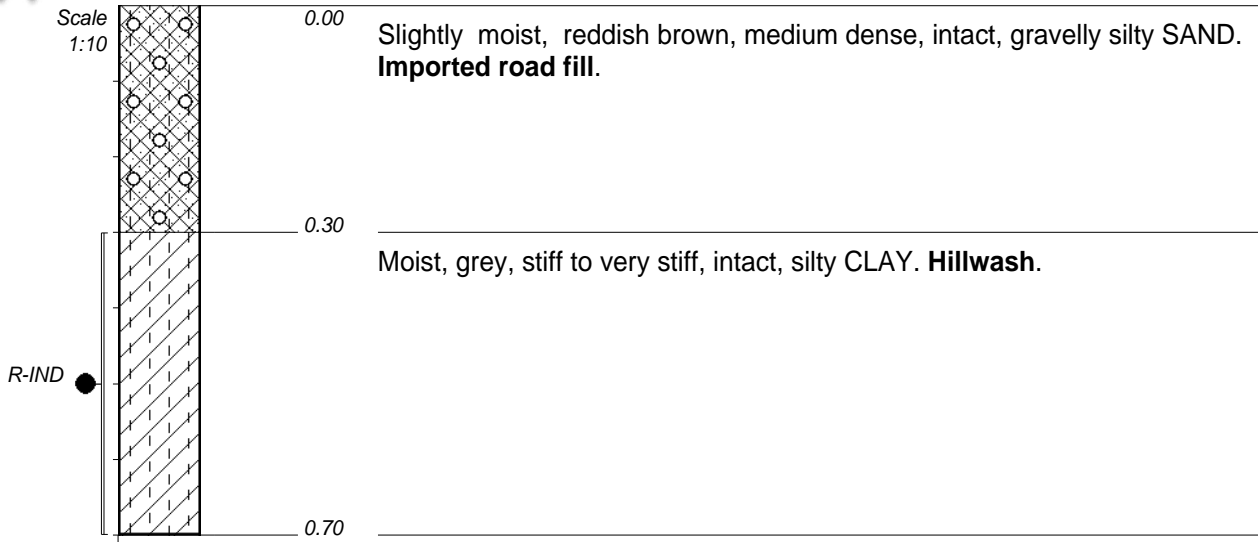


- NOTES**
- 1) Refusal on hard ferricrete at 1.4 m.
 - 2) No ground water seepage.
 - 3) Side wall stable.
 - 4) Disturbed sample at 0.1--1.3 m: R-IND.

CONTRACTOR : MR BLUE PROJECTS
MACHINE : TLB
DRILLED BY : MR BLUE PROJECTS
PROFILED BY : Fumani Vukeya
TYPE SET BY : Fumani Vukeya
SETUP FILE : STANDARD.SET

INCLINATION :
DIAM :
DATE : 03/02/2022
DATE : 03/02/2022
DATE : 09/03/2022 14:05
TEXT : ..dixASoilProfilesD192.txt

ELEVATION : 950 m
X-COORD : 28°37'20"E
Y-COORD : 23°53'6"S



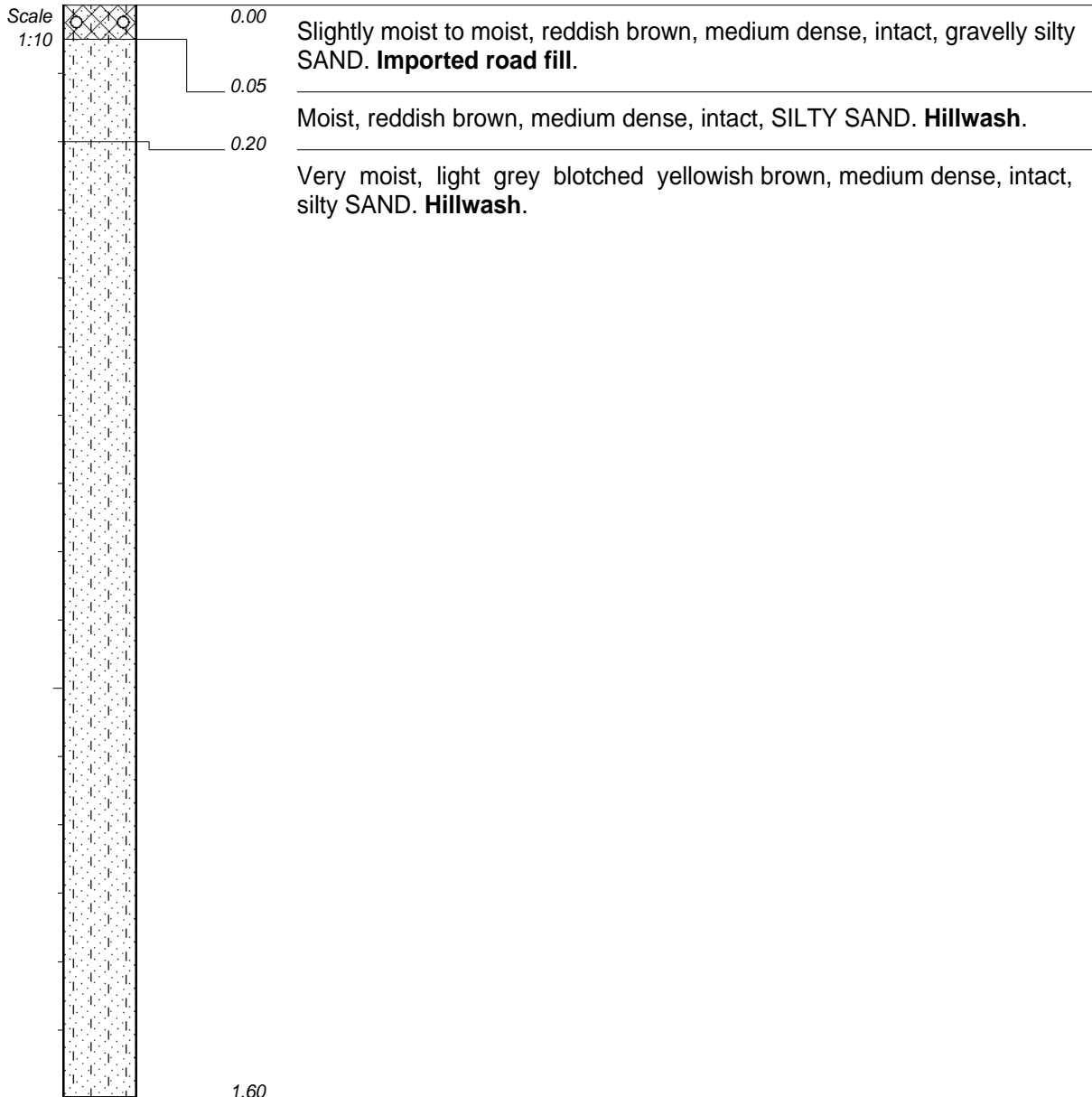
NOTES

- 1) Terminated due to slow progress.
- 2) No ground water seepage.
- 3) Disturbed sample at 0.3--0.7 m: R-IND.

CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya
 TYPE SET BY : Fumani Vukeya
 SETUP FILE : STANDARD.SET

INCLINATION :
 DIAM :
 DATE : 03/02/2022
 DATE : 03/02/2022
 DATE : 09/03/2022 14:05
 TEXT : ..dixASoilProfilesD192.txt

ELEVATION : 950 m
 X-COORD : 28°37'17"E
 Y-COORD : 23°52'56"S



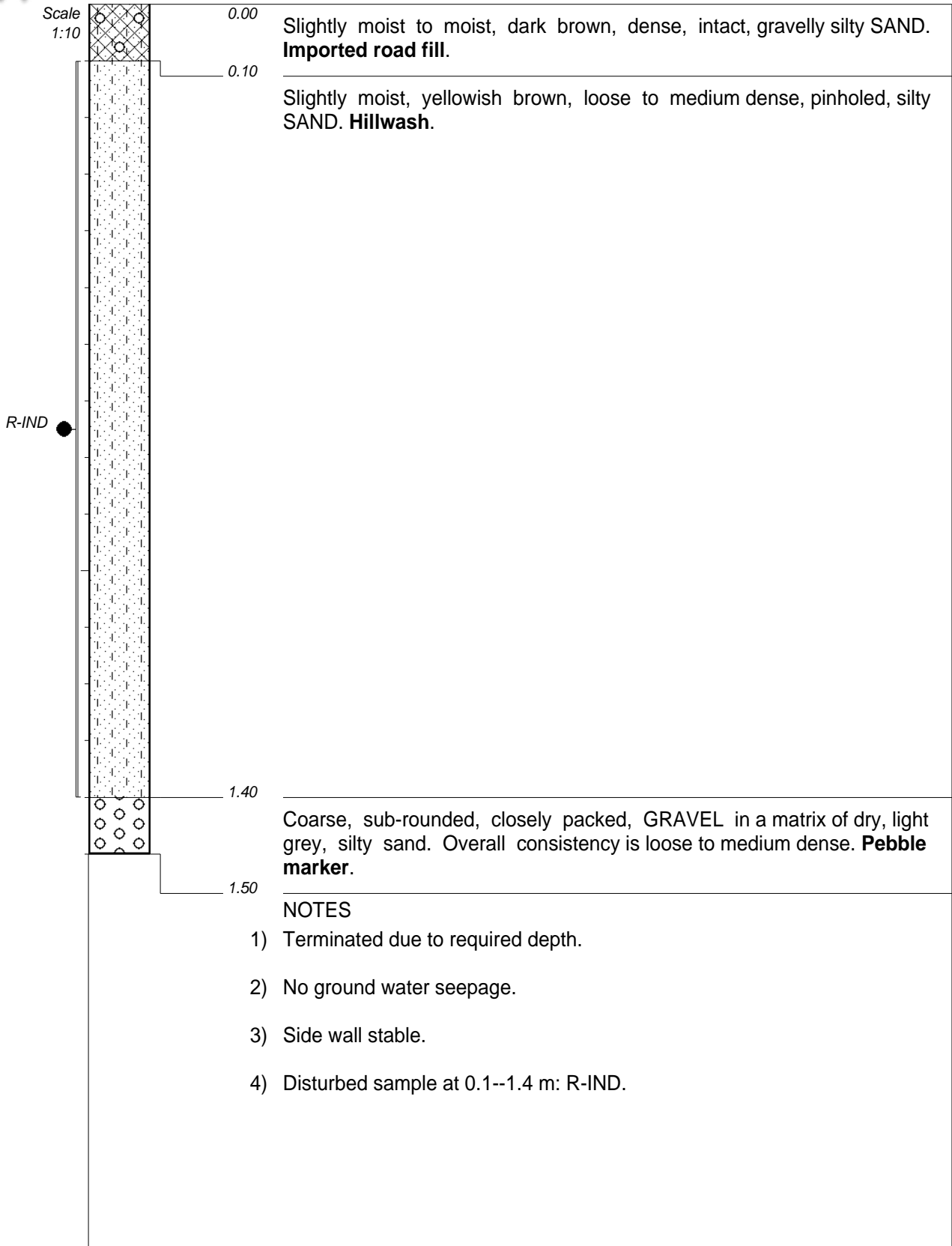
NOTES

- 1) Terminated due to required depth.
- 2) No ground water seepage.
- 3) Side wall stable.

CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya
 TYPE SET BY : Fumani Vukeya
 SETUP FILE : STANDARD.SET

INCLINATION :
 DIAM :
 DATE : 03/02/2022
 DATE : 03/02/2022
 DATE : 09/03/2022 14:05
 TEXT : ..dixASoilProfilesD192.txt

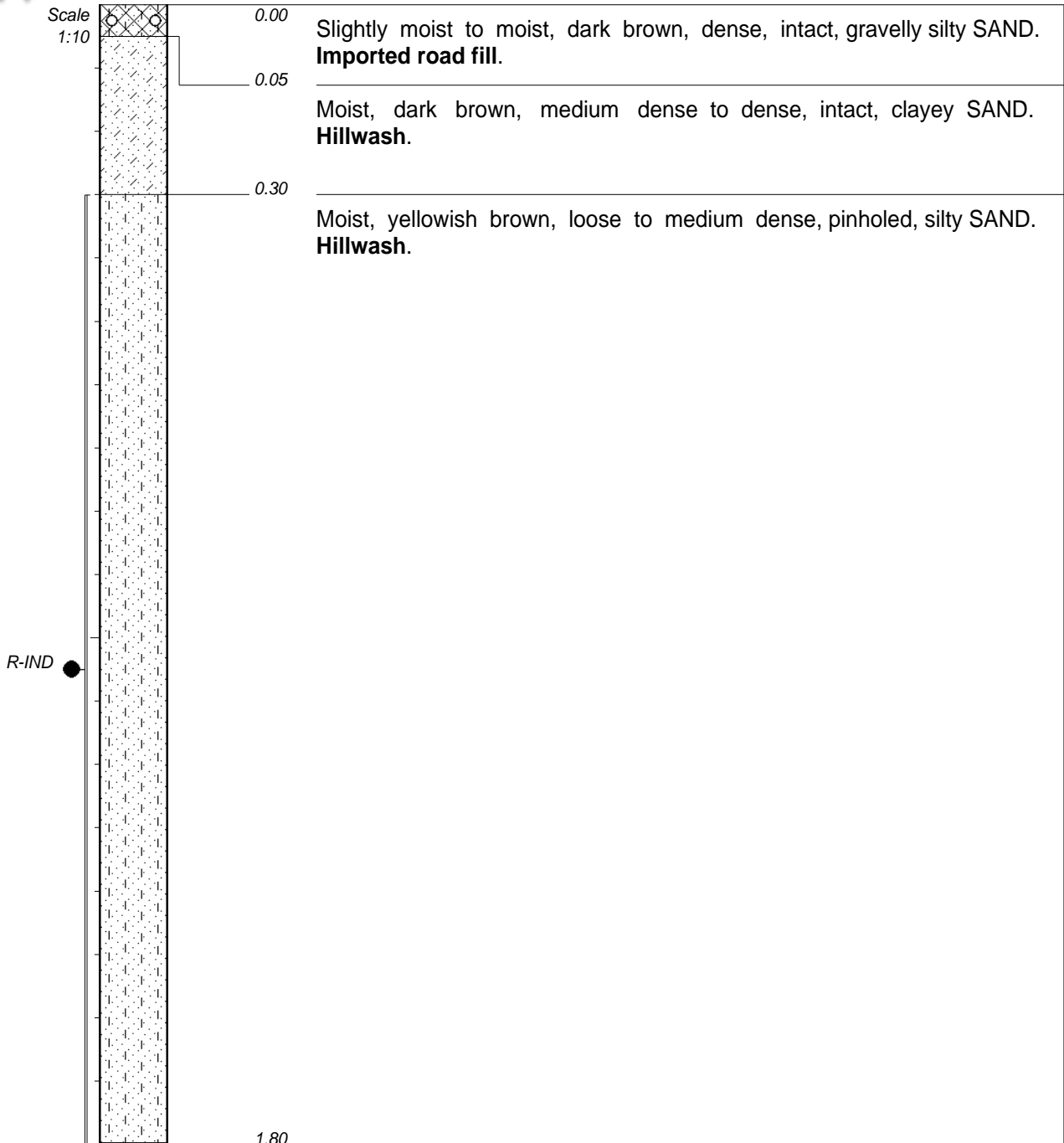
ELEVATION : 950 m
 X-COORD : 28°37'14"E
 Y-COORD : 23°52'44"S



CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya
 TYPE SET BY : Fumani Vukeya
 SETUP FILE : STANDARD.SET

INCLINATION :
 DIAM :
 DATE : 03/02/2022
 DATE : 03/02/2022
 DATE : 09/03/2022 14:05
 TEXT : ..dixASoilProfilesD192.txt

ELEVATION : 960 m
 X-COORD : 28°37'10"E
 Y-COORD : 23°52'32"S



NOTES

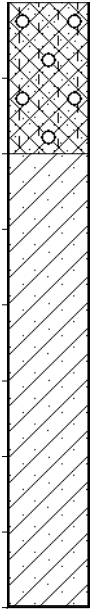
- 1) Terminated due to required depth.
- 2) No ground water seepage.
- 3) Side wall stable.
- 4) Disturbed sample at 0.3--1.8 m: R-IND.

CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya
 TYPE SET BY : Fumani Vukeya
 SETUP FILE : STANDARD.SET

INCLINATION :
 DIAM :
 DATE : 03/02/2022
 DATE : 03/02/2022
 DATE : 09/03/2022 14:05
 TEXT : ..dixASoilProfilesD192.txt

ELEVATION : 960 m
 X-COORD : 28°37'7"E
 Y-COORD : 23°52'21"S

Scale
1:10



0.00

Slightly moist, grey, dense, intact, gravelly silty SAND. **Imported road fill.**

0.20

Moist, dark brown, firm to stiff, intact, sandy CLAY. **Hillwash.**

0.80

NOTES

- 1) on dolerite boulder at 0.8m.
- 2) No ground water seepage.
- 3) Side wall stable.

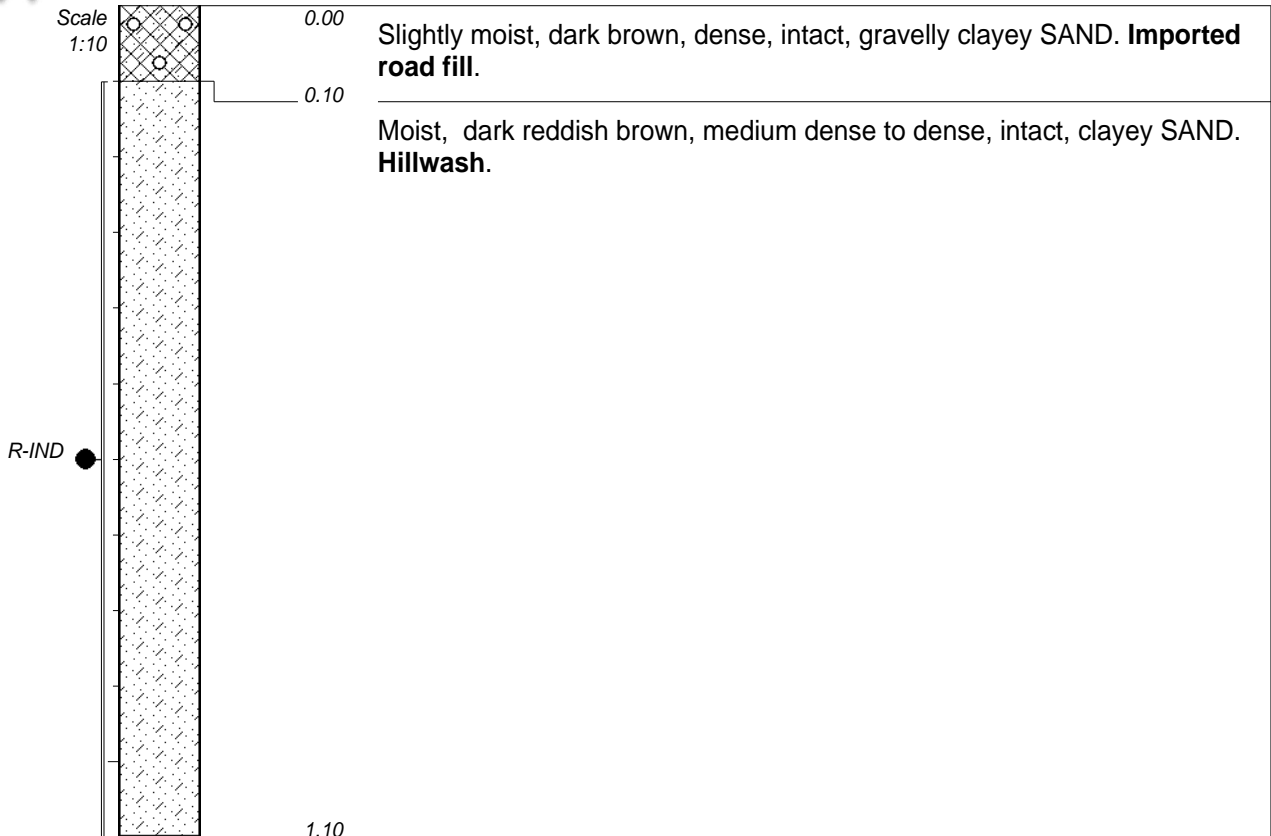
CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya

INCLINATION :
 DIAM :
 DATE : 03/02/2022
 DATE : 03/02/2022

ELEVATION : 960 m
 X-COORD : 28°37'4"E
 Y-COORD : 23°52'9"S

TYPE SET BY : Fumani Vukeya
 SETUP FILE : STANDARD.SET

DATE : 09/03/2022 14:05
 TEXT : ..dixASoilProfilesD192.txt



NOTES

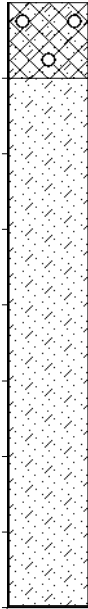
- 1) Refusal on dolerite boulder at 1.1m.
- 2) No ground water seepage.
- 3) Side wall stable.
- 4) Disturbed sample at 0.1--1.1 m: R-IND.

CONTRACTOR : MR BLUE PROJECTS
MACHINE : TLB
DRILLED BY : MR BLUE PROJECTS
PROFILED BY : Fumani Vukeya

INCLINATION :
DIAM :
DATE : 03/02/2022
DATE : 03/02/2022
DATE : 09/03/2022 14:05
TEXT : ..dixASoilProfilesD192.txt

ELEVATION : 960 m
X-COORD : 28°37'1"E
Y-COORD : 23°51'59"S

Scale
1:10



0.00

Slightly moist, dark brown, dense, intact, gravelly clayey SAND. **Imported road fill.**

0.10

Slightly moist to moist, dark reddish brown, dense to very dense, intact, clayey SAND. **Hillwash.**

0.80

NOTES

- 1) due to slow progress.
- 2) No ground water seepage.
- 3) Side wall stable.

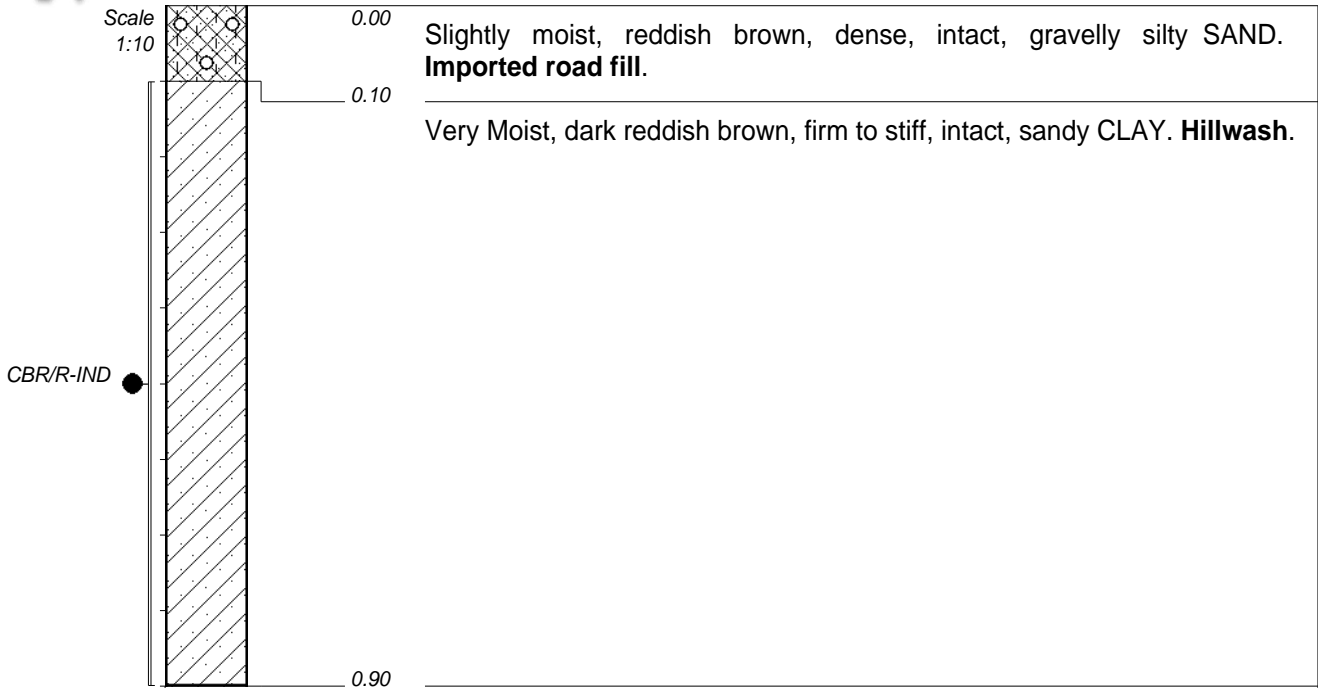
CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya

INCLINATION :
 DIAM :
 DATE : 03/02/2022
 DATE : 03/02/2022

ELEVATION : 950 m
 X-COORD : 28°37'14"E
 Y-COORD : 23°52'44"S

TYPE SET BY : Fumani Vukeya
 SETUP FILE : STANDARD.SET

DATE : 09/03/2022 14:05
 TEXT : ..dixASoilProfilesD192.txt



NOTES

- 1) due to slow progress.
- 2) No ground water seepage.
- 3) Side wall stable.
- 4) Disturbed sample at 0.1--0.9 m: CBR/R-IND.

CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya
 TYPE SET BY : Fumani Vukeya
 SETUP FILE : STANDARD.SET

INCLINATION :
 DIAM :
 DATE : 03/02/2022
 DATE : 03/02/2022
 DATE : 09/03/2022 14:05
 TEXT : ..dixASoilProfilesD192.txt

ELEVATION : 950 m
 X-COORD : 28°36'54"E
 Y-COORD : 23°51'36"S

Scale
1:10



0.00

Medium to coarse, sub-rounded, closely packed, GRAVEL of ferricrete in a matrix of slightly moist, brown, silty sand. Overall consistency is loose very dense, silty SAND. **Pedogenic**

0.10

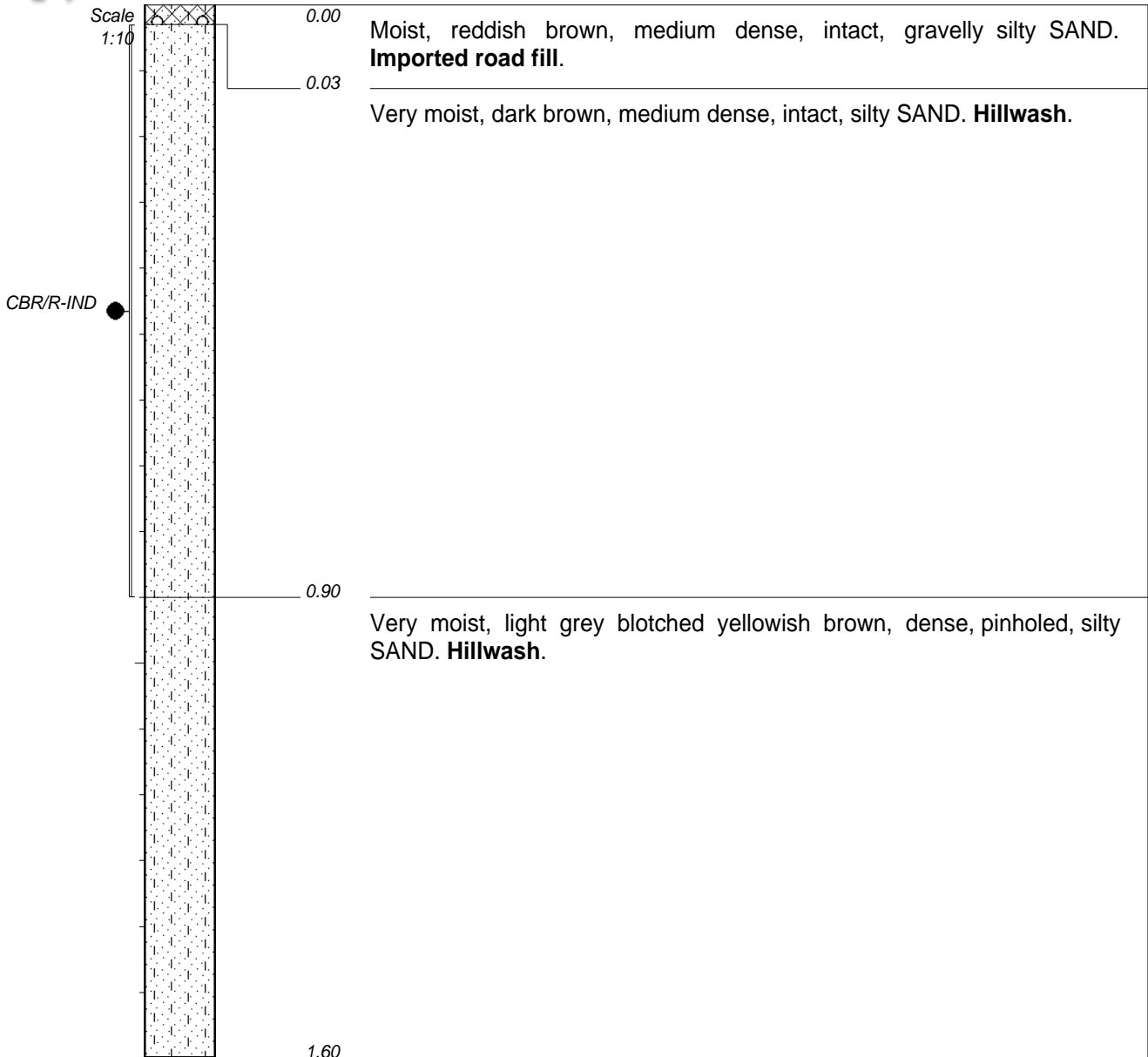
NOTES

- 1) on ferricrete pan at 0.1m.
- 2) No ground water seepage.
- 3) Side wall stable.

CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya

INCLINATION :
 DIAM :
 DATE : 03/02/2022
 DATE : 03/02/2022
 DATE : 09/03/2022 14:05
 TEXT : ..dixASoilProfilesD192.txt

ELEVATION : 940 m
 X-COORD : 28°36'50"E
 Y-COORD : 23°51'19"S



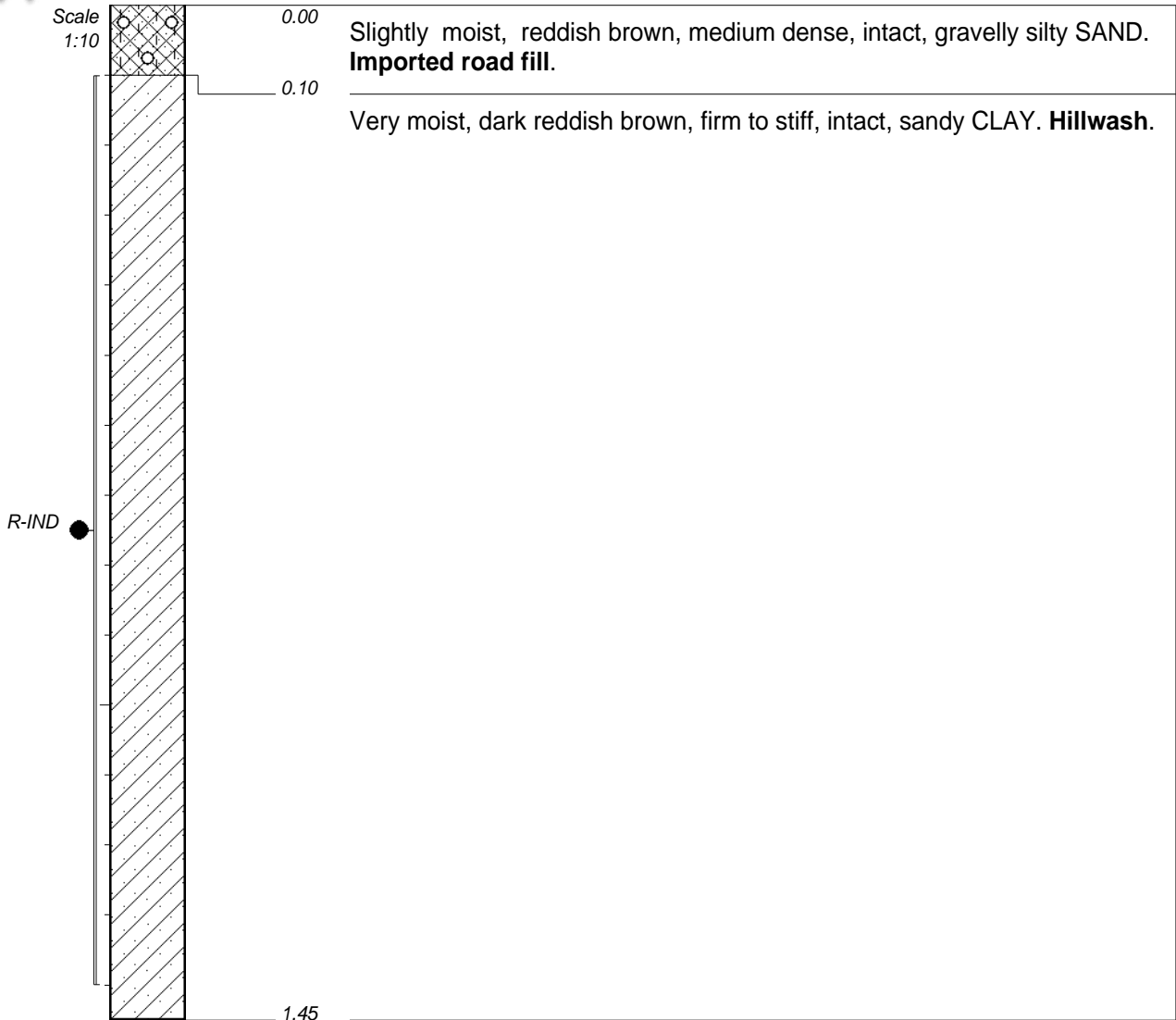
NOTES

- 1) Terminated due to required depth.
- 2) No ground water seepage.
- 3) Side wall stable.
- 4) Disturbed sample at 0.03--0.9 m: CBR/R-IND.

CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya
 TYPE SET BY : Fumani Vukeya
 SETUP FILE : STANDARD.SET

INCLINATION :
 DIAM :
 DATE : 03/02/2022
 DATE : 03/02/2022
 DATE : 09/03/2022 14:05
 TEXT : ..dixASoilProfilesD192.txt

ELEVATION : 940 m
 X-COORD : 28°36'48"E
 Y-COORD : 23°51'35"S



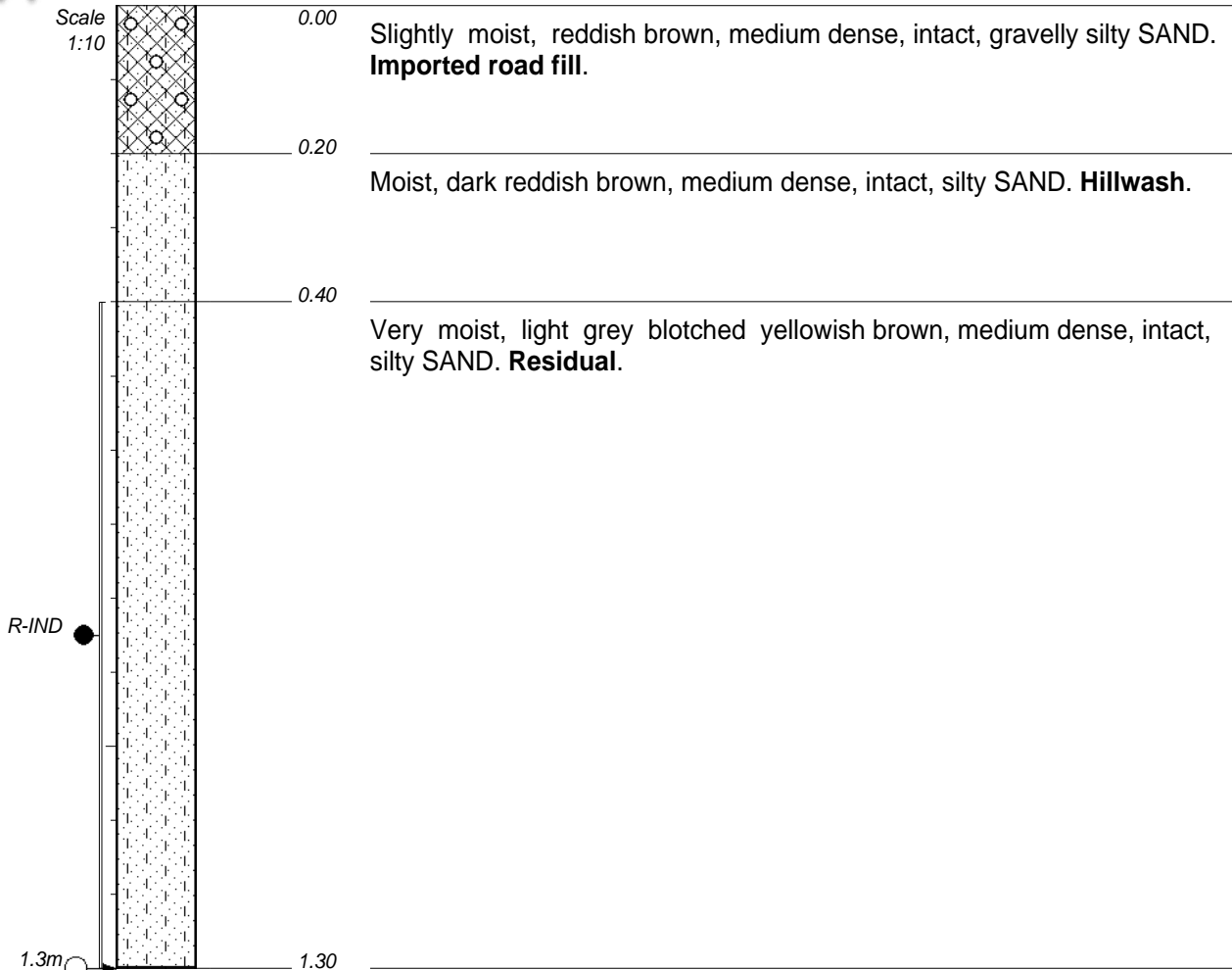
NOTES

- 1) Terminated due to required depth.
- 2) No ground water seepage.
- 3) Side wall stable.
- 4) Disturbed sample at 0.1--1.4 m: R-IND.

CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya
 TYPE SET BY : Fumani Vukeya
 SETUP FILE : STANDARD.SET

INCLINATION :
 DIAM :
 DATE : 03/02/2022
 DATE : 03/02/2022
 DATE : 09/03/2022 14:05
 TEXT : ..dixASoilProfilesD192.txt

ELEVATION : 930 m
 X-COORD : 28°36'39"E
 Y-COORD : 23°50'46"S



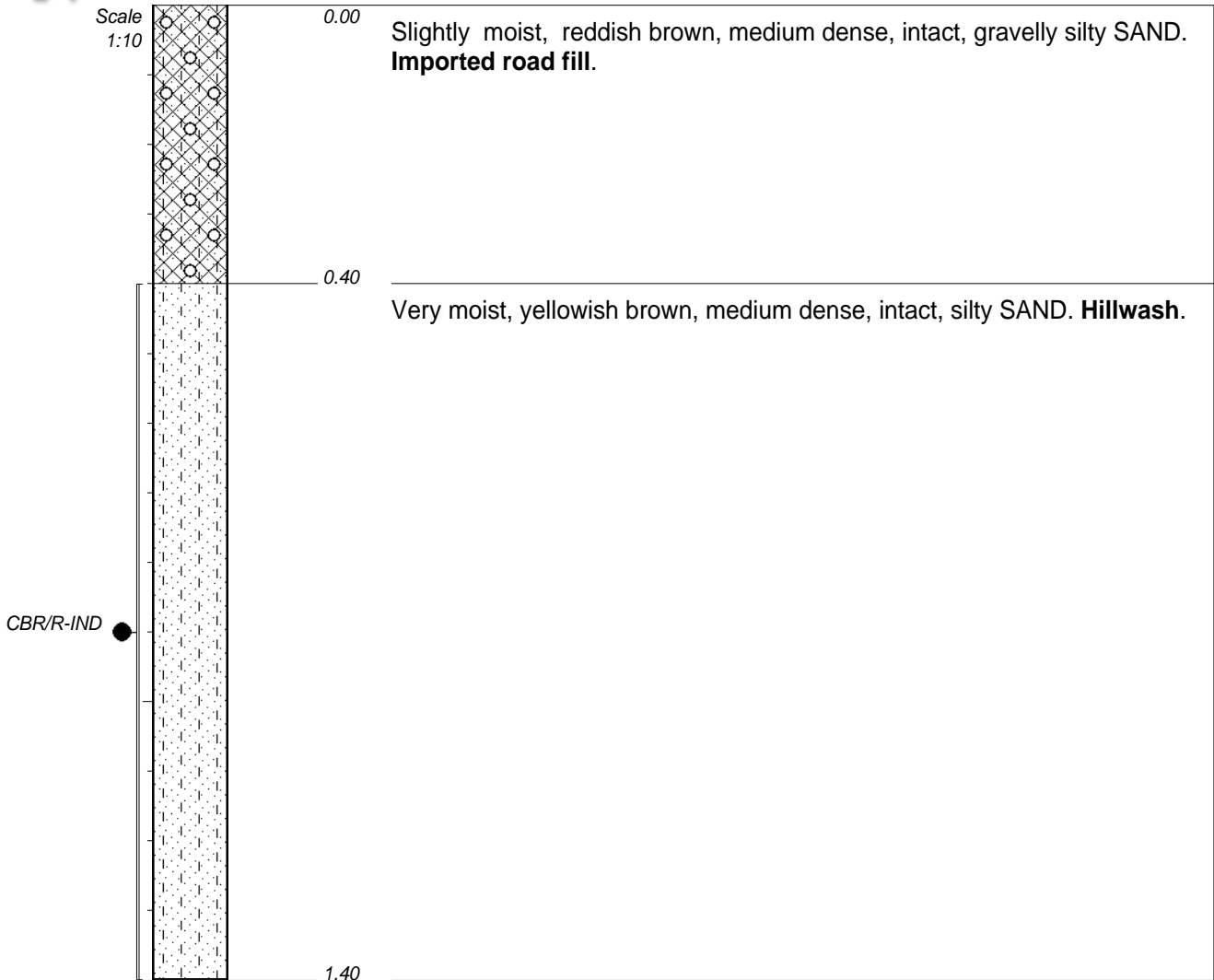
NOTES

- 1) Slow water seepage at 1.3m.
- 2) Terminated due to required depth.
- 3) Disturbed sample at 0.4--1.3 m: R-IND.

CONTRACTOR : MR BLUE PROJECTS
MACHINE : TLB
DRILLED BY : MR BLUE PROJECTS
PROFILED BY : Fumani Vukeya
TYPE SET BY : Fumani Vukeya
SETUP FILE : STANDARD.SET

INCLINATION :
DIAM :
DATE : 03/02/2022
DATE : 03/02/2022
DATE : 09/03/2022 14:05
TEXT : ..dixASoilProfilesD192.txt

ELEVATION : 930 m
X-COORD : 28°36'29"E
Y-COORD : 23°50'25"S



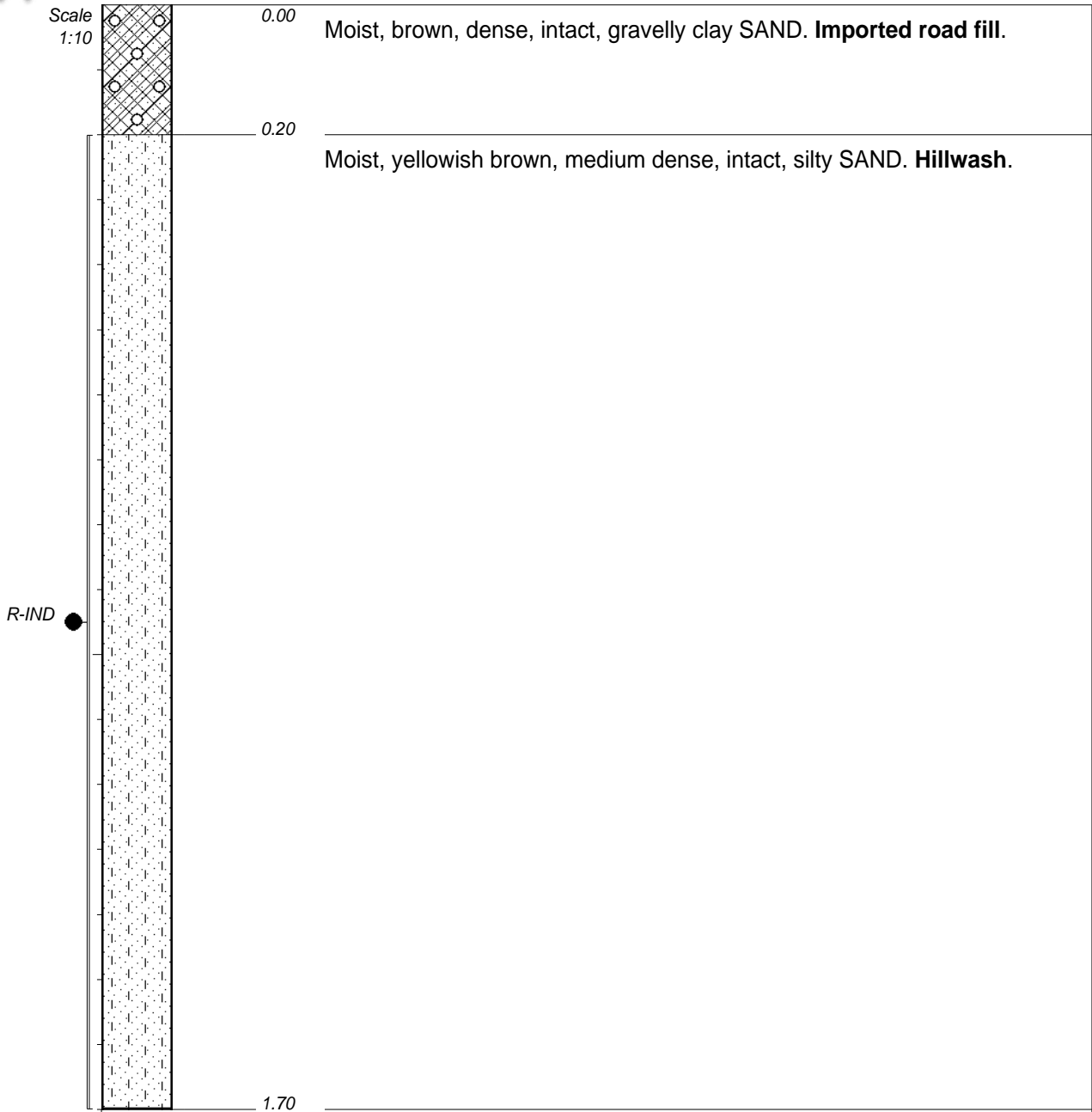
NOTES

- 1) Terminated due to required depth.
- 2) No ground water seepage.
- 3) Side wall stable.
- 4) Disturbed sample at 0.4--1.4 m: CBR/R-IND.

CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya
 TYPE SET BY : Fumani Vukeya
 SETUP FILE : STANDARD.SET

INCLINATION :
 DIAM :
 DATE : 03/02/2022
 DATE : 03/02/2022
 DATE : 09/03/2022 14:05
 TEXT : ..dixASoilProfilesD192.txt

ELEVATION : 940 m
 X-COORD : 28°36'2"E
 Y-COORD : 23°50'11"S



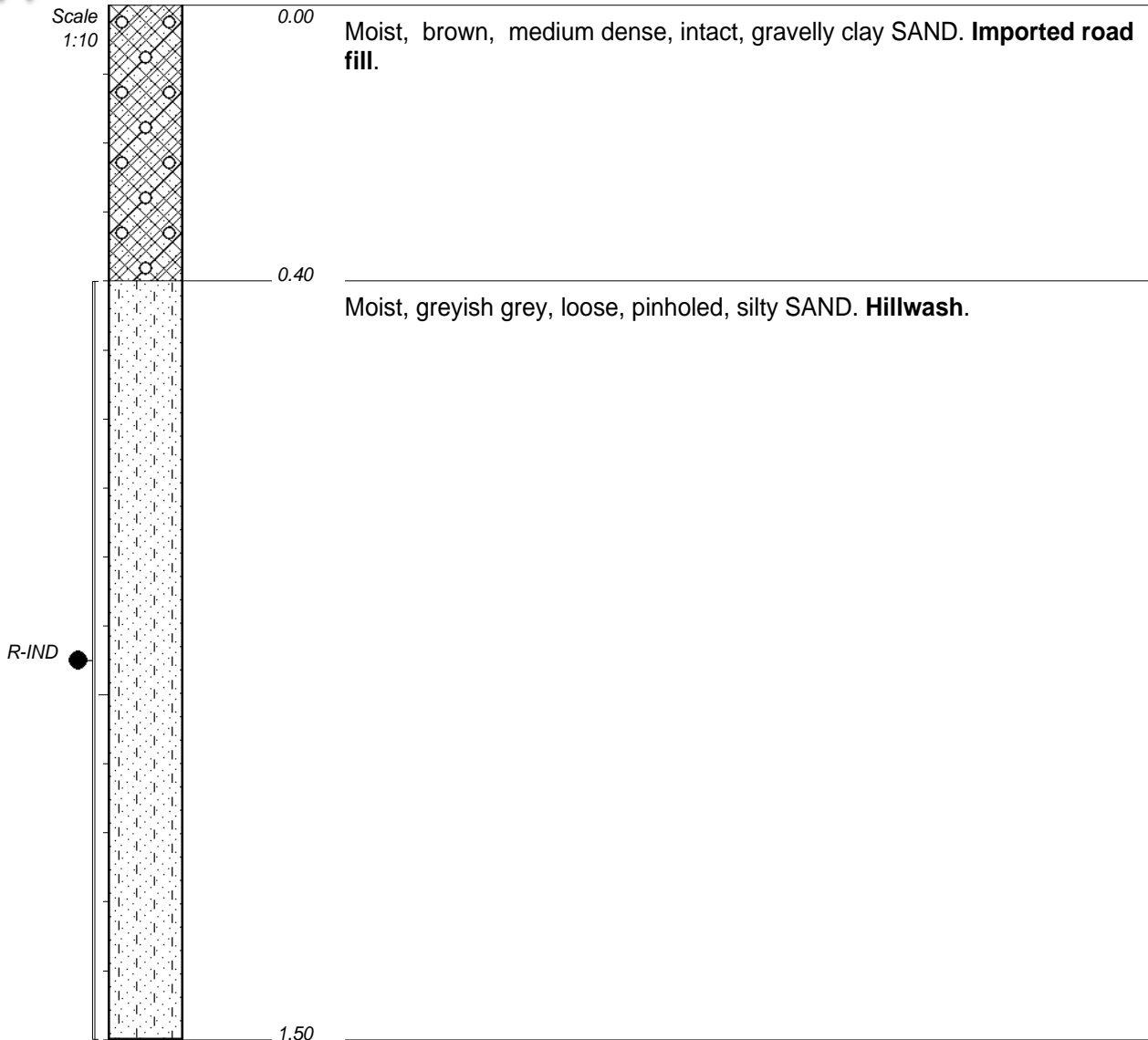
NOTES

- 1) Terminated due to required depth.
- 2) No ground water seepage.
- 3) Side wall stable.
- 4) Disturbed sample at 0.2--1.7 m: R-IND.

CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya
 TYPE SET BY : Fumani Vukeya
 SETUP FILE : STANDARD.SET

INCLINATION :
 DIAM :
 DATE : 03/02/2022
 DATE : 03/02/2022
 DATE : 09/03/2022 14:05
 TEXT : ..dixASoilProfilesD192.txt

ELEVATION : 940 m
 X-COORD : 28°36'31"E
 Y-COORD : 23°49'57"S



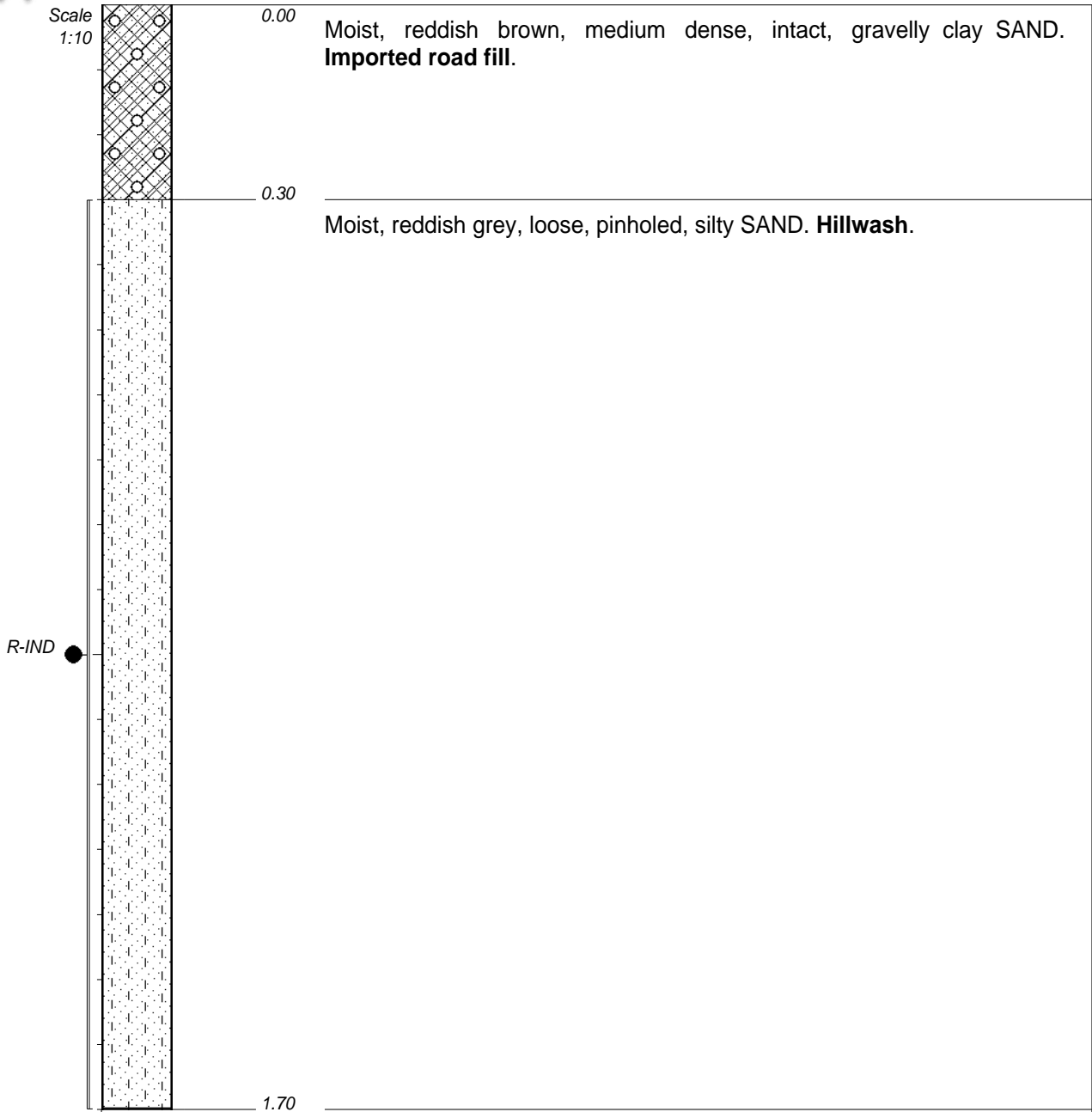
NOTES

- 1) Terminated due to required depth.
- 2) No ground water seepage.
- 3) Side wall stable.
- 4) Disturbed sample at 0.4--1.5 m: R-IND.

CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya

INCLINATION :
 DIAM :
 DATE : 03/02/2022
 DATE : 03/02/2022
 DATE : 09/03/2022 14:05
 TEXT : ..dixASoilProfilesD192.txt

ELEVATION : 940 m
 X-COORD : 28°36'35"E
 Y-COORD : 23°49'46"S



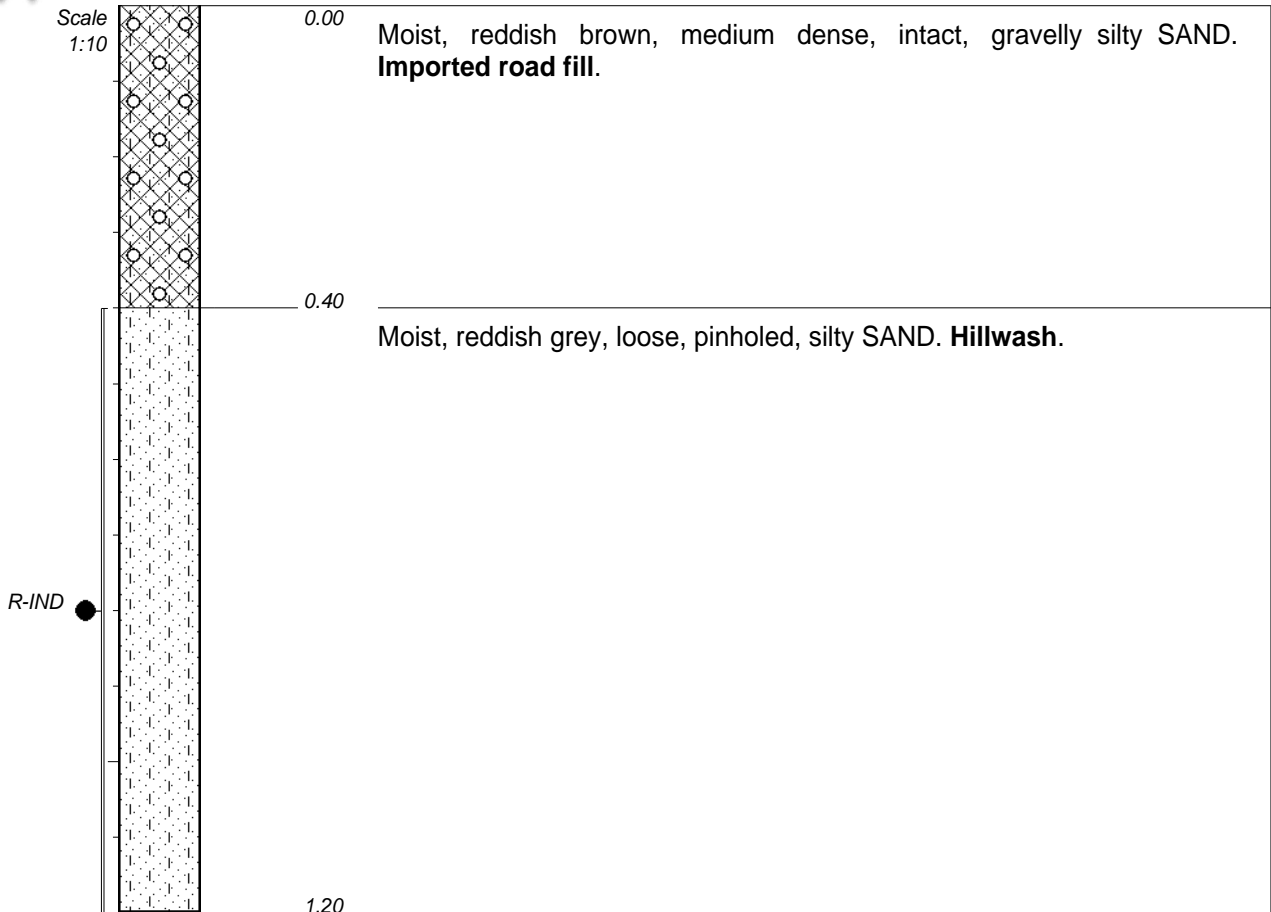
NOTES

- 1) Test pit collapsed.
- 2) Terminated due to required depth.
- 3) No ground water seepage.
- 4) Disturbed sample at 0.3--1.7 m: R-IND.

CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya

INCLINATION :
 DIAM :
 DATE : 03/02/2022
 DATE : 03/02/2022
 DATE : 09/03/2022 14:05
 TEXT : ..dixASoilProfilesD192.txt

ELEVATION : 930 m
 X-COORD : 28°36'41"E
 Y-COORD : 23°49'30"S



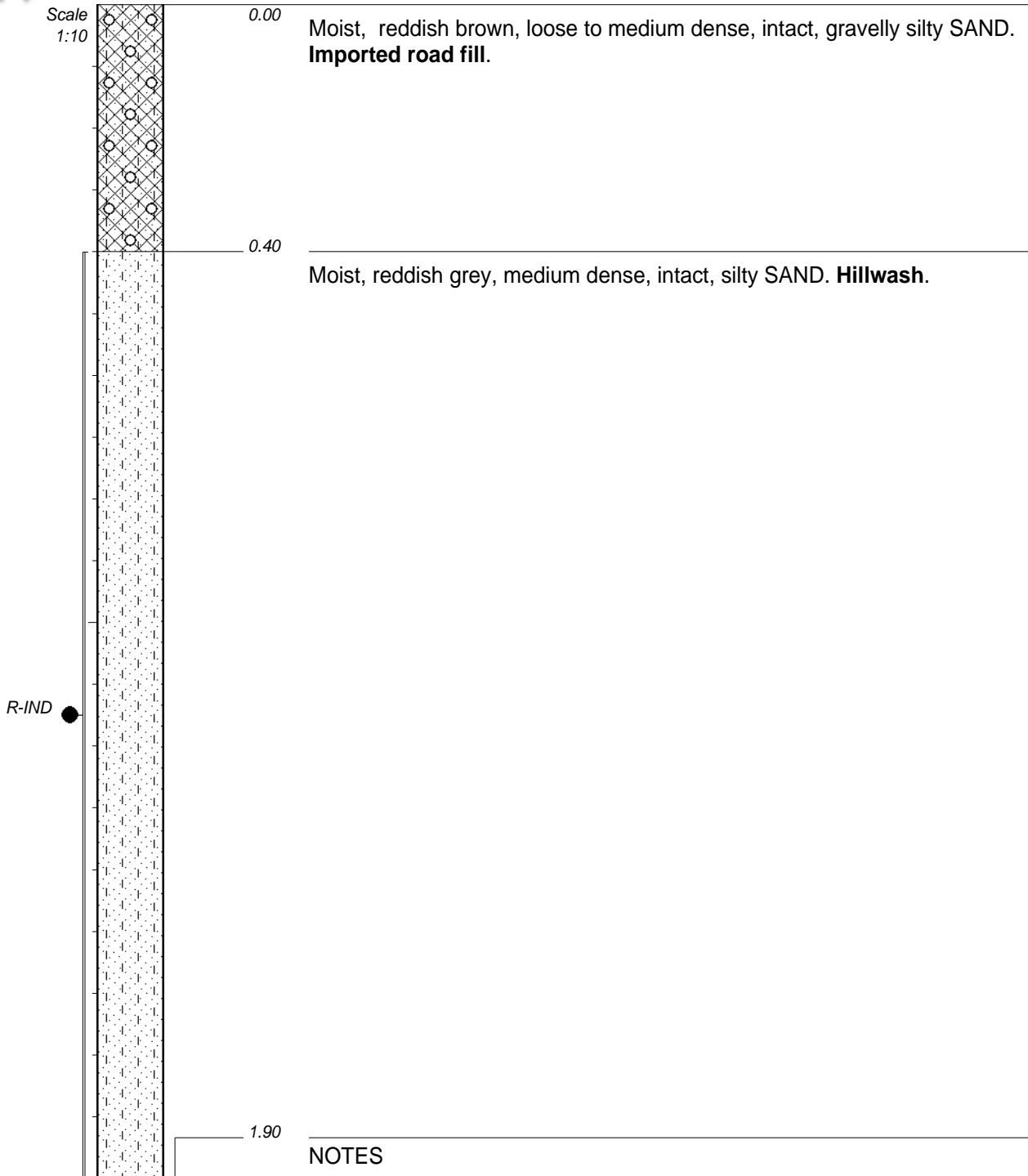
NOTES

- 1) Terminated due to required depth.
- 2) No ground water seepage.
- 3) Side wall stable.
- 4) Disturbed sample at 0.4--1.2 m: R-IND.

CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya
 TYPE SET BY : Fumani Vukeya
 SETUP FILE : STANDARD.SET

INCLINATION :
 DIAM :
 DATE : 03/02/2022
 DATE : 03/02/2022
 DATE : 09/03/2022 14:05
 TEXT : ..dixASoilProfilesD192.txt

ELEVATION : 940 m
 X-COORD : 28°36'47"E
 Y-COORD : 23°49'13"S














NOTES

- 1) Terminated due to required depth.
- 2) No ground water seepage.
- 3) Side wall stable.
- 4) Disturbed sample at 0.4--1.9 m: R-IND.

CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya
 TYPE SET BY : Fumani Vukeya
 SETUP FILE : STANDARD.SET

INCLINATION :
 DIAM :
 DATE : 03/02/2022
 DATE : 03/02/2022
 DATE : 09/03/2022 14:05
 TEXT : ..dixASoilProfilesD192.txt

ELEVATION : 940 m
 X-COORD : 28°36'53"E
 Y-COORD : 23°48'56"S

	BOULDERS	{SA01}
	GRAVEL	{SA02}
	GRAVELLY	{SA03}
	SAND	{SA04}
	SANDY	{SA05}
	SILTY	{SA07}
	CLAY	{SA08}
	CLAYEY	{SA09}
	SANDSTONE	{SA11}
	FERRICRETE	{SA24}
	FILL	{SA32}
Name ●	DISTURBED SAMPLE	{SA38}
12.5 ○ →	WATER SEEPAGE/water strike	{CH50}

 CONTRACTOR :
 MACHINE :
 DRILLED BY :
 PROFILED BY :

 INCLINATION :
 DIAM :
 DATE :
 DATE :

 ELEVATION :
 X-COORD :
 Y-COORD :

 TYPE SET BY : Fumani Vukeya
 SETUP FILE : STANDARD.SET

 DATE : 09/03/2022 14:05
 TEXT : ..dixASoilProfilesD192.txt

LEGEND
 SUMMARY OF SYMBOLS

APPENDIX B: SOIL PROFILES
(BORROW PIT)

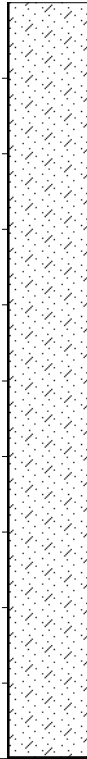


MORULA CONSULTING ENGINEERS
GEOTECHNICAL INVESTIGATION:
BORROW PITS-D192 ROAD

HOLE No: BTP1
Sheet 1 of 1

JOB NUMBER: MAK0830203

Scale
1:10



0.00

Slightly moist to moist, dark brown, dense, shattered, clayey SAND.
Hillwash.

1.00

NOTES

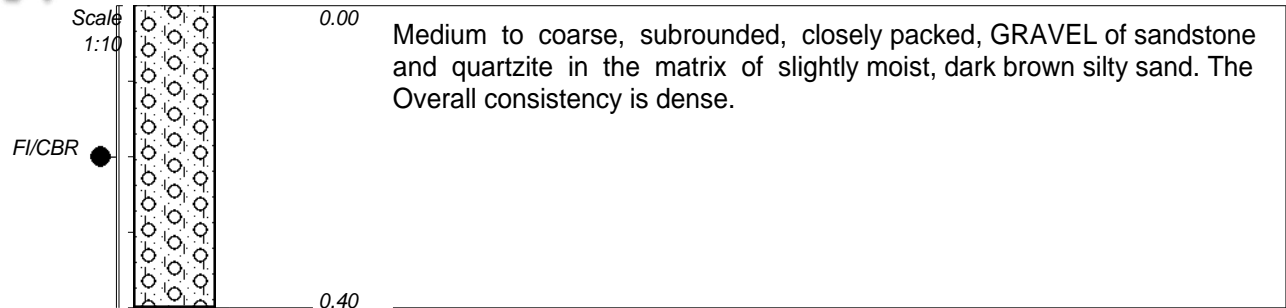
- 1) The pit is located around Jakkalskuil Village.

CONTRACTOR : MR BLUE PROJECTS
MACHINE : TLB
DRILLED BY : MR BLUE PROJECTS
PROFILED BY : Fumani Vukeya
TYPE SET BY : Fumani Vukeya
SETUP FILE : STANDARD.SET

INCLINATION :
DIAM :
DATE : 09/02/2022
DATE : 15/02/2022
DATE : 09/03/2022 14:06
TEXT : ..ilProfilesBorrowpits.txt

ELEVATION : 940m
X-COORD : 28°36'27"E
Y-COORD : 23°50'41"S

HOLE No: BTP1



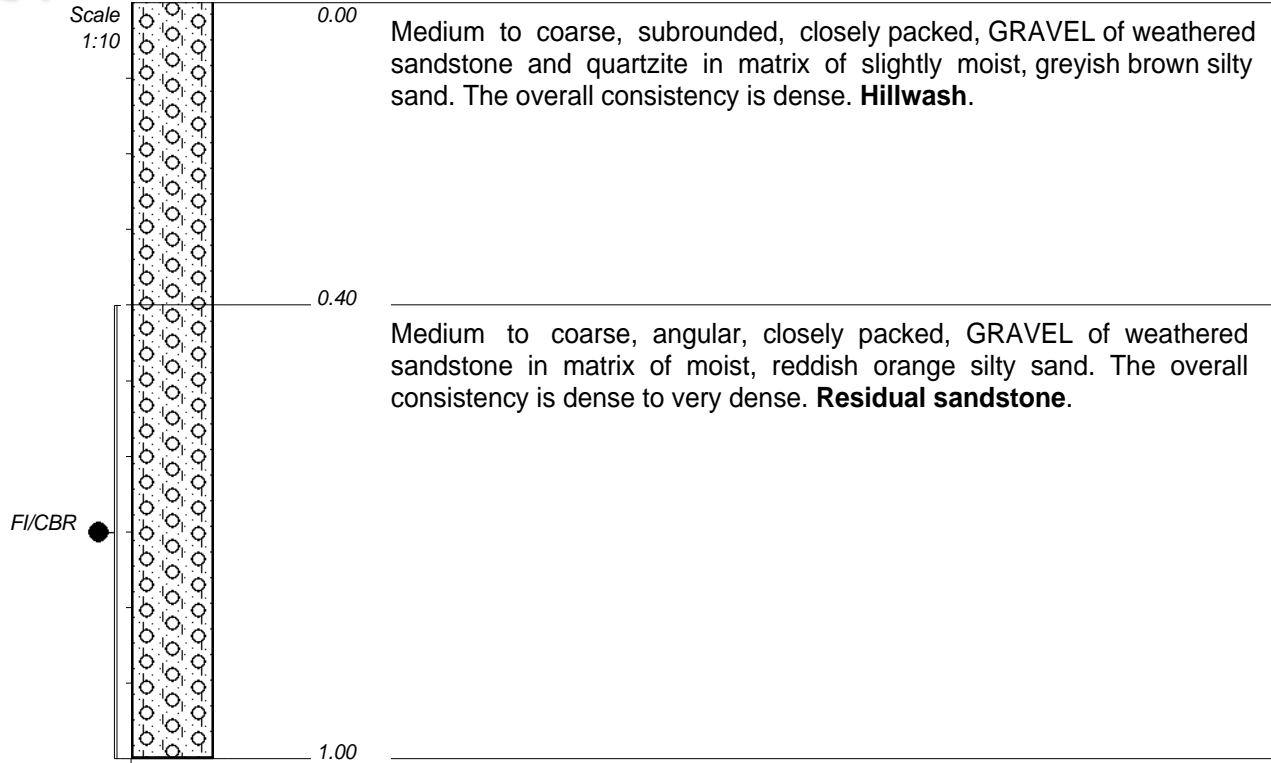
NOTES

- 1) Refusal at 0.4m on a weathered sandstone.
- 2) The borrow pit located at Jakkalskuil Village.
- 3) Disturbed sample taken for FI/CBR at 0.0--0.40m.

CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya

INCLINATION :
 DIAM :
 DATE : 09/02/2022
 DATE : 15/02/2022
 DATE : 09/03/2022 14:06
 TEXT : ..ilProfilesBorrowpits.txt

ELEVATION : 940 m
 X-COORD : 28°36'26"E
 Y-COORD : 23°50'41"S



NOTES

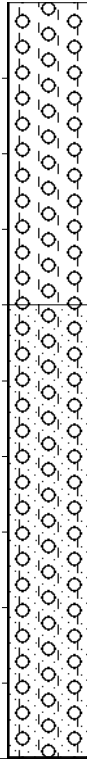
- 1) Refusal at 1.0 m of weathered silty sandstone.
- 2) The borrow pit located at Jakkalskuil Village.
- 3) Disturbed sample taken for FI/CBR at 0.4--1.0m.

CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya
 TYPE SET BY : Fumani Vukeya
 SETUP FILE : STANDARD.SET

INCLINATION :
 DIAM :
 DATE : 09/02/2022
 DATE : 15/02/2022
 DATE : 09/03/2022 14:06
 TEXT : ..ilProfilesBorrowpits.txt

ELEVATION : 940 m
 X-COORD : 28°36'27"E
 Y-COORD : 23°50'44"S

Scale
1:10



0.00

Medium to coarse, subrounded, closely packed, GRAVEL of weathered sandstone and quartzite in matrix of slightly moist, greyish brown silty sand. The overall consistency is dense. **Hillwash.**

0.40

Medium to coarse, angular, closely packed, GRAVEL of weathered sandstone in matrix of moist, reddish orange silty sand. The overall consistency is dense to very dense. **Residual sandstone.**

1.00

NOTES

- 1) Refusal at 1.0 m of weathered silty sandstone.
- 2) No ground water seepage.
- 3) The borrow pit located at Jakkalskuil Village.

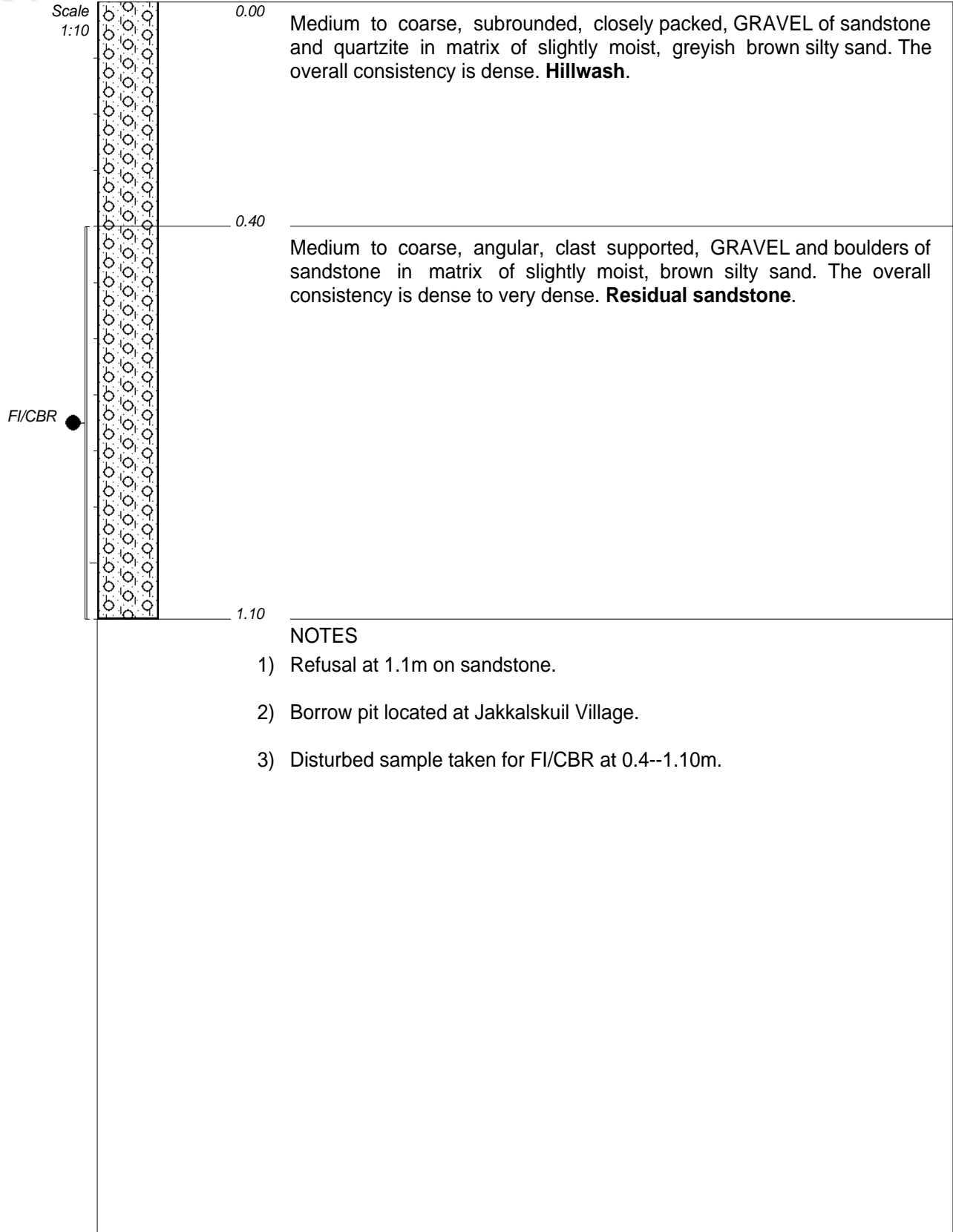
CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya

INCLINATION :
 DIAM :
 DATE : 09/02/2022
 DATE : 15/02/2022

ELEVATION : 940 m
 X-COORD : 28°36'29"E
 Y-COORD : 23°50'48"S

TYPE SET BY : Fumani Vukeya
 SETUP FILE : STANDARD.SET

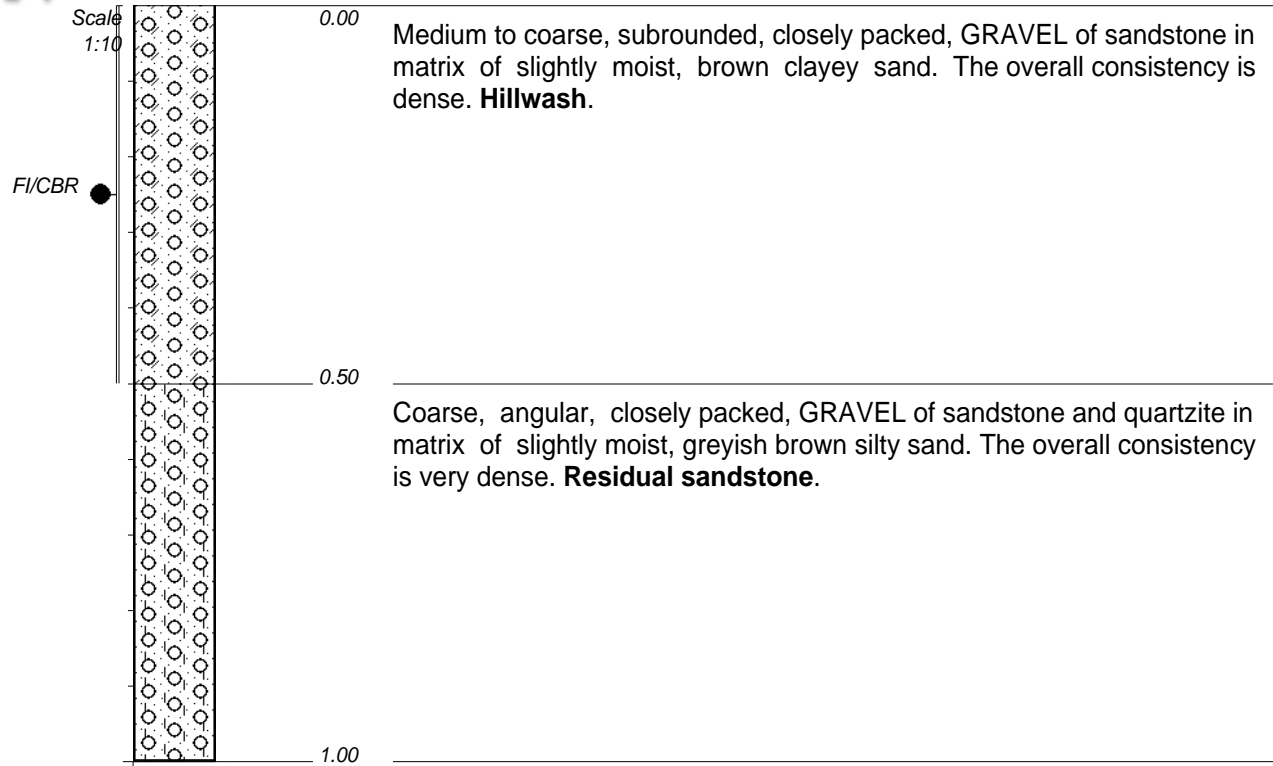
DATE : 09/03/2022 14:06
 TEXT : ..ilProfilesBorrowpits.txt



CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya
 TYPE SET BY : Fumani Vukeya
 SETUP FILE : STANDARD.SET

INCLINATION :
 DIAM :
 DATE : 09/02/2022
 DATE : 15/02/2022
 DATE : 09/03/2022 14:06
 TEXT : ..ilProfilesBorrowpits.txt

ELEVATION : 940 m
 X-COORD : 28°36'26"E
 Y-COORD : 23°50'48"S



NOTES

- 1) No ground water seepage.
- 2) Borrow pit located at Jakkalskuil Village.
- 3) Disturbed sample taken for FI/CBR at 0.0--0.50m.

CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya

INCLINATION :
 DIAM :
 DATE : 09/02/2022
 DATE : 15/02/2022
 DATE : 09/03/2022 14:06
 TEXT : ..ilProfilesBorrowpits.txt

ELEVATION : 940 m
 X-COORD : 28°36'43"E
 Y-COORD : 23°50'46"S

Scale
1:10



0.00

Medium to coarse, subrounded, closely packed, GRAVEL of silty sandstone and quartzite in matrix of slightly moist, greyish brown silty sand. The overall consistency is dense. **Hillwash.**

0.30

Medium to coarse, subrounded, closely packed, GRAVEL and boulders of silty sandstone in matrix of slightly moist, greyish brown silty sand. The overall consistency is dense. **Residual sandstone.**

0.90

NOTES

- 1) Refusal at 0.9m on weathered silty sandstone.
- 2) Borrow pit located at Jakkalskuil Village.

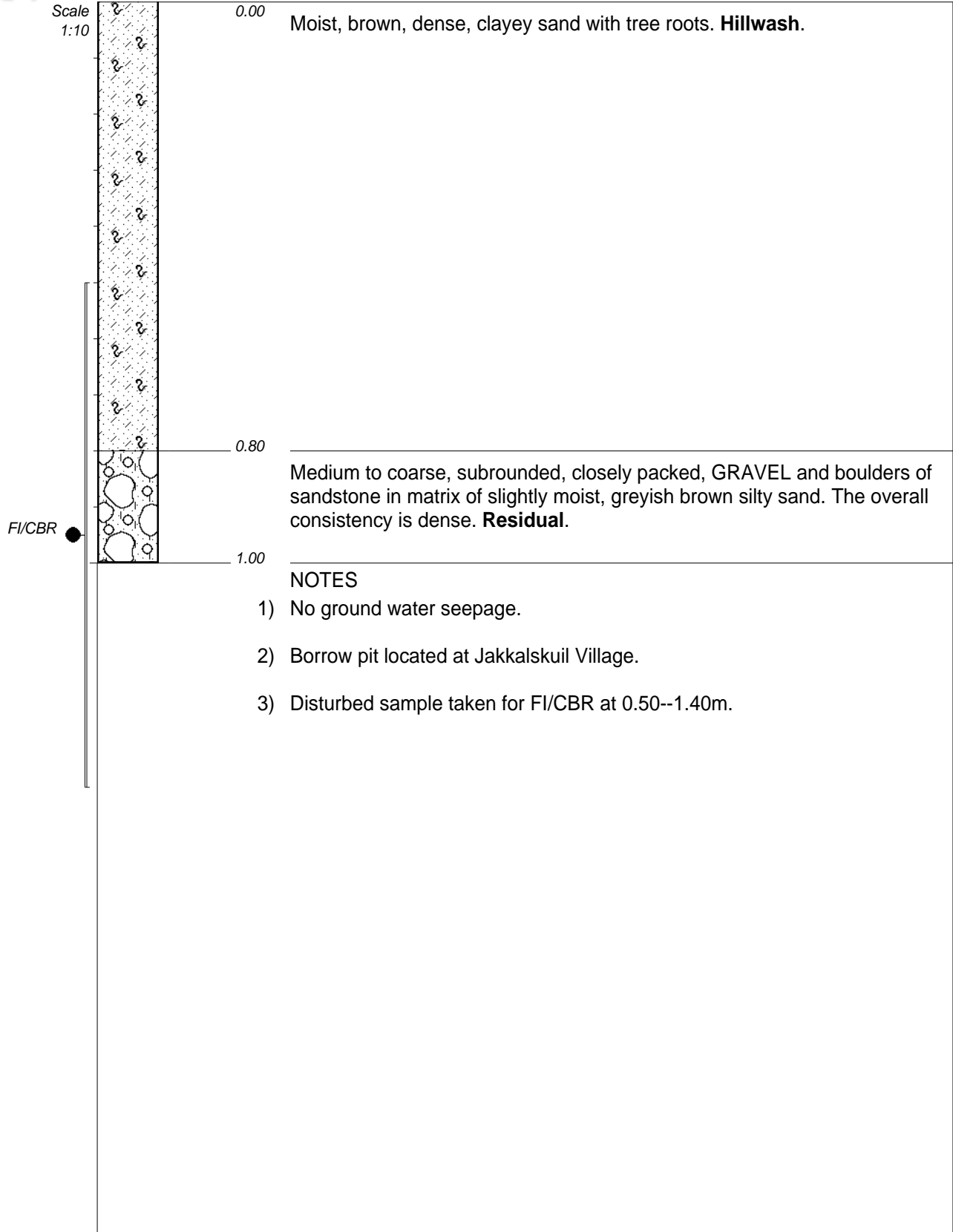
CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya

TYPE SET BY : Fumani Vukeya
 SETUP FILE : STANDARD.SET

INCLINATION :
 DIAM :
 DATE : 09/02/2022
 DATE : 15/02/2022

DATE : 09/03/2022 14:06
 TEXT : ..ilProfilesBorrowpits.txt

ELEVATION : 940 m
 X-COORD : 28°36'28"E
 Y-COORD : 23°50'45"S

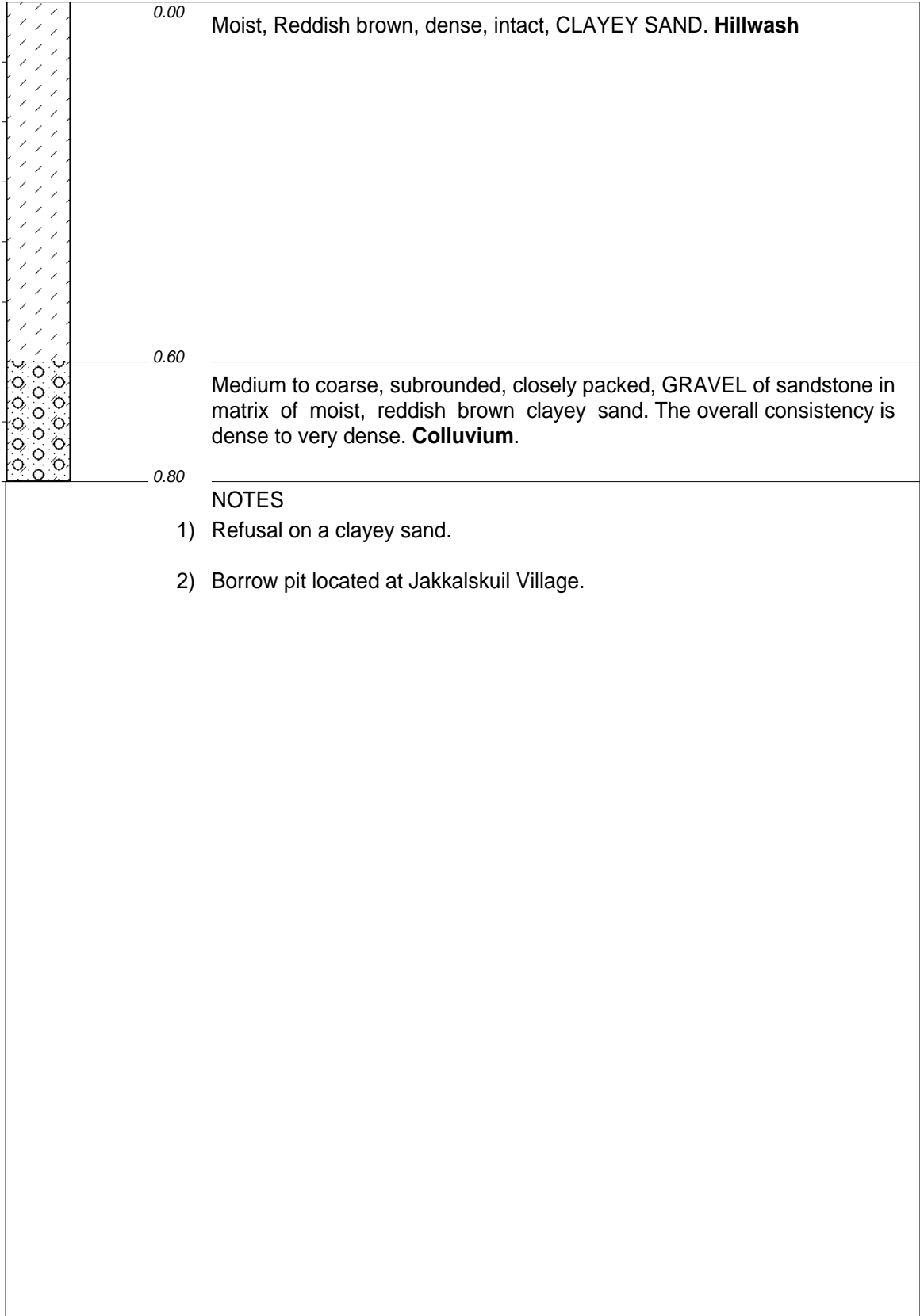


CONTRACTOR : MR BLUE PROJECTS
MACHINE : TLB
DRILLED BY : MR BLUE PROJECTS
PROFILED BY : Fumani Vukeya
TYPE SET BY : Fumani Vukeya
SETUP FILE : STANDARD.SET

INCLINATION :
DIAM :
DATE : 09/02/2022
DATE : 15/02/2022
DATE : 09/03/2022 14:06
TEXT : ..ilProfilesBorrowpits.txt

ELEVATION : 940 m
X-COORD : 28°36'23"E
Y-COORD : 23°50'44"S

Scale
1:10

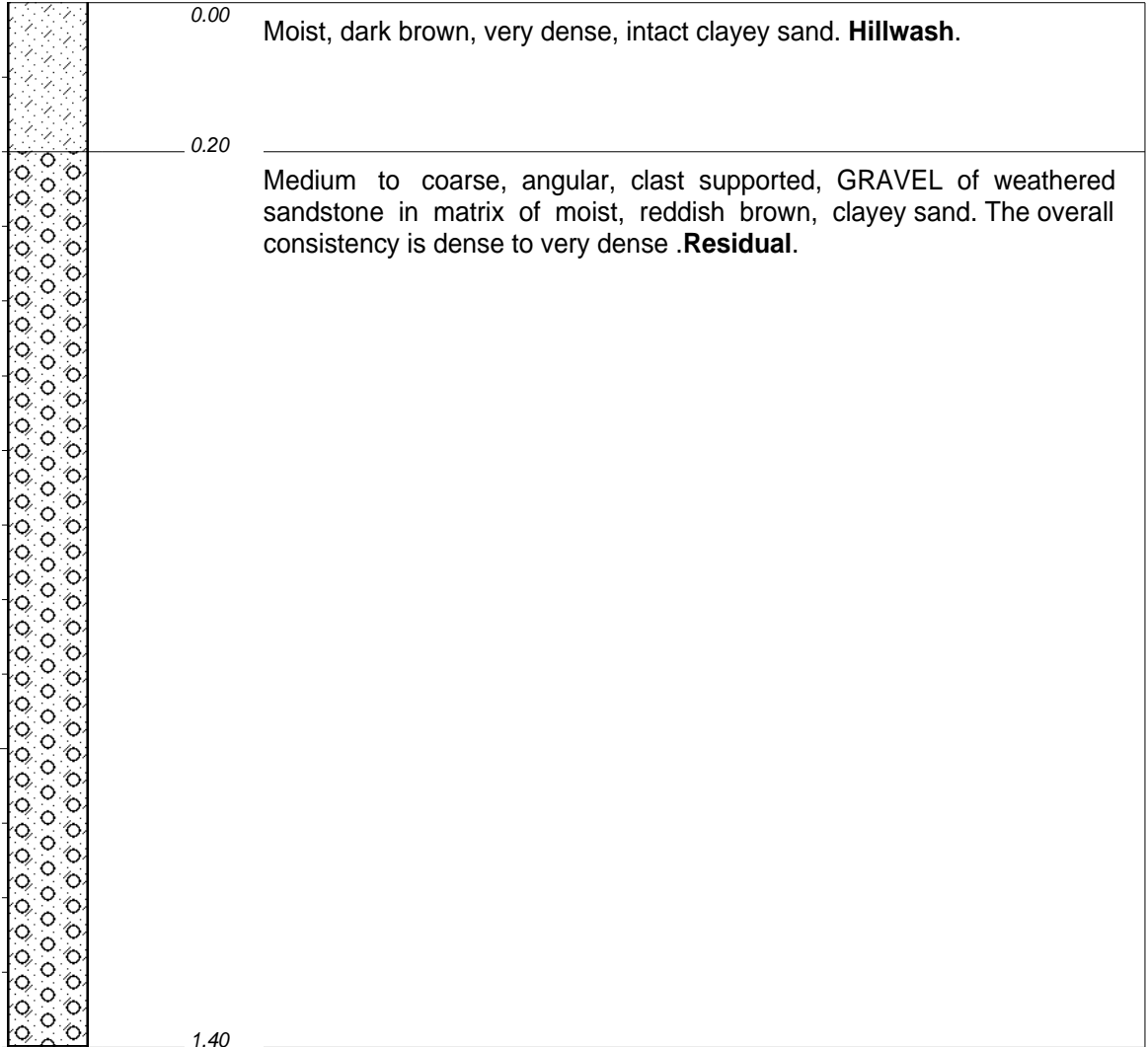


CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya
 TYPE SET BY : Fumani Vukeya
 SETUP FILE : STANDARD.SET

INCLINATION :
 DIAM :
 DATE : 09/02/2022
 DATE : 15/02/2022
 DATE : 09/03/2022 14:06
 TEXT : ..ilProfilesBorrowpits.txt

ELEVATION : 950 m
 X-COORD : 28°36'7"E
 Y-COORD : 23°50'42"S

Scale
1:10



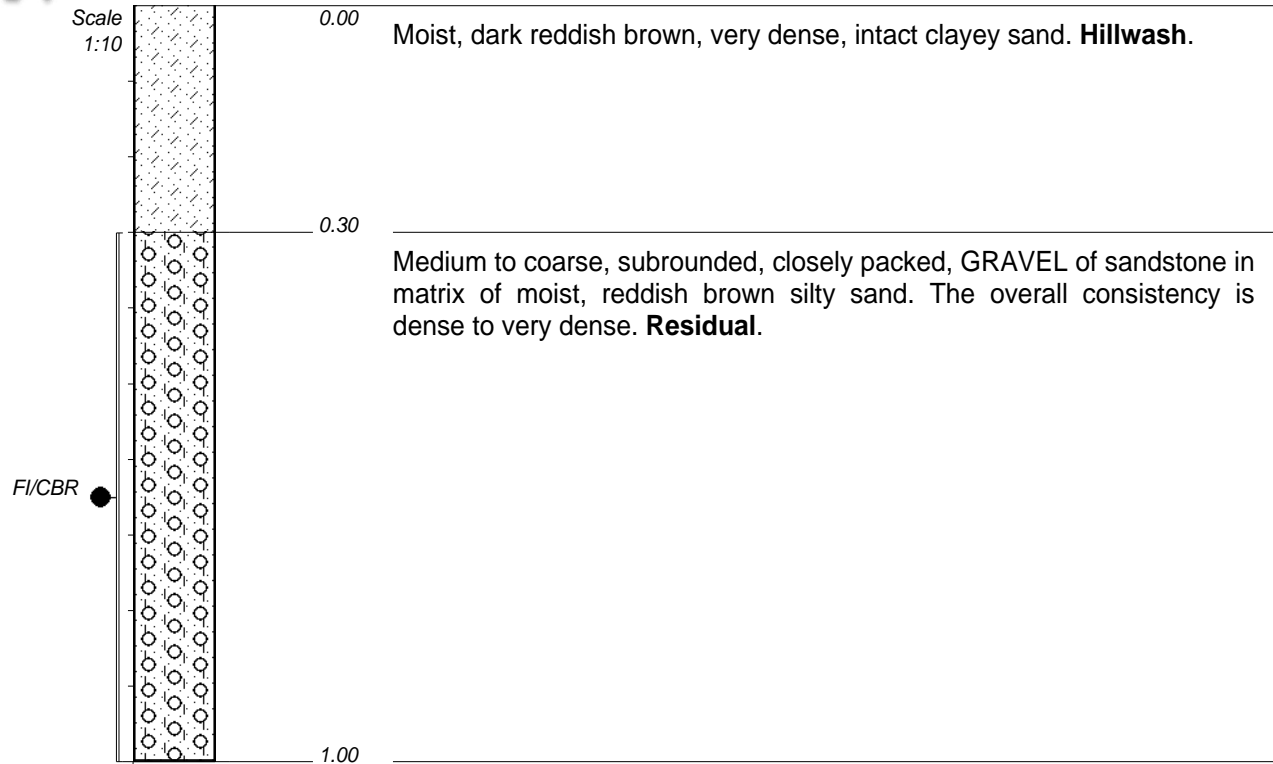
NOTES

- 1) No ground water seepage.
- 2) Borrow pit located at Jakkalskuil Village.

CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya

INCLINATION :
 DIAM :
 DATE : 09/02/2022
 DATE : 15/02/2022
 DATE : 09/03/2022 14:06
 TEXT : ..ilProfilesBorrowpits.txt

ELEVATION : 950 m
 X-COORD : 28°36'6"E
 Y-COORD : 23°50'40"S



NOTES

- 1) No ground water seepage.
- 2) Borrow pit located at Jakkalskuil Village.
- 3) Disturbed sample taken for FI/CBR at 0.3--1.0m.

CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya

INCLINATION :
 DIAM :
 DATE : 09/02/2022
 DATE : 15/02/2022
 DATE : 09/03/2022 14:06
 TEXT : ..ilProfilesBorrowpits.txt

ELEVATION : 950 m
 X-COORD : 28°36'5"E
 Y-COORD : 23°50'41"S

HOLE No: BTP11

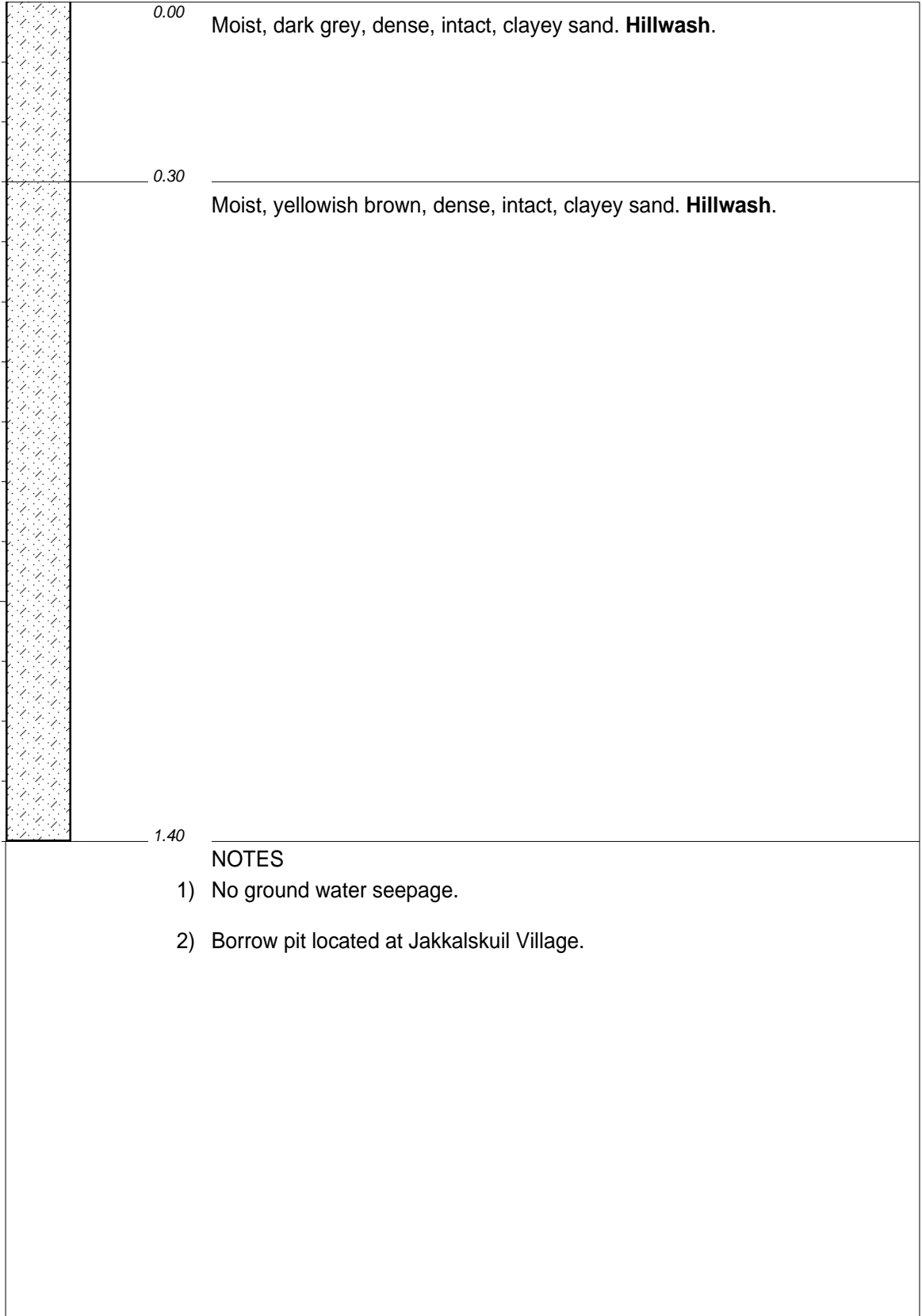


MORULA CONSULTING ENGINEERS
GEOTECHNICAL INVESTIGATION:
BORROW PITS-D192 ROAD

HOLE No: BTP12
Sheet 1 of 1

JOB NUMBER: MAK0830203

Scale
1:10

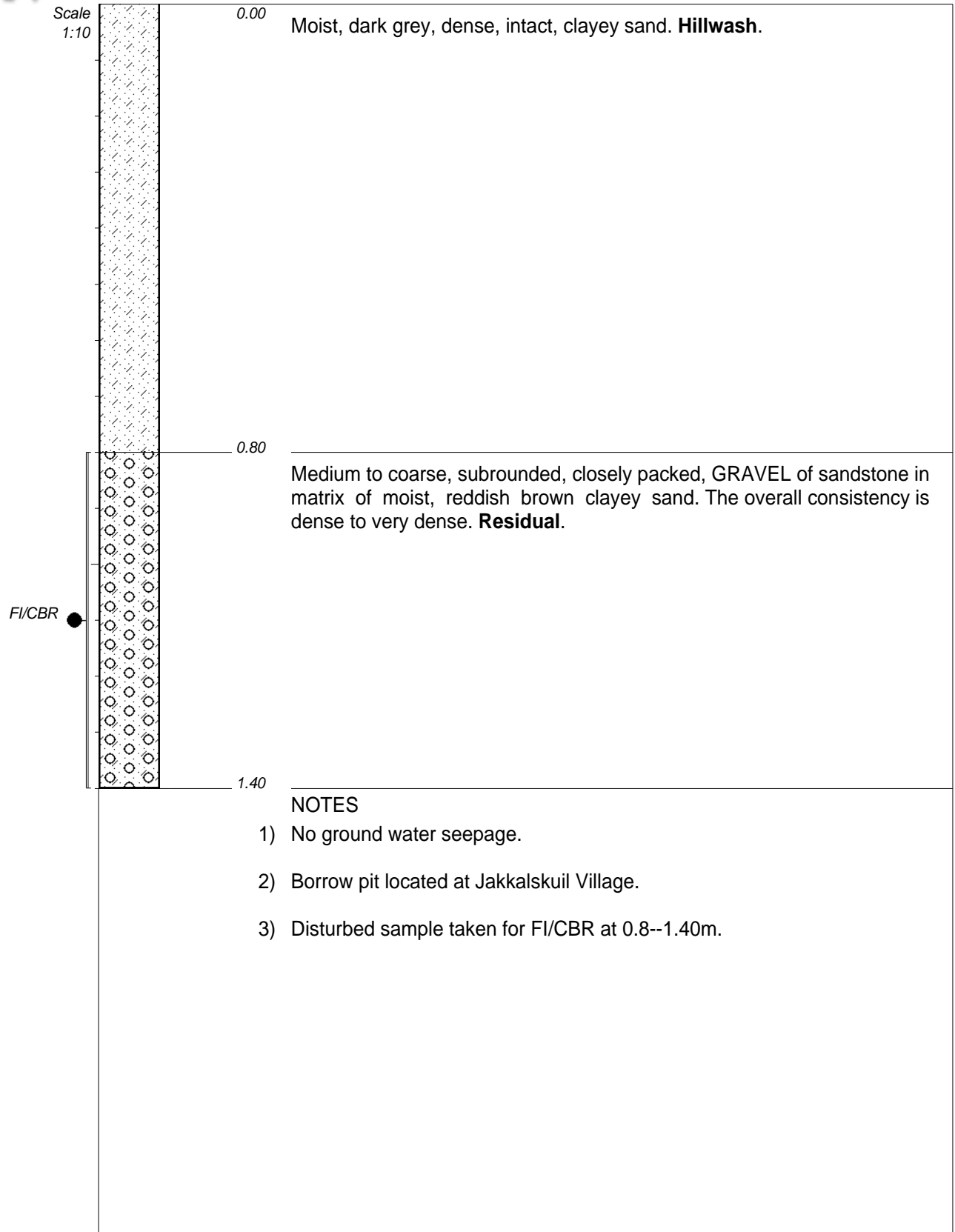


CONTRACTOR : MR BLUE PROJECTS
MACHINE : TLB
DRILLED BY : MR BLUE PROJECTS
PROFILED BY : Fumani Vukeya
TYPE SET BY : Fumani Vukeya
SETUP FILE : STANDARD.SET

INCLINATION :
DIAM :
DATE : 09/02/2022
DATE : 15/02/2022
DATE : 09/03/2022 14:06
TEXT : ..ilProfilesBorrowpits.txt

ELEVATION : 950 m
X-COORD : 28°36'3"E
Y-COORD : 23°50'41"S

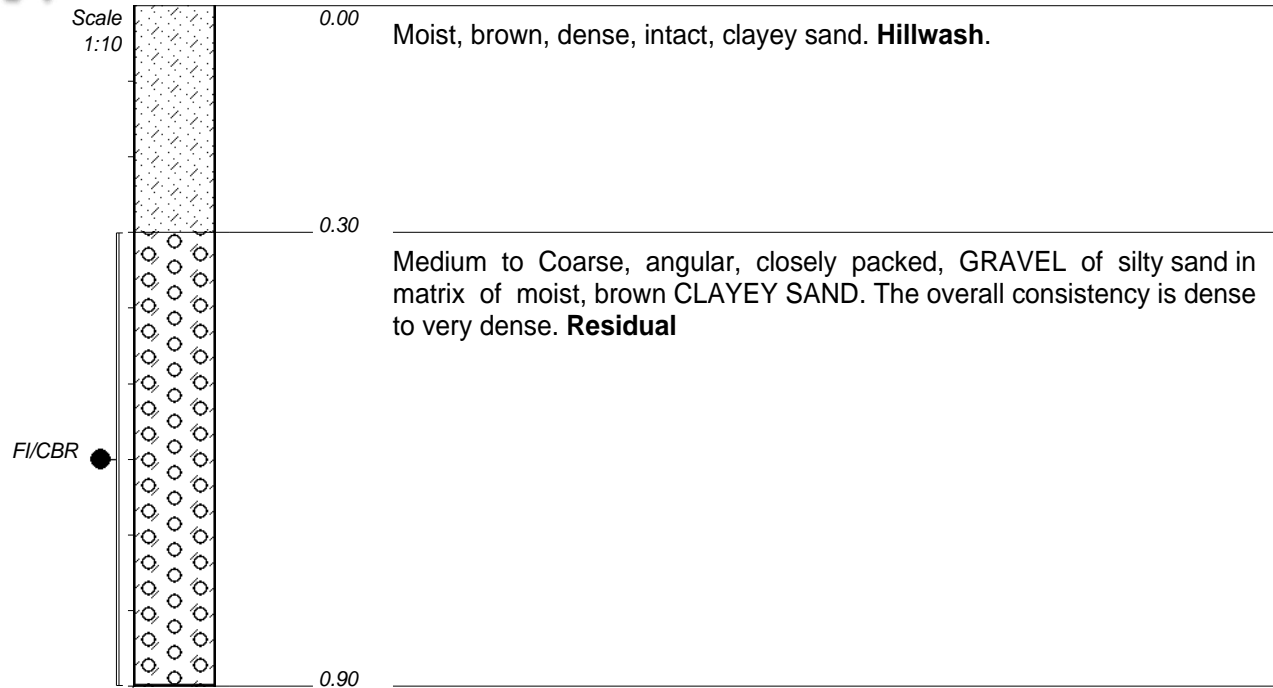
HOLE No: BTP12



CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya
 TYPE SET BY : Fumani Vukeya
 SETUP FILE : STANDARD.SET

INCLINATION :
 DIAM :
 DATE : 09/02/2022
 DATE : 15/02/2022
 DATE : 09/03/2022 14:06
 TEXT : ..ilProfilesBorrowpits.txt

ELEVATION : 950 m
 X-COORD : 28°36'4"E
 Y-COORD : 23°50'42"S



NOTES

- 1) Terminated due to slow progress.
- 2) Borrow pit located at Jakkalskuil Village.
- 3) Disturbed sample taken for FI/CBR at 0.3--0.90m.

CONTRACTOR : MR BLUE PROJECTS
MACHINE : TLB
DRILLED BY : MR BLUE PROJECTS
PROFILED BY : Fumani Vukeya

INCLINATION :
DIAM :
DATE : 09/02/2022
DATE : 15/02/2022

ELEVATION : 960 m
X-COORD : 28°37'60"E
Y-COORD : 23°54'17"S

TYPE SET BY : Fumani Vukeya
SETUP FILE : STANDARD.SET

DATE : 09/03/2022 14:06
TEXT : ..ilProfilesBorrowpits.txt

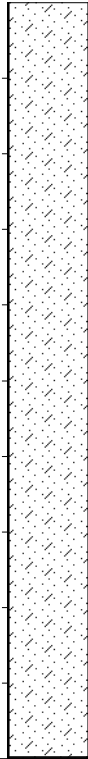


MORULA CONSULTING ENGINEERS
GEOTECHNICAL INVESTIGATION:
BORROW PITS-D192 ROAD

HOLE No: BTP15
Sheet 1 of 1

JOB NUMBER: MAK0830203

Scale
1:10



0.00

Slightly moist to moist, yellow brown, dense to very dense, intact, clayey sand. **Hillwash.**

1.00

NOTES

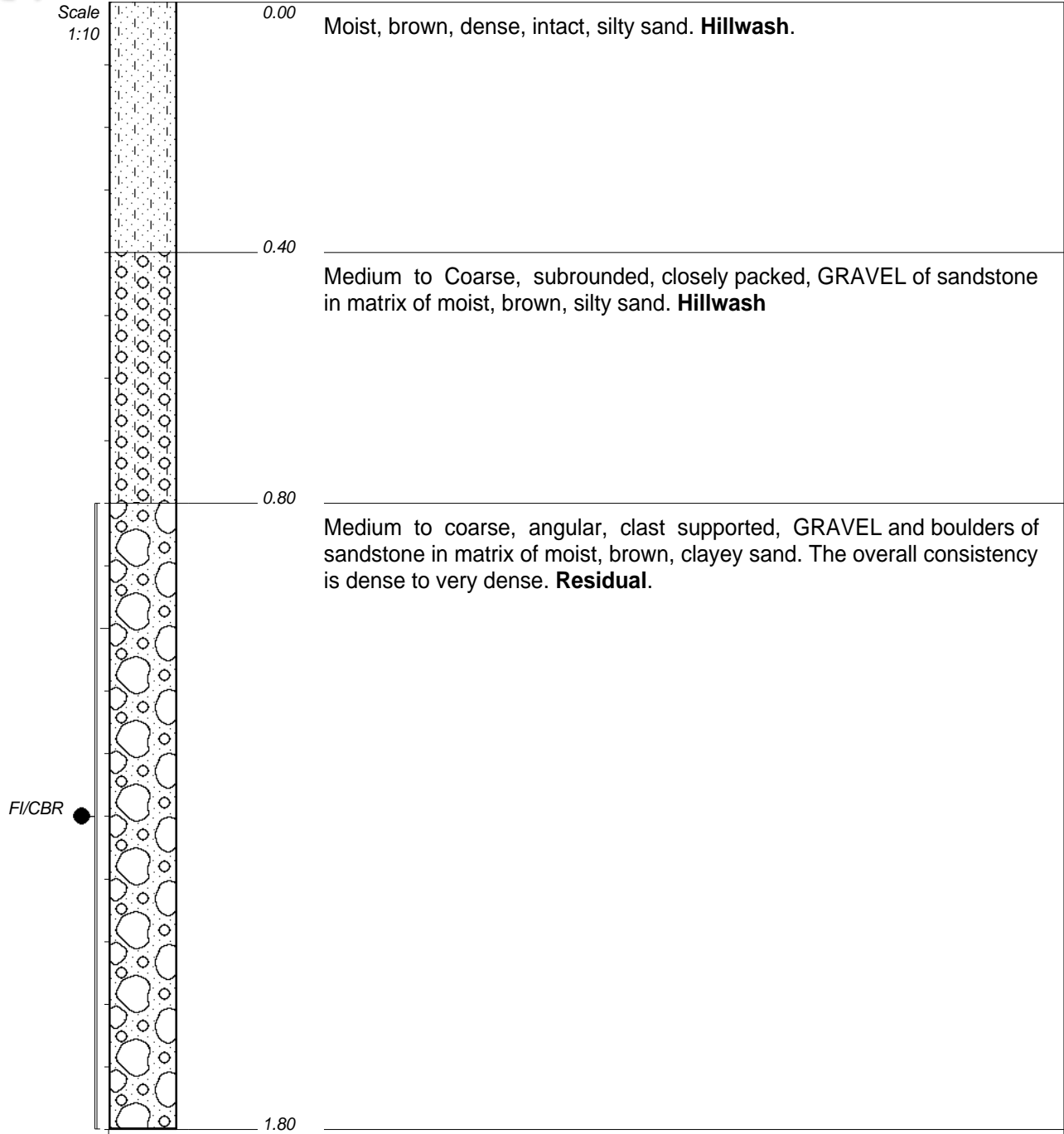
- 1) Terminated due to slow progress.
- 2) Borrow pit located at Jakkalskuil Village.

CONTRACTOR : MR BLUE PROJECTS
MACHINE : TLB
DRILLED BY : MR BLUE PROJECTS
PROFILED BY : Fumani Vukeya
TYPE SET BY : Fumani Vukeya
SETUP FILE : STANDARD.SET

INCLINATION :
DIAM :
DATE : 09/02/2022
DATE : 15/02/2022
DATE : 09/03/2022 14:06
TEXT : ..ilProfilesBorrowpits.txt

ELEVATION : 960 m
X-COORD : 28°38'38"E
Y-COORD : 23°54'14"S

HOLE No: BTP15



NOTES

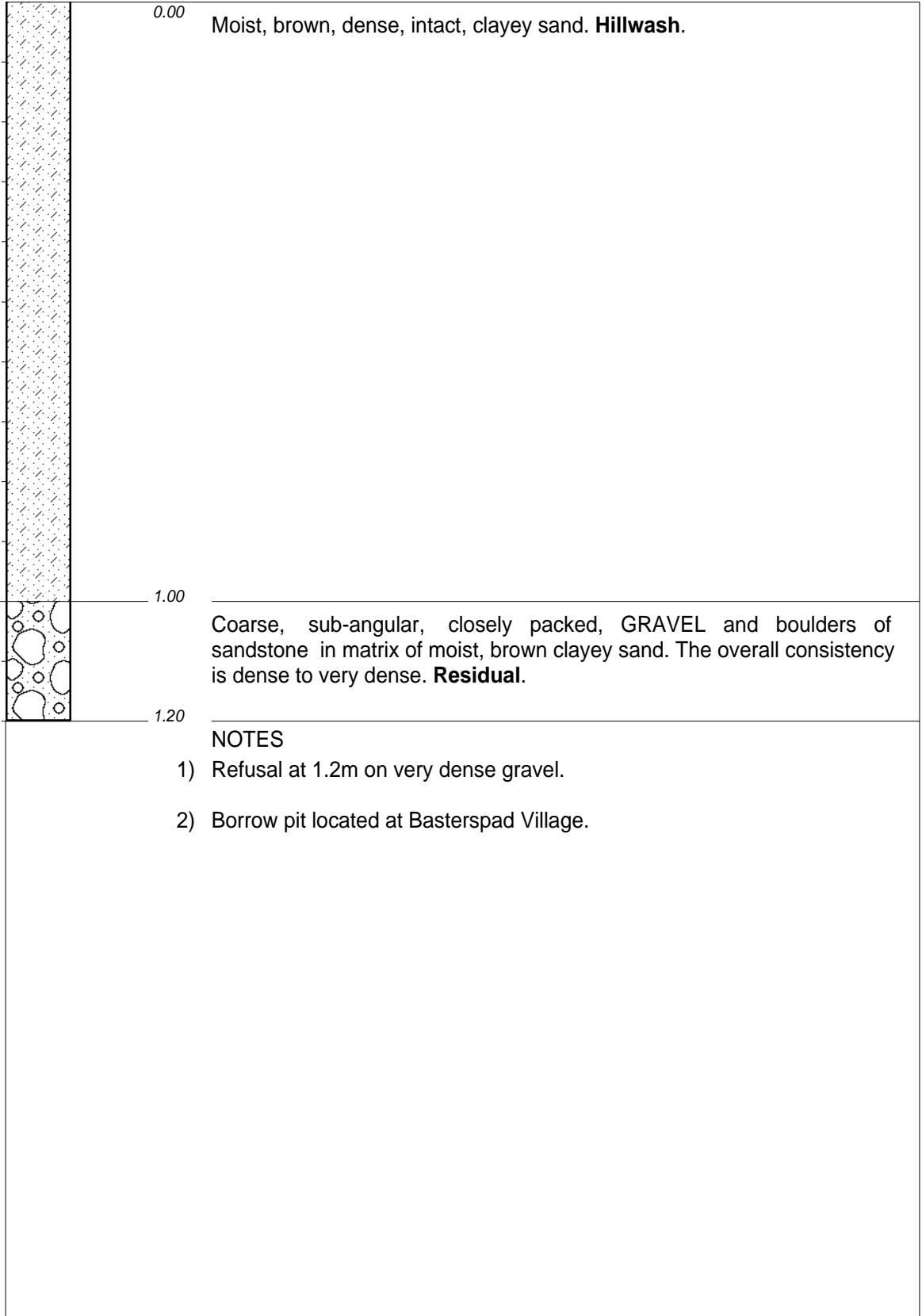
- 1) No ground water seepage.
- 2) Borrow pit located at Jakkalskuil Village.
- 3) Disturbed sample taken for FI/CBR at 0.8--1.80m.

CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya
 TYPE SET BY : Fumani Vukeya
 SETUP FILE : STANDARD.SET

INCLINATION :
 DIAM :
 DATE : 09/02/2022
 DATE : 15/02/2022
 DATE : 09/03/2022 14:06
 TEXT : ..ilProfilesBorrowpits.txt

ELEVATION : 970 m
 X-COORD : 28°38'3"E
 Y-COORD : 23°54'17"S

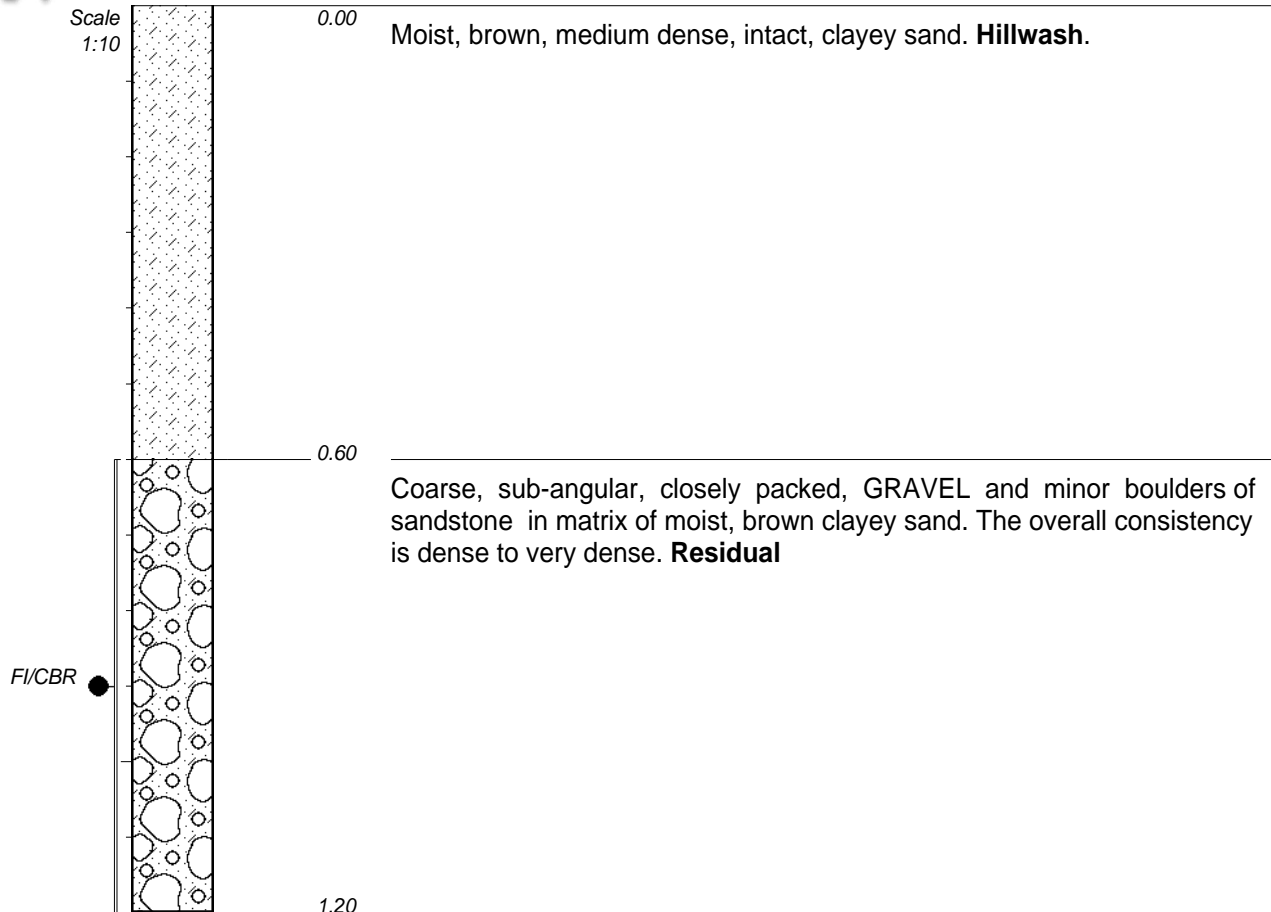
Scale
1:10



CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya

INCLINATION :
 DIAM :
 DATE : 09/02/2022
 DATE : 15/02/2022
 DATE : 09/03/2022 14:06
 TEXT : ..ilProfilesBorrowpits.txt

ELEVATION : 970 m
 X-COORD : 28°38'6"E
 Y-COORD : 23°54'20"S



NOTES

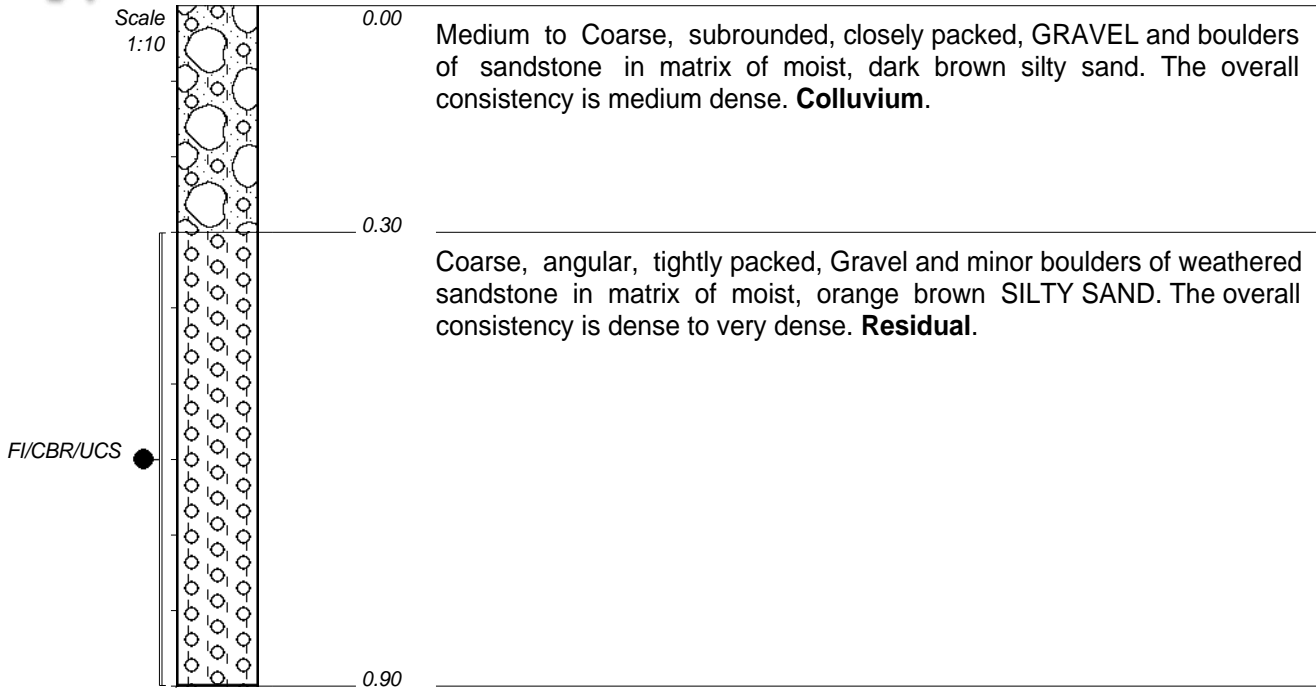
- 1) Refusal at 1.2m on very dense gravel.
- 2) Borrow pit located at Basterspad Village.
- 3) Disturbed sample taken for FI/CBR at 0.6--1.20m.

CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya
 TYPE SET BY : Fumani Vukeya
 SETUP FILE : STANDARD.SET

INCLINATION :
 DIAM :
 DATE : 09/02/2022
 DATE : 15/02/2022
 DATE : 09/03/2022 14:06
 TEXT : ..ilProfilesBorrowpits.txt

ELEVATION : 980 m
 X-COORD : 28°38'9"E
 Y-COORD : 23°54'17"S

HOLE No: BTP18



NOTES

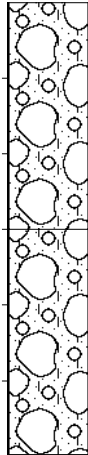
- 1) No groundwater seepage.
- 2) Borrow pit located at Basterspad Village.
- 3) Refusal at 0.9m (Weathered sandstone).
- 4) Disturbed sample taken for FI/CBR/UCS at 0.3--0.90m.

CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya

INCLINATION :
 DIAM :
 DATE : 09/02/2022
 DATE : 15/02/2022
 DATE : 09/03/2022 14:06
 TEXT : ..ilProfilesBorrowpits.txt

ELEVATION : 1010 m
 X-COORD : 28°37.9837'E
 Y-COORD : 23°56.2508'S

Scale
1:10



0.00

Medium to Coarse, subrounded, closely packed, GRAVEL and boulders of sandstone in matrix of moist, dark brown silty sand. The overall consistency is medium dense **Colluvium**.

0.30

Coarse, angular, tightly packed, GRAVEL and minor boulders of weathered sandstone in matrix of moist, orange brown silty sand. The overall consistency is dense to very dense **Residual**.

0.60

NOTES

- 1) No groundwater seepage.
- 2) Sidewall Stable.
- 3) Refusal at 0.6m (Weathered sandstone).
- 4) Borrow pit located at Basterspad Village.

CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya

INCLINATION :
 DIAM :
 DATE : 09/02/2022
 DATE : 15/02/2022

ELEVATION : 1000 m
 X-COORD : 28°38.0216'E
 Y-COORD : 23°56.2404'S

TYPE SET BY : Fumani Vukeya
 SETUP FILE : STANDARD.SET

DATE : 09/03/2022 14:06
 TEXT : ..ilProfilesBorrowpits.txt

HOLE No: BTP21

Scale
 1:10



0.00

Medium to Coarse, subrounded, closely packed, GRAVEL and boulders of sandstone in matrix of moist, dark brown silty sand. The overall consistency is medium dense. **Colluvium.**

0.20

Coarse, angular, tightly packed, GRAVEL and minor boulders of weathered sandstone in matrix of moist, orange brown silty sand. The overall consistency is dense to very dense. **Residual.**

0.70

NOTES

- 1) No groundwater seepage.
- 2) Sidewall Stable.
- 3) Refusal at 0.7m on weathered sandstone.
- 4) Borrow pit located at Basterspad Village.

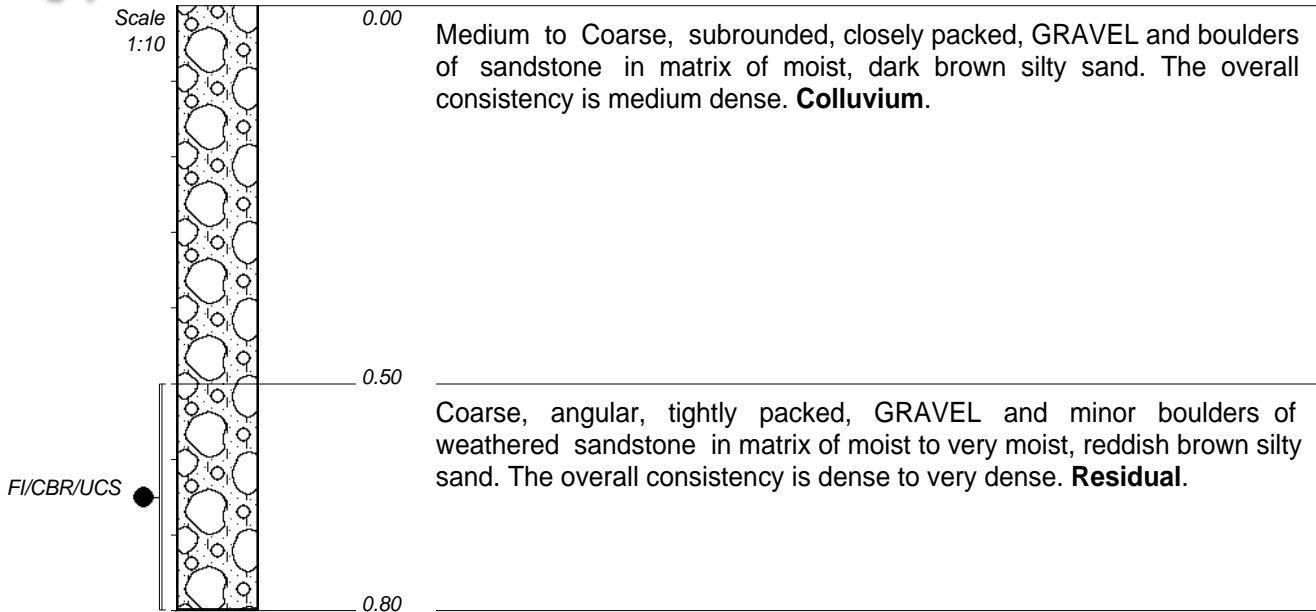
CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya

TYPE SET BY : Fumani Vukeya
 SETUP FILE : STANDARD.SET

INCLINATION :
 DIAM :
 DATE : 09/02/2022
 DATE : 15/02/2022

DATE : 09/03/2022 14:06
 TEXT : ..ilProfilesBorrowpits.txt

ELEVATION : 1010 m
 X-COORD : 28°38.0339'E
 Y-COORD : 23°56.1898'S



NOTES

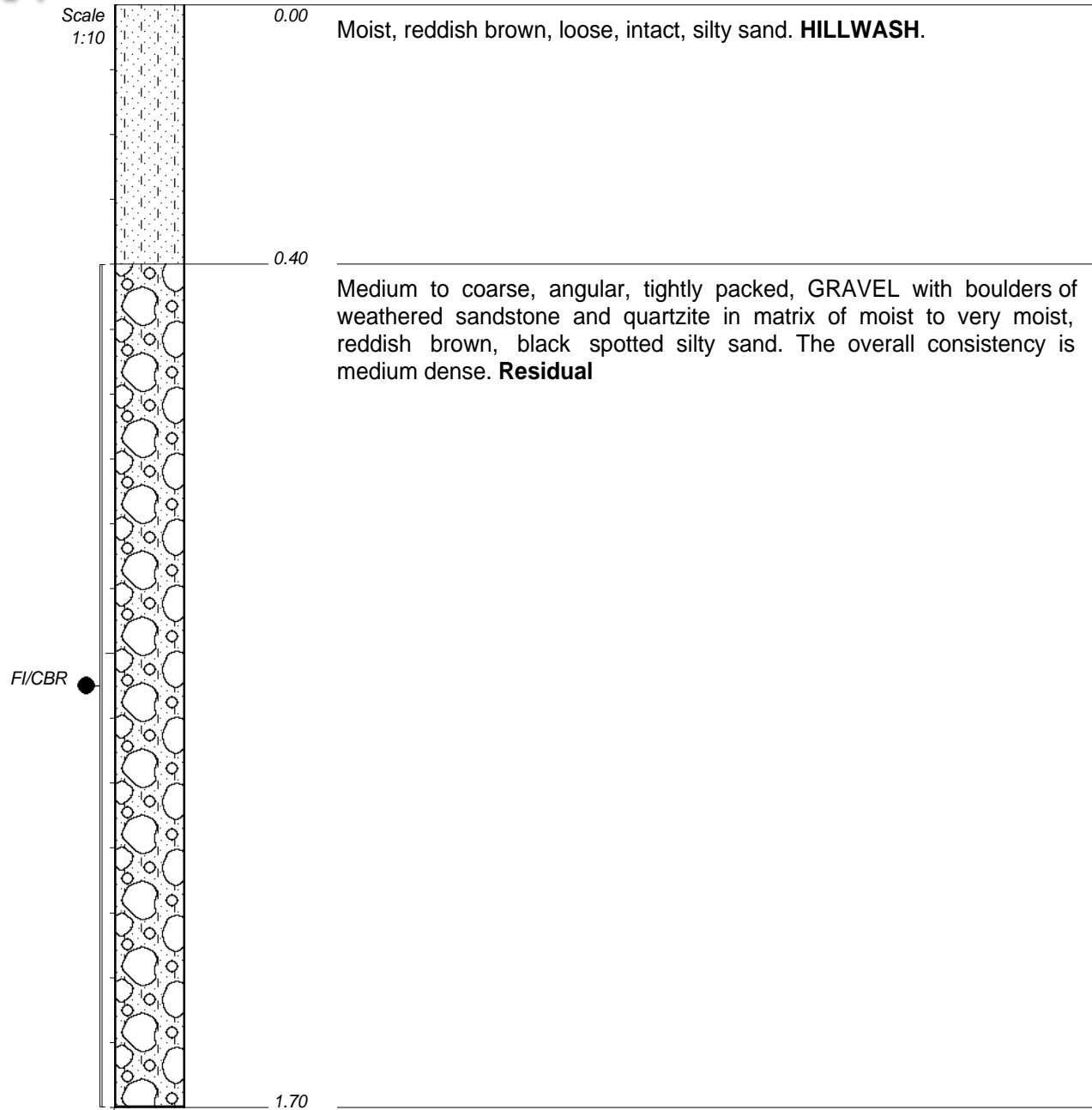
- 1) No groundwater seepage.
- 2) Borrow pit located at Rantlakane Village.
- 3) Refusal at 0.8m (Weathered sandstone)
- 4) Disturbed sample taken for FI/CBR/UCS at 0.5--0.80m.

CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya

INCLINATION :
 DIAM :
 DATE : 09/02/2022
 DATE : 15/02/2022
 DATE : 09/03/2022 14:06
 TEXT : ..ilProfilesBorrowpits.txt

ELEVATION : 1000 m
 X-COORD : 28°38'2"E
 Y-COORD : 23°56'14"S

HOLE No: BTP23



NOTES

- 1) No groundwater seepage.
- 2) Sidewall Stable.
- 3) Located in Rantlakane Village.
- 4) Disturbed sample taken for FI/CBR at 0.4--1.70m.

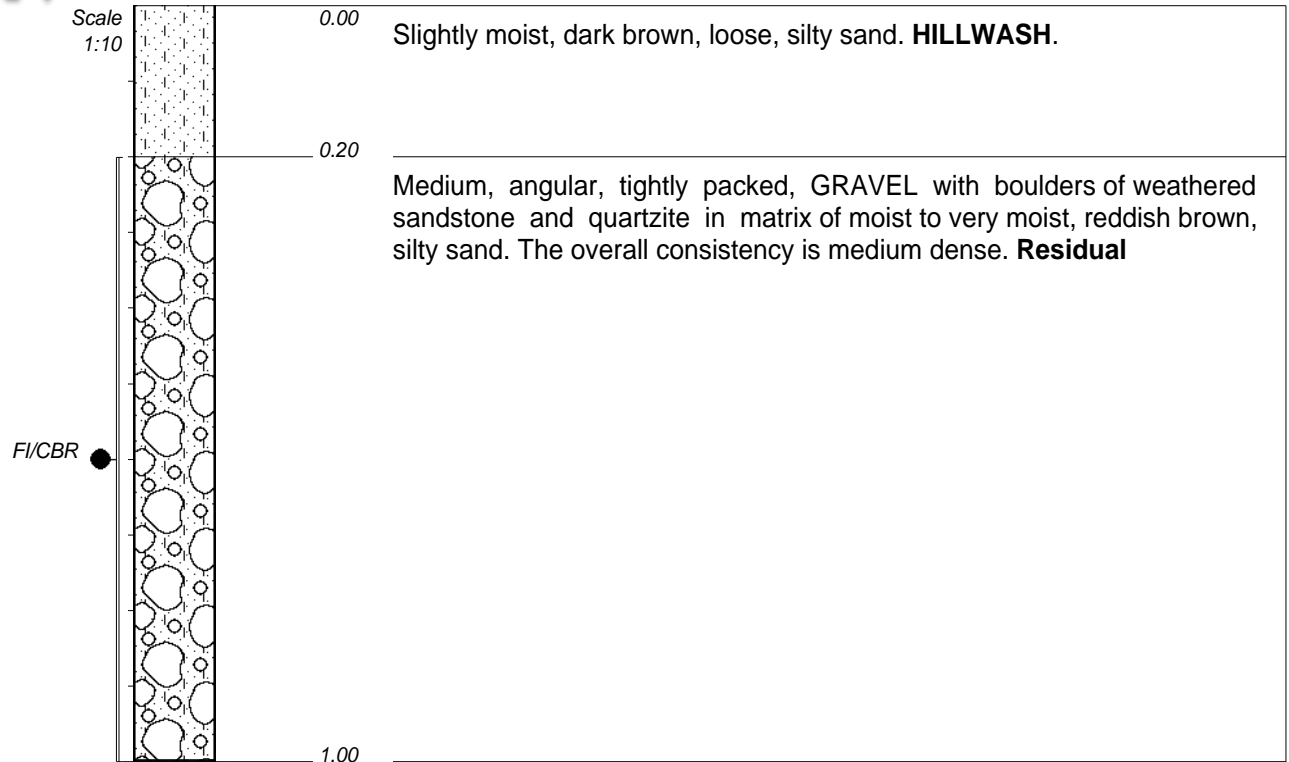
CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya

INCLINATION :
 DIAM :
 DATE : 09/02/2022
 DATE : 15/02/2022

ELEVATION : 1000 m
 X-COORD : 28°38'2"E
 Y-COORD : 23°56'15"S

TYPE SET BY : Fumani Vukeya
 SETUP FILE : STANDARD.SET

DATE : 09/03/2022 14:06
 TEXT : ..ilProfilesBorrowpits.txt



NOTES

- 1) No groundwater seepage.
- 2) Sidewall Stable.
- 3) Located in Rantlakane Village.
- 4) Disturbed sample taken for FI/CBR at 0.2--1.0m.

CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya

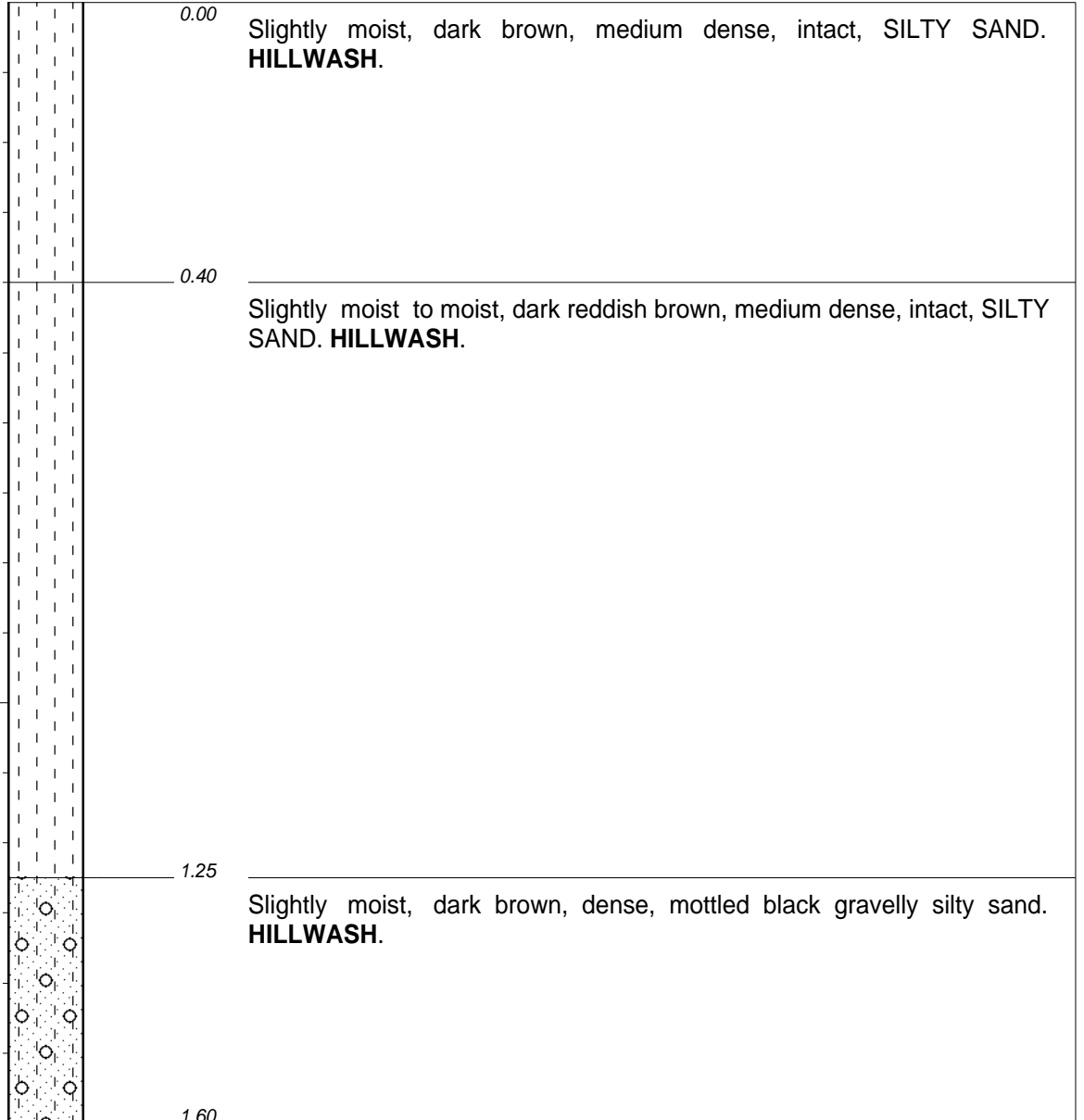
INCLINATION :
 DIAM :
 DATE : 09/02/2022
 DATE : 15/02/2022

ELEVATION : 1000 m
 X-COORD : 28°38'1"E
 Y-COORD : 23°56'18"S

TYPE SET BY : Fumani Vukeya
 SETUP FILE : STANDARD.SET

DATE : 09/03/2022 14:06
 TEXT : ..ilProfilesBorrowpits.txt

Scale
1:10



NOTES

- 1) No groundwater seepage.
- 2) Sidewall Stable.
- 3) Can be further excavated.
- 4) Located in Lesodi Village.

CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya

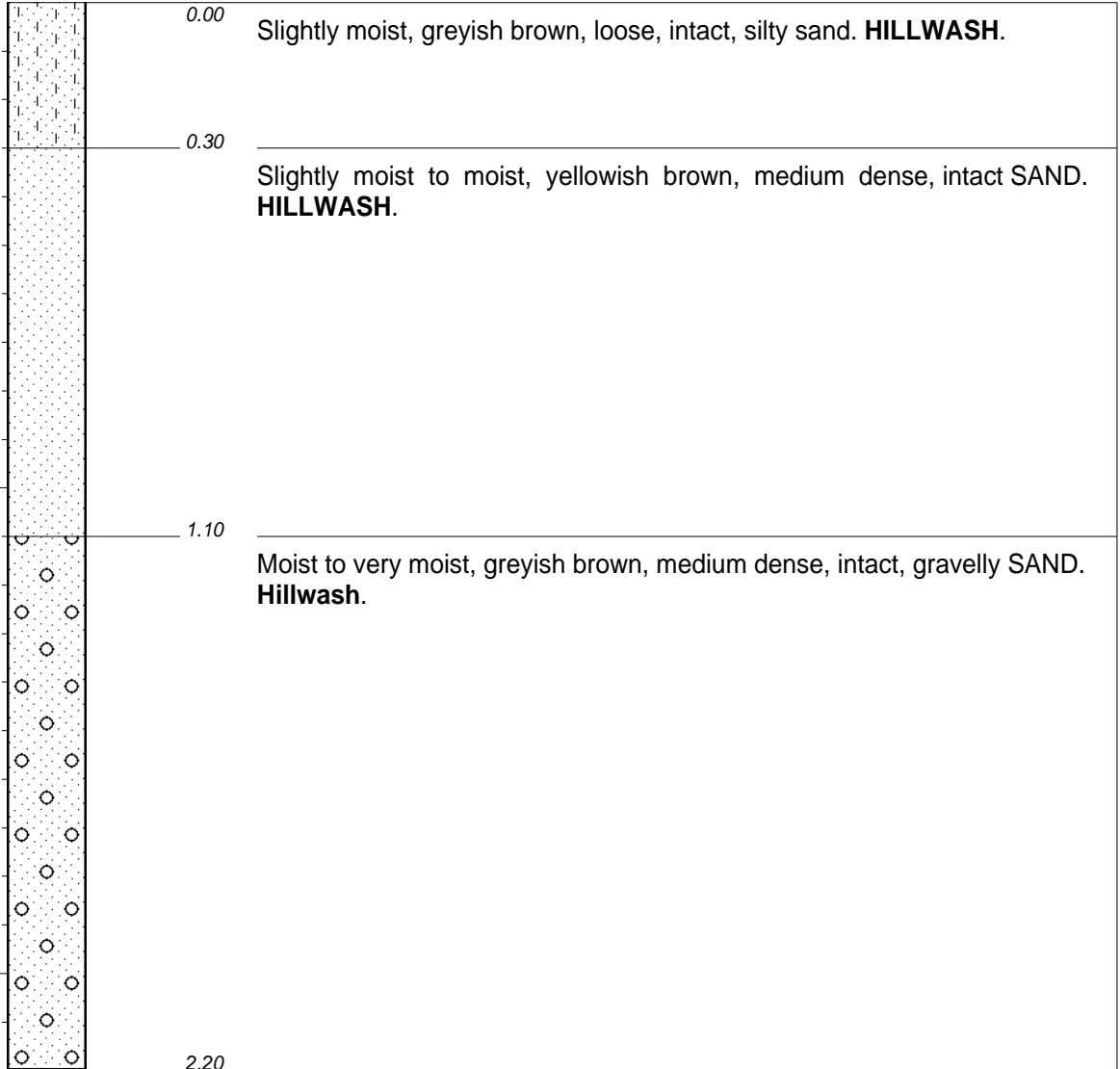
INCLINATION :
 DIAM :
 DATE : 09/02/2022
 DATE : 15/02/2022

ELEVATION : 1050 m
 X-COORD : 28°39.7733'E
 Y-COORD : 23°57.9417'S

TYPE SET BY : Fumani Vukeya
 SETUP FILE : STANDARD.SET

DATE : 09/03/2022 14:06
 TEXT : ..\ProfilesBorrowpits.txt

Scale
1:15



NOTES

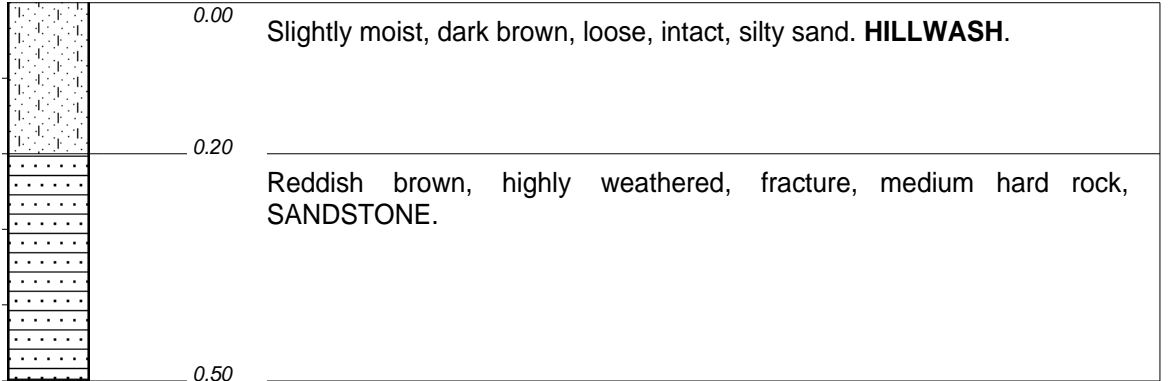
- 1) No groundwater seepage.
- 2) Sidewall Stable.
- 3) Can be further excavated.
- 4) Located in Lesodi Village.

CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya
 TYPE SET BY : Fumani Vukeya
 SETUP FILE : STANDARD.SET

INCLINATION :
 DIAM :
 DATE : 09/02/2022
 DATE : 15/02/2022
 DATE : 09/03/2022 14:06
 TEXT : ..ilProfilesBorrowpits.txt

ELEVATION : 1050 m
 X-COORD : 28°39.7212'E
 Y-COORD : 23°57.9519'S

Scale
1:10



NOTES

- 1) No groundwater seepage.
- 2) Sidewall Stable.
- 3) Terminated due to slow progress.
- 4) Located in Lesodi Village.

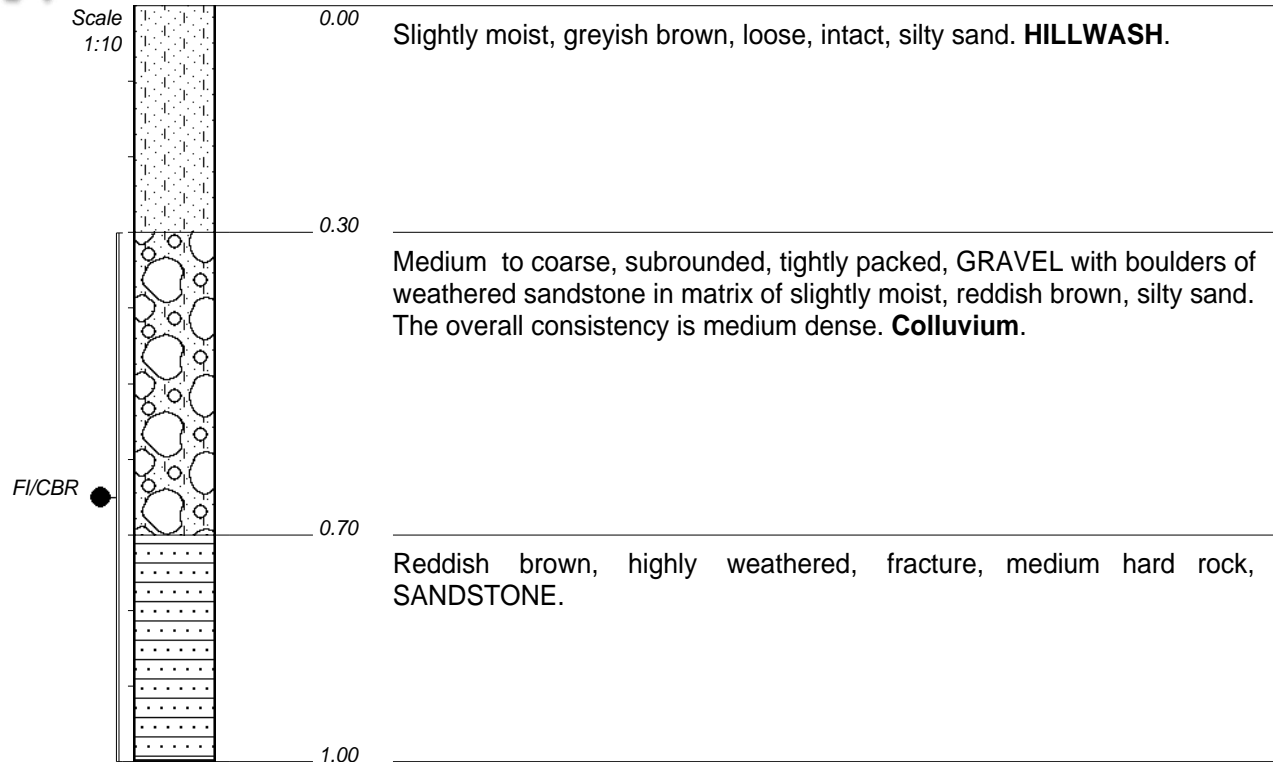
CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya

INCLINATION :
 DIAM :
 DATE : 09/02/2022
 DATE : 15/02/2022

ELEVATION : 1050 m
 X-COORD : 28°39'42"E
 Y-COORD : 23°57'56"S

TYPE SET BY : Fumani Vukeya
 SETUP FILE : STANDARD.SET

DATE : 09/03/2022 14:06
 TEXT : ..ilProfilesBorrowpits.txt



NOTES

- 1) No groundwater seepage.
- 2) Sidewall Stable.
- 3) Terminated due to slow progress but an be further excavated.
- 4) Located in Lesodi Village.
- 5) Disturbed sample taken for FI/CBR at 0.3--1.0m.

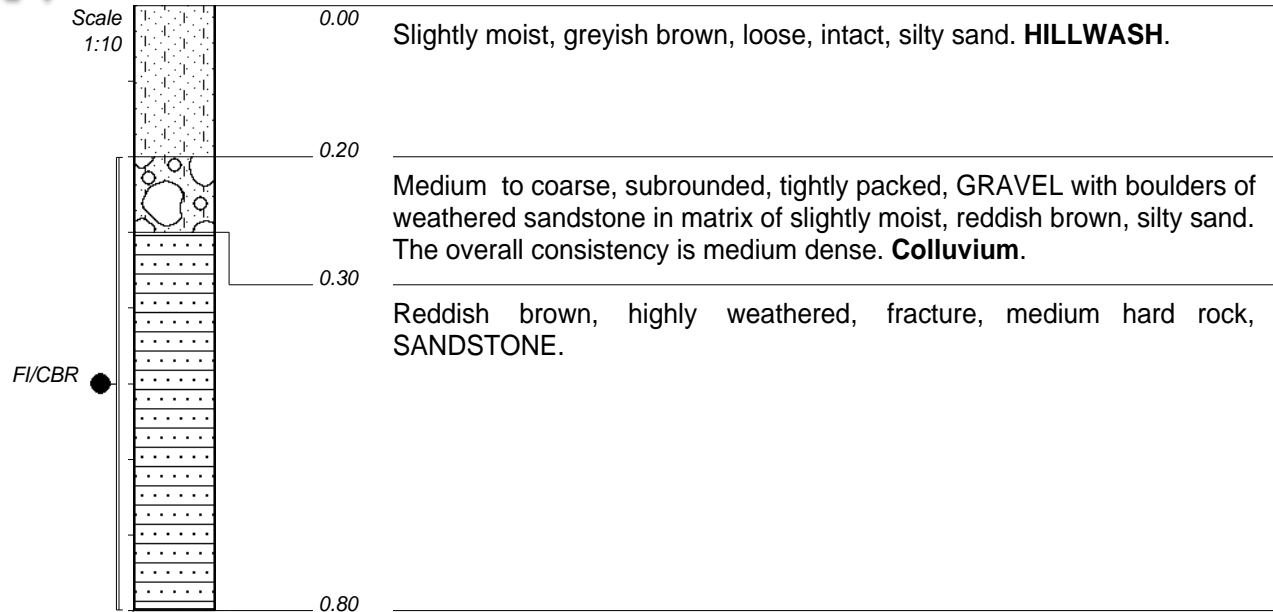
CONTRACTOR : MR BLUE PROJECTS
 MACHINE : TLB
 DRILLED BY : MR BLUE PROJECTS
 PROFILED BY : Fumani Vukeya

INCLINATION :
 DIAM :
 DATE : 09/02/2022
 DATE : 15/02/2022

ELEVATION : 1050 m
 X-COORD : 28°39'41"E
 Y-COORD : 23°57'55"S

TYPE SET BY : Fumani Vukeya
 SETUP FILE : STANDARD.SET

DATE : 09/03/2022 14:06
 TEXT : ..ilProfilesBorrowpits.txt



NOTES

- 1) No groundwater seepage.
- 2) Sidewall Stable.
- 3) Terminated due to slow progress but an be further excavated.
- 4) Located in Lesodi Village.
- 5) Disturbed sample taken for FI/CBR at 0.2--0.80m.

CONTRACTOR : MR BLUE PROJECTS
MACHINE : TLB
DRILLED BY : MR BLUE PROJECTS
PROFILED BY : Fumani Vukeya

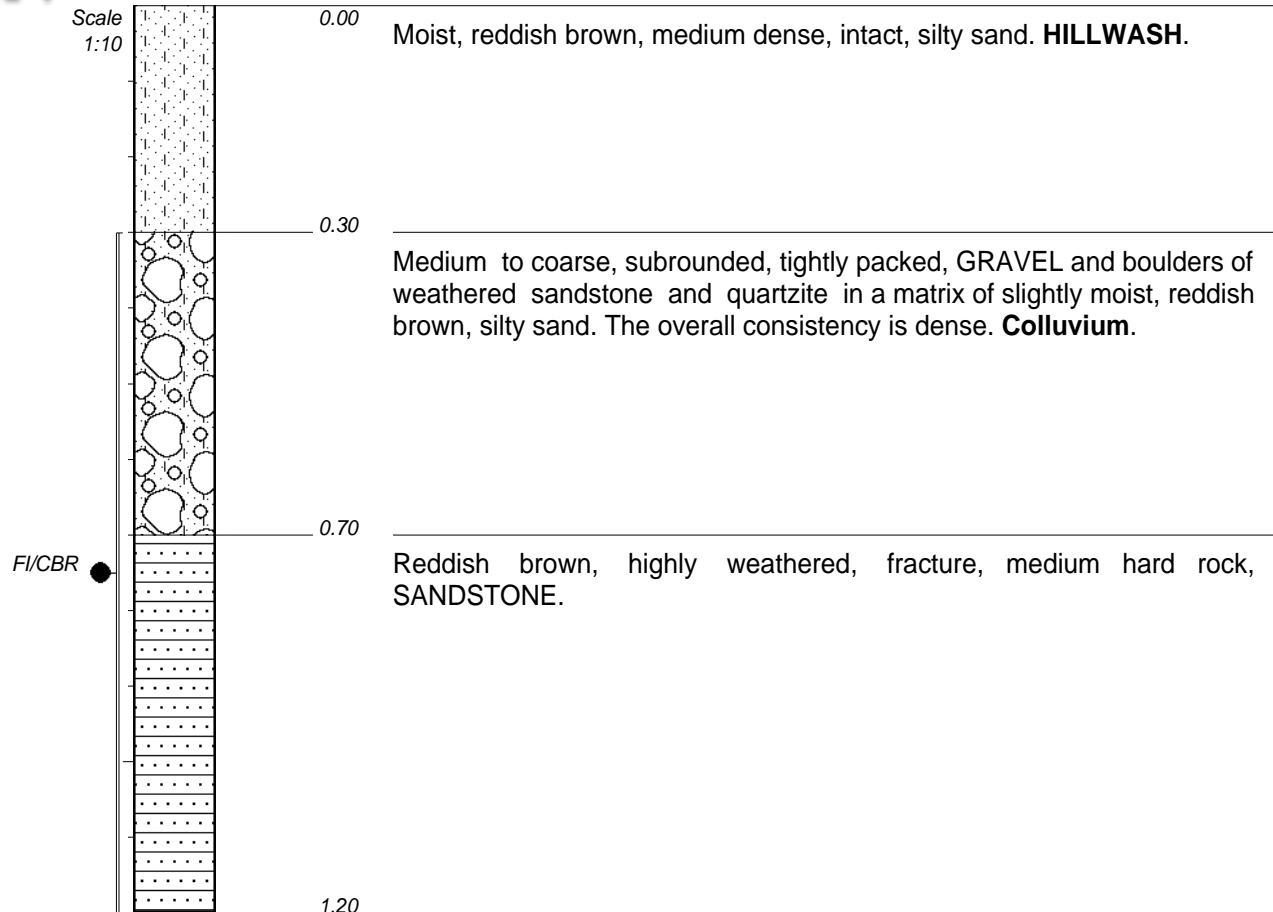
INCLINATION :
DIAM :
DATE : 09/02/2022
DATE : 15/02/2022

ELEVATION : 1050 m
X-COORD : 28°39'39"E
Y-COORD : 23°57'55"S

TYPE SET BY : Fumani Vukeya
SETUP FILE : STANDARD.SET

DATE : 09/03/2022 14:06
TEXT : ..ilProfilesBorrowpits.txt

HOLE No: BTP30



NOTES

- 1) No groundwater seepage.
- 2) Sidewall Stable.
- 3) Terminated due to slow progress but an be further excavated.
- 4) Located in Lesodi Village.
- 5) Disturbed sample taken for FI/CBR at 0.3--1.20m.

CONTRACTOR : MR BLUE PROJECTS
MACHINE : TLB
DRILLED BY : MR BLUE PROJECTS
PROFILED BY : Fumani Vukeya

INCLINATION :
DIAM :
DATE : 09/02/2022
DATE : 15/02/2022

ELEVATION : 1050 m
X-COORD : 28°39'39"E
Y-COORD : 23°57'57"S

TYPE SET BY : Fumani Vukeya
SETUP FILE : STANDARD.SET

DATE : 09/03/2022 14:06
TEXT : ..ilProfilesBorrowpits.txt

HOLE No: BTP31



MORULA CONSULTING ENGINEERS
GEOTECHNICAL INVESTIGATION:
BORROW PITS-D192 ROAD

LEGEND
 Sheet 1 of 1

JOB NUMBER: MAK0830203

	BOULDERS	{SA01}
	GRAVEL	{SA02}
	GRAVELLY	{SA03}
	SAND	{SA04}
	SILTY	{SA07}
	CLAYEY	{SA09}
	SANDSTONE	{SA11}
	DISTURBED SAMPLE	{SA38}
	ROOTS	{SA40}

Name ●

CONTRACTOR :
 MACHINE :
 DRILLED BY :
 PROFILED BY :

INCLINATION :
 DIAM :
 DATE :
 DATE :

ELEVATION :
 X-COORD :
 Y-COORD :

TYPE SET BY : Fumani Vukeya
 SETUP FILE : STANDARD.SET

DATE : 09/03/2022 14:06
 TEXT : ..ilProfilesBorrowpits.txt

LEGEND
 SUMMARY OF SYMBOLS

APPENDIX C: LABORATORY TEST RESULTS

(SANS 3001-GR1, GR3, GR10, GR20, GR30, GR40, PR5: 2013 – Civil Engineering test methods – Foundation Indicator Tests – SANS Accredited Soil Laboratory)

Cover Page

Client :	Makhuma Consulting Engineers	Job No. :	QOJ207
Address :	1468 Lowveld close	Request No. :	N/A
	Pretoria		
	0034		
Attention :	Hudson Mabelane	Date Received :	15 February 2021
		Date Tested :	28 February 2022
E-mail :	hudsonmabelane@gmail.com	Date Reported :	04 March 2022
Project :	D192 Geotechnical Investigation	Report Status :	Final Report
		Page :	1 of 1

Herewith please find the test report(s) pertaining to the above project. All tests were conducted in accordance with prescribed test method(s). Information herein consists of the following:

Test(s) conducted / Item(s) measured	Qty.	Test Method(s)	Authorized By**	Sample No.
Determination of the maximum dry density and optimum moisture content	12.000	SANS 3001-GR30:2015	MM Ngwenya	QOJ207/1-42
Determination of the California bearing ratio	12.000	SANS 3001-GR40:2013	MM Ngwenya	QOJ207/1-42
Dry preparation and dry particle size analysis of gravels and sands	42.000	SANS 3001-GR1:2013	MM Ngwenya	QOJ207/1-42
Determination of the flow curve liquid limit	42.000	SANS 3001-GR11:2013	MM Ngwenya	QOJ207/1-42

Deviation and subcontract: # Deviations indicated if any on the report and clearly communicated to the client. Subcontracted report are sent to client as received from subcontractor.

Document reproduction: Documents may only be reproduced or published in their full context.

Report status: Only final status results are to be good for publication.

Samples received and result relation: Any information contained in this test report pertain only to the areas and/or samples tested.

Sample delivered by client: The results apply to the sample as received

Samples retainment: Unless otherwise requested or stated, all samples will be discarded after a period of 3 months.

Opinion and recommendation: * All interpretations, Opinions and/or Classifications contained in this report falls outside our scope of Igneous Soil lab
Further use of the above information is not the responsibility or liability of igneous soil laboratory.

Test Report for Mod CBR Road Indicator Report SANS 3001-GR1,GR10,GR20,GR30,GR40

CLIENT: Makhuma Consulting Engineers
1468 Lowveld close
Pretoria
0034

DATE RECEIVED: 10/Feb/2022
DATE TESTED: 18/Feb/2022
DATE REPORTED: 25/Feb/2022
REPORT NO.: QOJ207/1

ATT: Hudson Mabelane

PROJECT: D192 Geotechnical Investigation

DESCRIPTION: Material sampled by Client

SAMPLE NO: QOJ207/1

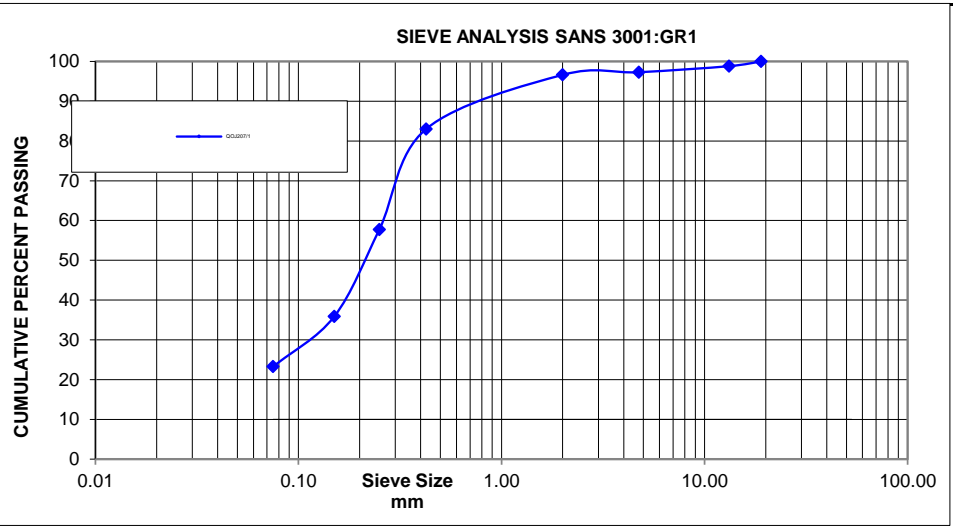
MATERIAL DESCR.: drk Yellow Silty sand

JOB NUMBER: QOJ207

TP : TP 1

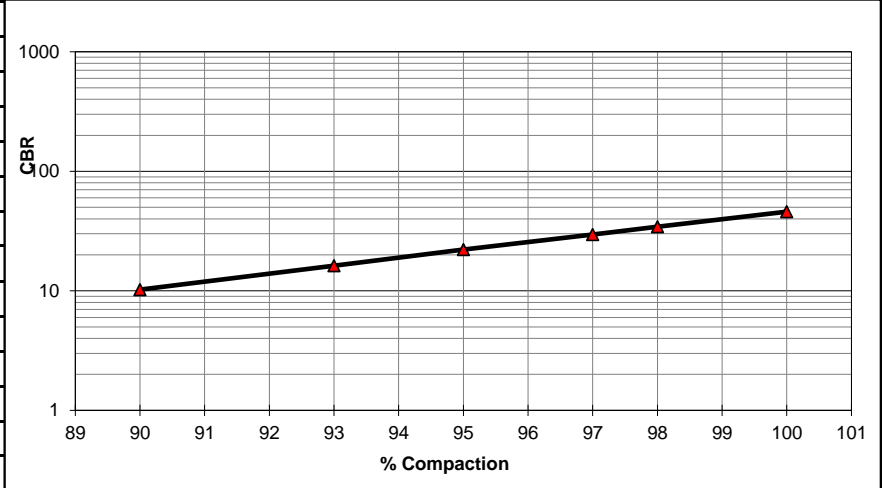
DEPTH (m): 0.3-0.7m below EGL

Sieve mm	% Passing
100.0	
75.0	
63.0	
50.0	
37.5	
28.0	
20.0	100
14.0	99
5.00	97
2.00	97
0.425	83
0.250	58
0.150	36
0.075	23



Soil Mortar % SANS 3001-PR5		Grading Modulus SANS 3001:PR5		*Classifications	
Coarse Sand	14	Grading Modulus	0.97	Unified Soil Classification	SM(d)
Coarse Fine Sand	26	Soil Constants SANS 3001:GR12		COLTO (1998)	G7
Medium Fine Sand	23	Liquid Limit (%)		US Highway	A-2-4
Fine Fine Sand	13	Plasticity Index (%)	NP	Group Index	0
Silt and Clay	24	Linear Shrinkage (%)	0.0		

CBR SANS 3001:GR30,GR40			
MDD kg/m ³	2064		
OMC %	6.6		
Comp. Moisture %	6.6		
Dry Density kg/m ³	2062	1961	1857
Compaction %	99.9	95.0	90.0
% Swell	1.29	1.76	2.20
CBR @ % MDD			
@ 100% comp. :	46		
@ 98% comp. :	34		
@ 97% comp. :	30		
@ 95% comp. :	22		
@ 93% comp. :	16		
@ 90% comp. :	10		



Remarks

Technical Signatory: _____

(Signature)
Madoda Ngwenya

*The above test results are only relevant to samples delivered and tested at the laboratory. This report shall not be reproduced or altered without the prior consent of the laboratory, except copied in full. * Opinions and interpretations expressed herein are outside the scope of SANAS accreditation.*

Results marked "#" in this report are not included in the SANAS schedule of Accreditation for this laboratory.

Test report for Maximum Dry Density and Optimum Moisture Content SANS 3001-GR20,GR30

CLIENT: Makhuma Consulting Engineers
1468 Lowveld close
Pretoria
0034

DATE RECEIVED: 10/Feb/2022
DATE TESTED: 18/Feb/2022
DATE REPORTED: 25/Feb/2022
REPORT NO.: QOJ207/1

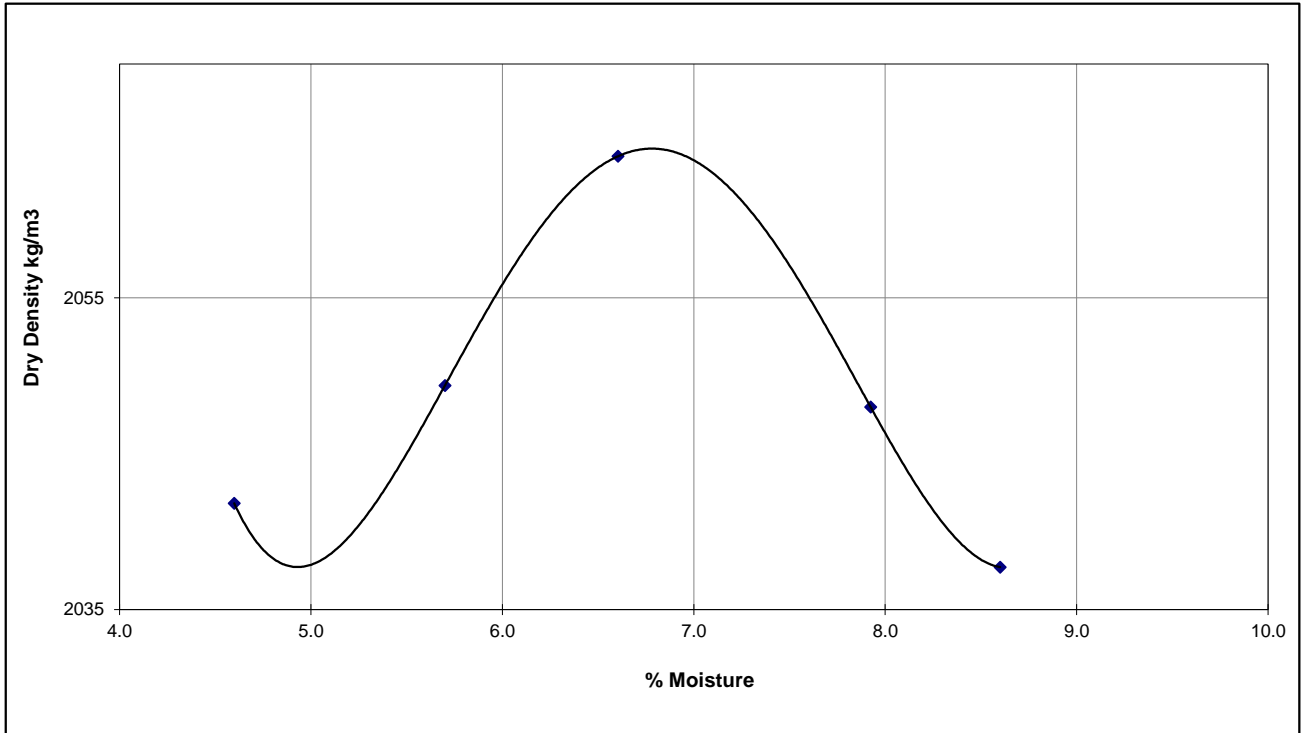
ATT: Hudson Mabelane

PROJECT: D192 Geotechnical Investigation


DESCRIPTION: Material sampled by Client
DESCRIPTION: drk Yellow Silty sand
TP : TP 1
DEPTH (m): 0.3-0.7m below EGL

SAMPLE NO: QOJ207/1
JOB NUMBER: QOJ207
PREPERATION METHOD: Scalping

Maximum Dry Density (MDD) - SANS 3001: GR30, GR20						
Point No	1	2	3	4	5	
Dry Density MDD kg/m ³	2064	2048	2038	2049	2042	
Moisture Content OMC %	6.6	7.9	8.6	5.7	4.6	



Maximum Dry Density MDD kg/m ³	2064
Optimum Moisture Content OMC %	6.6

Technical Signatory: 
Madoda Ngwenya

The above test results are only relevant to samples delivered and tested at the laboratory. This report shall not be reproduced or altered without the prior consent of the laboratory, except copied in full. * Opinions and interpretations expressed herein are outside the scope of SANAS accreditation.
Results marked "#" in this report are not included in the SANAS schedule of Accreditation for this laboratory.

Test Report for Mod CBR Road Indicator Report SANS 3001-GR1,GR10,GR20,GR30,GR40

CLIENT: Makhuma Consulting Engineers
1468 Lowveld close
Pretoria
0034

DATE RECEIVED: 10/Feb/2022
DATE TESTED: 18/Feb/2022
DATE REPORTED: 25/Feb/2022
REPORT NO.: QOJ207/2

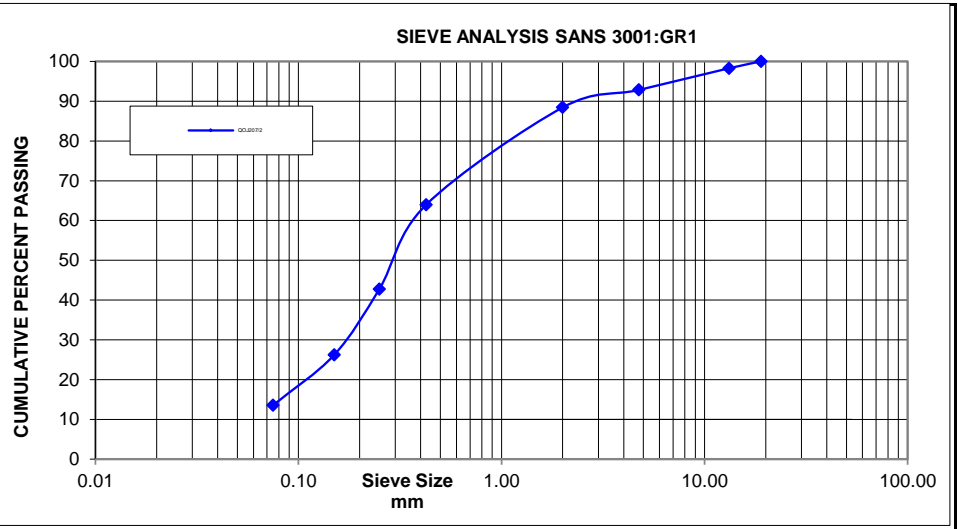
ATT: Hudson Mabelane

PROJECT: D192 Geotechnical Investigation

DESCRIPTION: Material sampled by Client
MATERIAL DESCR.: lt Yellow Silty sand
TP : TP 2

SAMPLE NO: QOJ207/2
JOB NUMBER: QOJ207
DEPTH (m): 0.0-0.4m below EGL

Sieve mm	% Passing
100.0	
75.0	
63.0	
50.0	
37.5	
28.0	
20.0	100
14.0	98
5.00	93
2.00	88
0.425	64
0.250	43
0.150	26
0.075	14



Soil Mortar % SANS 3001-PR5		Grading Modulus SANS 3001:PR5		*Classifications	
Coarse Sand	28	Grading Modulus	1.34	Unified Soil Classification	SM(d)
Coarse Fine Sand	24	Soil Constants SANS 3001:GR12		COLTO (1998)	-
Medium Fine Sand	19	Liquid Limit (%)		US Highway	A-2-4
Fine Fine Sand	14	Plasticity Index (%)	NP	Group Index	0
Silt and Clay	15	Linear Shrinkage (%)	0.0		

Remarks

Technical Signatory: _____

Madoda Ngwenya

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Results marked "#" in this report are not included in the SANAS schedule of Accreditation for this laboratory.

Test Report for Mod CBR Road Indicator Report SANS 3001-GR1,GR10,GR20,GR30,GR40

CLIENT: Makhuma Consulting Engineers
1468 Lowveld close
Pretoria
0034

DATE RECEIVED: 10/Feb/2022
DATE TESTED: 18/Feb/2022
DATE REPORTED: 25/Feb/2022
REPORT NO.: QOJ207/3

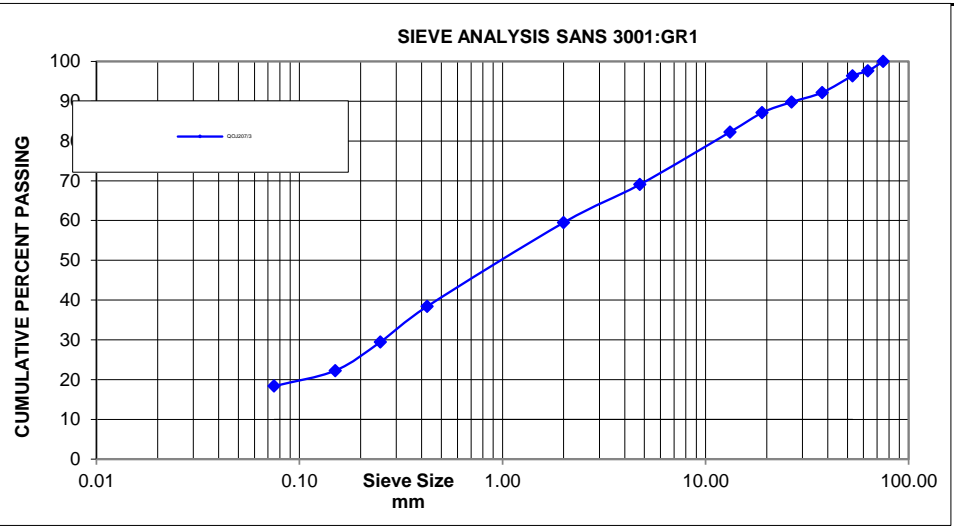
ATT: Hudson Mabelane

PROJECT: D192 Geotechnical Investigation

DESCRIPTION: Material sampled by Client
MATERIAL DESCR.: lt Brown Silty sand
TP : TP 3

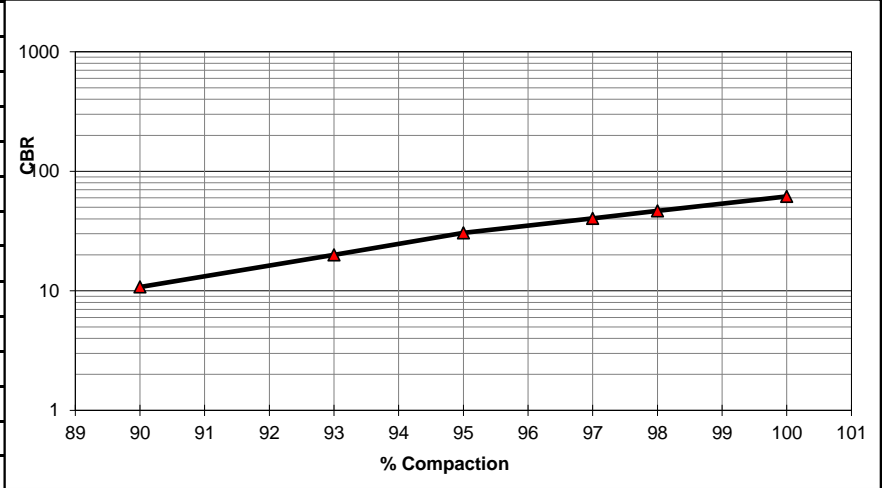
SAMPLE NO: QOJ207/3
JOB NUMBER: QOJ207
DEPTH (m): 0-0.3m below EGL

Sieve mm	% Passing
100.0	
75.0	100
63.0	98
50.0	96
37.5	92
28.0	90
20.0	87
14.0	82
5.00	69
2.00	59
0.425	38
0.250	29
0.150	22
0.075	18



Soil Mortar % SANS 3001-PR5		Grading Modulus SANS 3001:PR5		*Classifications	
Coarse Sand	35	Grading Modulus	1.84	Unified Soil Classification	SM(d)
Coarse Fine Sand	15	Soil Constants SANS 3001:GR12		COLTO (1998)	G6
Medium Fine Sand	12	Liquid Limit (%)		US Highway	A-1-b
Fine Fine Sand	7	Plasticity Index (%)	SP	Group Index	0
Silt and Clay	31	Linear Shrinkage (%)	1.0		

CBR SANS 3001:GR30,GR40			
MDD kg/m ³	2128		
OMC %	8.0		
Comp. Moisture %	8.1		
Dry Density kg/m ³	2130	2025	1919
Compaction %	100.1	95.2	90.2
% Swell	0.28	0.35	0.39
CBR @ % MDD			
@ 100% comp. :	62		
@ 98% comp. :	47		
@ 97% comp. :	40		
@ 95% comp. :	31		
@ 93% comp. :	20		
@ 90% comp. :	11		



Remarks

Technical Signatory: _____

Madoda Ngwenya

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Results marked "#" in this report are not included in the SANAS schedule of Accreditation for this laboratory.

Test report for Maximum Dry Density and Optimum Moisture Content SANS 3001-GR20,GR30

CLIENT: Makhuma Consulting Engineers
1468 Lowveld close
Pretoria
0034

DATE RECEIVED: 10/Feb/2022
DATE TESTED: 18/Feb/2022
DATE REPORTED: 25/Feb/2022
REPORT NO.: QOJ207/3

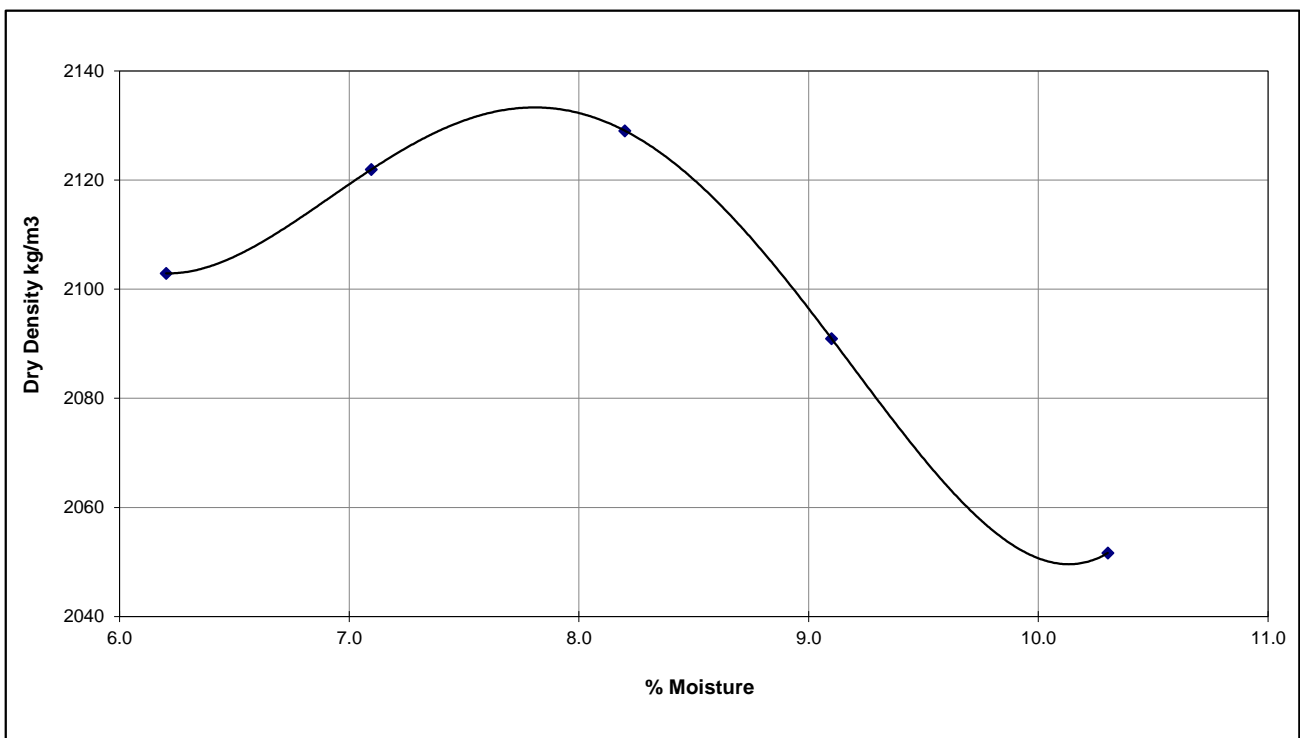
ATT: Hudson Mabelane

PROJECT: D192 Geotechnical Investigation


DESCRIPTION: Material sampled by Client
DESCRIPTION: It Brown Silty sand
TP : TP 3
DEPTH (m): 0-0.3m below EGL

SAMPLE NO: QOJ207/3
JOB NUMBER: QOJ207
PREPERATION METHOD: Scalping

Maximum Dry Density (MDD) - SANS 3001: GR30, GR20						
Point No	1	2	3	4	5	
Dry Density MDD kg/m ³	2122	2129	2091	2052	2103	
Moisture Content OMC %	7.1	8.2	9.1	10.3	6.2	



Maximum Dry Density MDD kg/m ³	2128
Optimum Moisture Content OMC %	8

Technical Signatory: 
Madoda Ngwenya

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Results marked "#" in this report are not included in the SANAS schedule of Accreditation for this laboratory.

Test Report for Mod CBR Road Indicator Report SANS 3001-GR1,GR10,GR20,GR30,GR40

CLIENT: Makhuma Consulting Engineers
1468 Lowveld close
Pretoria
0034

DATE RECEIVED: 10/Feb/2022
DATE TESTED: 18/Feb/2022
DATE REPORTED: 25/Feb/2022
REPORT NO.: QOJ207/4

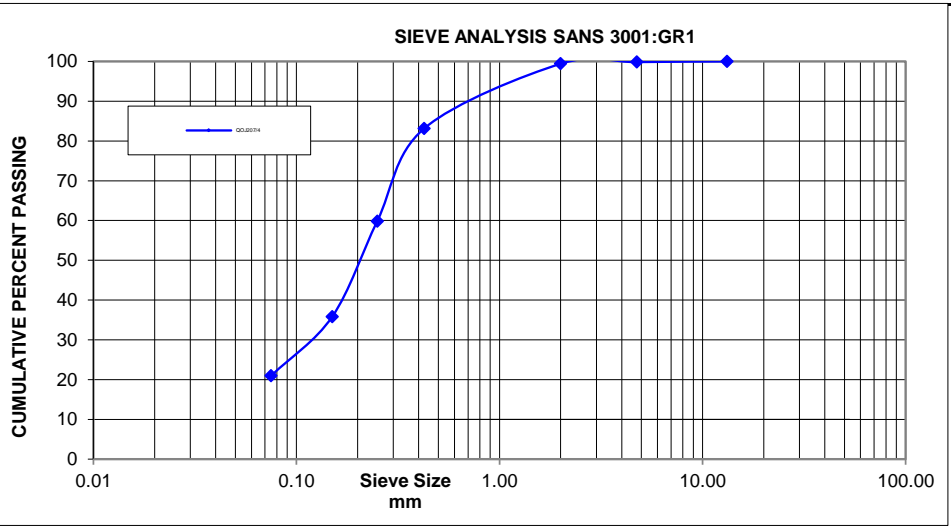
ATT: Hudson Mabelane

PROJECT: D192 Geotechnical Investigation

DESCRIPTION: Material sampled by Client
MATERIAL DESCR.: drk Yel. Orange Silty sand
TP : TP 4

SAMPLE NO: QOJ207/4
JOB NUMBER: QOJ207
DEPTH (m): 0.05-0.55m below EGL

Sieve mm	% Passing
100.0	
75.0	
63.0	
50.0	
37.5	
28.0	
20.0	
14.0	100
5.00	100
2.00	99
0.425	83
0.250	60
0.150	36
0.075	21



Soil Mortar % SANS 3001-PR5		Grading Modulus SANS 3001:PR5		*Classifications	
Coarse Sand	16	Grading Modulus	0.97	Unified Soil Classification	SM(d)
Coarse Fine Sand	23	Soil Constants SANS 3001:GR12		COLTO (1998)	-
Medium Fine Sand	24	Liquid Limit (%)		US Highway	A-2-4
Fine Fine Sand	15	Plasticity Index (%)	NP	Group Index	0
Silt and Clay	21	Linear Shrinkage (%)	0.0		

Remarks

Technical Signatory: _____

Madoda Ngwenya

*The above test results are only relevant to samples delivered and tested at the laboratory. This report shall not be reproduced or altered without the prior consent of the laboratory, except copied in full. * Opinions and interpretations expressed herein are outside the scope of SANAS accreditation.*

Results marked "#" in this report are not included in the SANAS schedule of Accreditation for this laboratory.

Test Report for Foundation Indicator

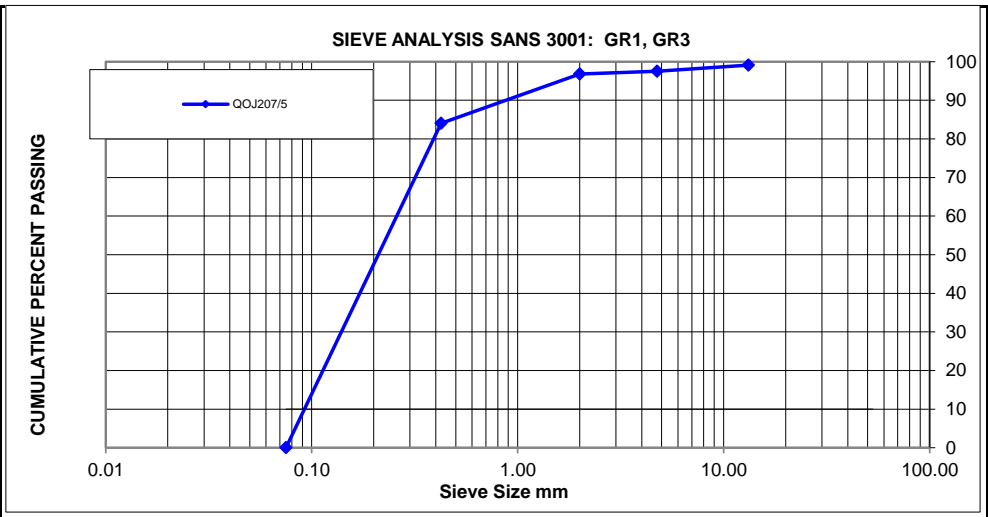
Client Name: Makhuma Consulting Engineers	Date received: 10/Feb/2022
Client Address: 1468 Lowveld close Pretoria	Date Tested: 18/Feb/2022
	Date reported: 25/Feb/2022
	Report No: QOJ207/5

Attestion: Hudson Mabelane

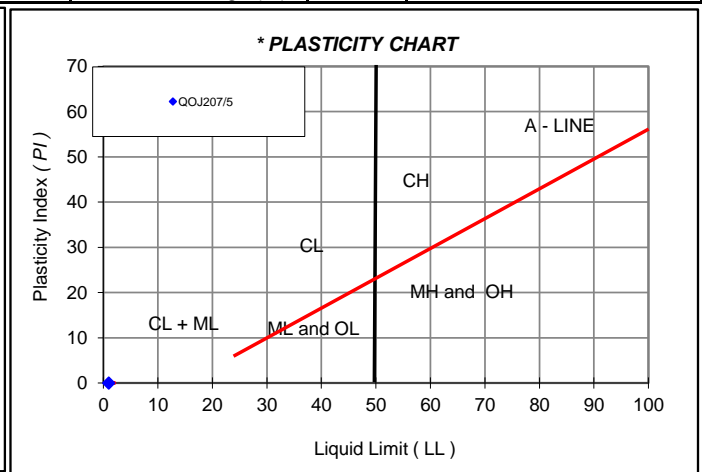
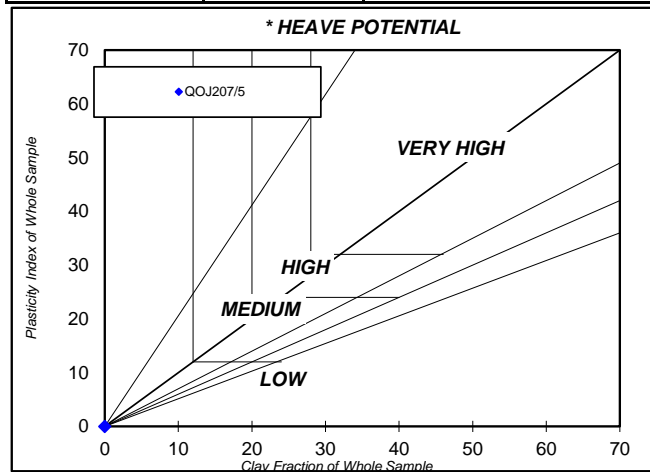
Project: D192 Geotechnical Investigation

Description: Material sampled by Client	Sample No.: QOJ207/5
Description: drk Reddish Brown Silty sand	Job Number: QOJ207
TP : TP 5	Depth (m): 0.3-0.9m below EGL

Sieve mm	% Passing
100.0	
75.0	
63.0	
50.0	
37.5	
28.0	
20.0	
14.0	99
5.00	98
2.00	97
0.425	84
0.075	21



#Hydrometer Analysis SANS 3001: GR3		*Classification Grain size Boundaries %		*Grading Modulus SANS 3001 : PR5		*Classifications	
#N/A	#DIV/0!	Clay	#DIV/0!	Grading Modulus	0.98	USCS	SM(d)
#N/A	#DIV/0!	Silt	#DIV/0!	SANS 3001:GR12		COLTO (1998)	-
#N/A	#DIV/0!	Sand	#DIV/0!	Liquid Limit (%)		US Highway	A-2-4
#N/A	#DIV/0!	Gravel	3	Plasticity Index (%)	NP	Group Index	0
#N/A	#DIV/0!			Linear Shrinkage (%)	0.0		



Remarks
The material is too sandy, therefore no MOD & CBR could be tested

Technical Signatory:
Madoda Ngwenya

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Results marked "#" in this report are not included in the SANAS schedule of Accreditation for this laboratory.

Test Report for Mod CBR Road Indicator Report SANS 3001-GR1,GR10,GR20,GR30,GR40

CLIENT: Makhuma Consulting Engineers
1468 Lowveld close
Pretoria
0034

DATE RECEIVED: 10/Feb/2022
DATE TESTED: 18/Feb/2022
DATE REPORTED: 25/Feb/2022
REPORT NO.: QOJ207/6

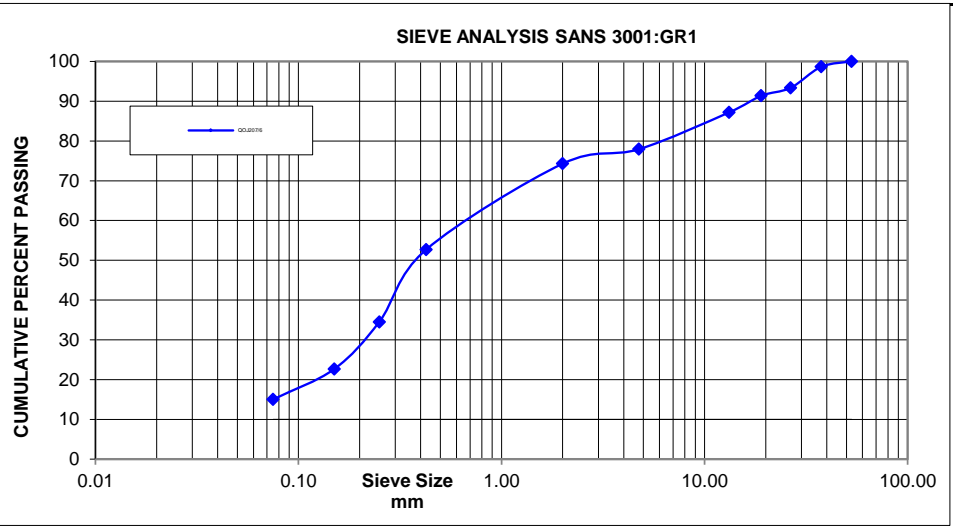
ATT: Hudson Mabelane

PROJECT: D192 Geotechnical Investigation

DESCRIPTION: Material sampled by Client
MATERIAL DESCR.: lt Yellow Silty sand
TP : TP 6

SAMPLE NO: QOJ207/6
JOB NUMBER: QOJ207
DEPTH (m): 0-0.3m below EGL

Sieve mm	% Passing
100.0	
75.0	
63.0	
50.0	100
37.5	99
28.0	93
20.0	91
14.0	87
5.00	78
2.00	74
0.425	53
0.250	35
0.150	23
0.075	15



Soil Mortar % SANS 3001-PR5		Grading Modulus SANS 3001:PR5		*Classifications	
Coarse Sand	29	Grading Modulus	1.58	Unified Soil Classification	SM(d)
Coarse Fine Sand	24	Soil Constants SANS 3001:GR12		COLTO (1998)	#DIV/0!
Medium Fine Sand	16	Liquid Limit (%)		US Highway	A-2-4
Fine Fine Sand	10	Plasticity Index (%)	NP	Group Index	0
Silt and Clay	20	Linear Shrinkage (%)	0.0		

Remarks

Technical Signatory: _____

Madoda Ngwenya

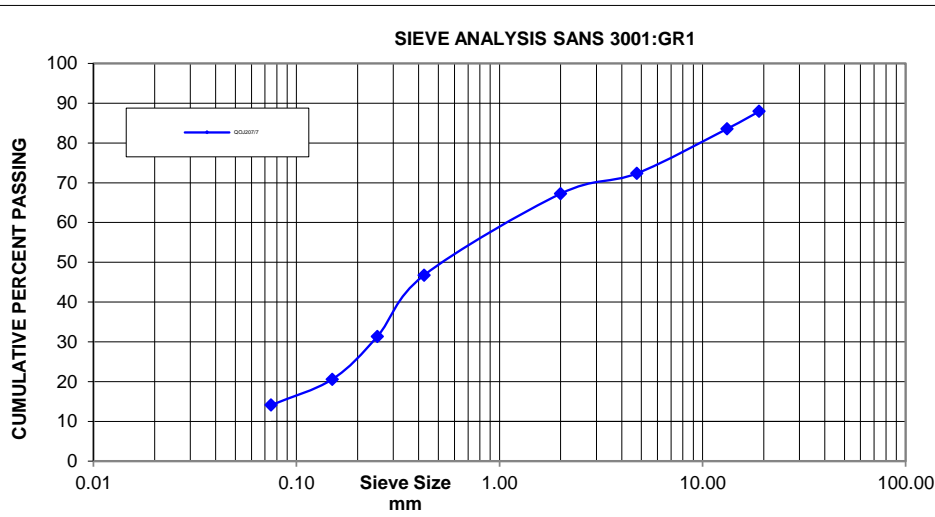
*The above test results are only relevant to samples delivered and tested at the laboratory. This report shall not be reproduced or altered without the prior consent of the laboratory, except copied in full. * Opinions and interpretations expressed herein are outside the scope of SANAS accreditation.*

Results marked "#" in this report are not included in the SANAS schedule of Accreditation for this laboratory.

Test Report for Mod CBR Road Indicator Report SANS 3001-GR1,GR10,GR20,GR30,GR40

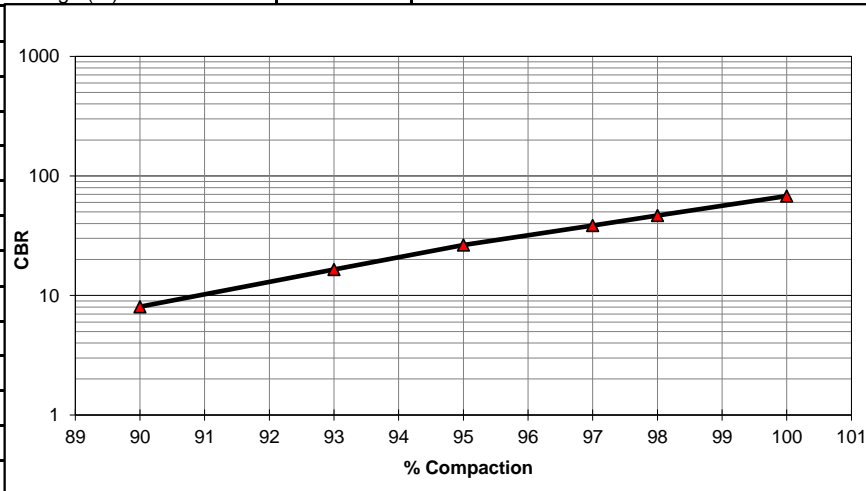
CLIENT:	Makhuma Consulting Engineers	DATE RECEIVED:	10/Feb/2022
	1468 Lowveld close	DATE TESTED:	18/Feb/2022
	Pretoria	DATE REPORTED:	25/Feb/2022
	0034	REPORT NO.:	QOJ207/7
ATT:	Hudson Mabelane		
PROJECT:	D192 Geotechnical Investigation		
DESCRIPTION:	Material sampled by Client	SAMPLE NO:	QOJ207/7
MATERIAL DESCR.:	lt Yellow Silty sand	JOB NUMBER:	QOJ207
TP :	TP 7	DEPTH (m):	0.2-0.8m below EGL

Sieve mm	% Passing
100.0	
75.0	
63.0	
50.0	
37.5	
28.0	
20.0	88
14.0	84
5.00	72
2.00	67
0.425	47
0.250	31
0.150	21
0.075	14



Soil Mortar % SANS 3001-PR5		Grading Modulus SANS 3001-PR5		*Classifications	
Coarse Sand	30	Grading Modulus	1.72	Unified Soil Classification	SM(d)
Coarse Fine Sand	23	Soil Constants SANS 3001:GR12		COLTO (1998)	G6
Medium Fine Sand	16	Liquid Limit (%)		US Highway	A-1-b
Fine Fine Sand	10	Plasticity Index (%)	NP	Group Index	0
Silt and Clay	21	Linear Shrinkage (%)	0.0		

CBR SANS 3001:GR30,GR40			
MDD kg/m ³	2124		
OMC %	5.3		
Comp. Moisture %	5.4		
Dry Density kg/m ³	2120	2015	1909
Compaction %	99.8	94.9	89.9
% Swell	0.93	1.57	2.01
CBR @ % MDD			
@ 100% comp. :	68		
@ 98% comp. :	47		
@ 97% comp. :	39		
@ 95% comp. :	26		
@ 93% comp. :	17		
@ 90% comp. :	8		



Remarks

Technical Signatory:

Madoda Ngwenya

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Test report for Maximum Dry Density and Optimum Moisture Content SANS 3001-GR20,GR30

CLIENT: Makhuma Consulting Engineers
1468 Lowveld close
Pretoria
0034

DATE RECEIVED: 10/Feb/2022
DATE TESTED: 18/Feb/2022
DATE REPORTED: 25/Feb/2022
REPORT NO.: QOJ207/7

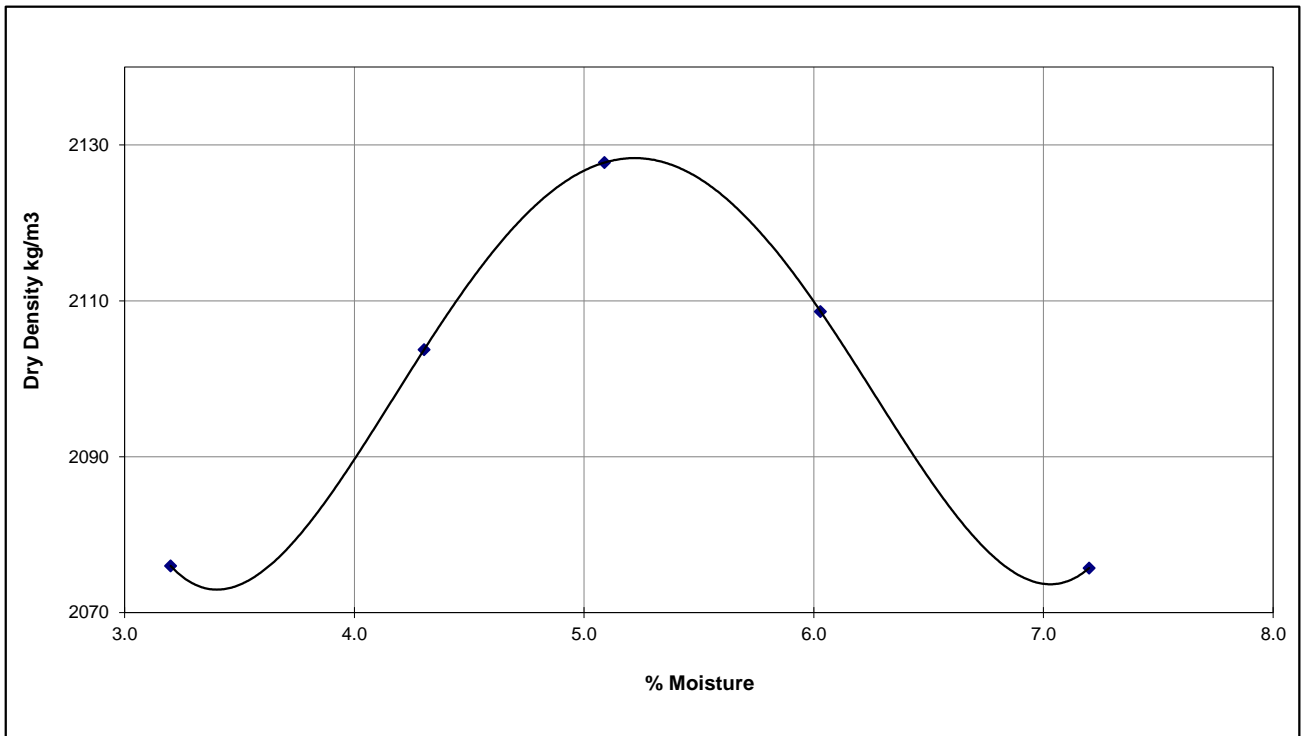
ATT: Hudson Mabelane

PROJECT: D192 Geotechnical Investigation


DESCRIPTION: Material sampled by Client
DESCRIPTION: lt Yellow Silty sand
TP : TP 7
DEPTH (m): 0.2-0.8m below EGL

SAMPLE NO: QOJ207/7
JOB NUMBER: QOJ207
PREPERATION METHOD: Scalping

Maximum Dry Density (MDD) - SANS 3001: GR30, GR20						
Point No	1	2	3	4	5	
Dry Density MDD kg/m ³	2128	2109	2076	2104	2076	
Moisture Content OMC %	5.1	6.0	7.2	4.3	3.2	



Maximum Dry Density MDD kg/m ³	2124
Optimum Moisture Content OMC %	5.3

Technical Signatory: 
Madoda Ngwenya

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Results marked "#" in this report are not included in the SANAS schedule of Accreditation for this laboratory.

Test Report for Mod CBR Road Indicator Report SANS 3001-GR1,GR10,GR20,GR30,GR40

CLIENT: Makhuma Consulting Engineers
1468 Lowveld close
Pretoria
0034

DATE RECEIVED: 10/Feb/2022
DATE TESTED: 18/Feb/2022
DATE REPORTED: 25/Feb/2022
REPORT NO.: QOJ207/8

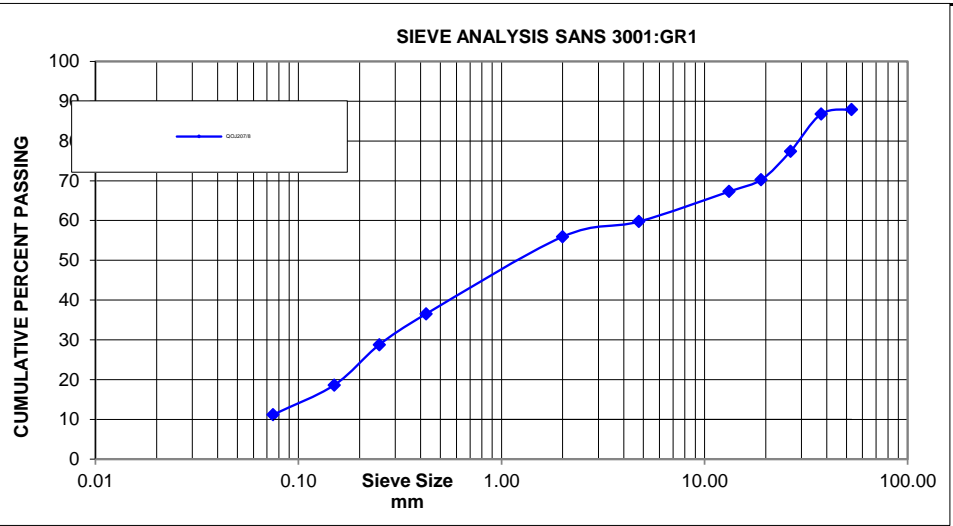
ATT: Hudson Mabelane

PROJECT: D192 Geotechnical Investigation

DESCRIPTION: Material sampled by Client
MATERIAL DESCR.: lt Brown Poorly graded silty/clayey sand
TP : TP 9

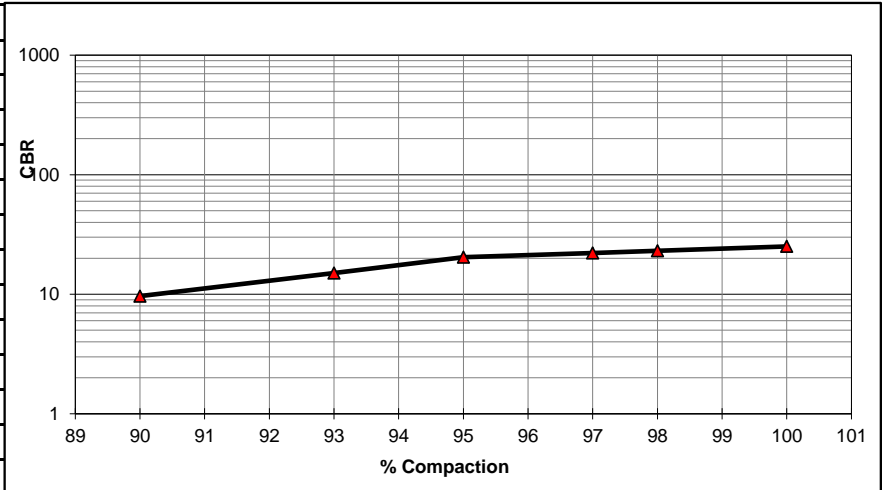
SAMPLE NO: QOJ207/8
JOB NUMBER: QOJ207
DEPTH (m): 0.3-1.3m below EGL

Sieve mm	% Passing
100.0	
75.0	
63.0	
50.0	88
37.5	87
28.0	77
20.0	70
14.0	67
5.00	60
2.00	56
0.425	37
0.250	29
0.150	19
0.075	11



Soil Mortar % SANS 3001-PR5		Grading Modulus SANS 3001:PR5		*Classifications	
Coarse Sand	35	Grading Modulus	1.96	Unified Soil Classification	sp/sm/sc
Coarse Fine Sand	14	Soil Constants SANS 3001:GR12		COLTO (1998)	G7
Medium Fine Sand	18	Liquid Limit (%)	20	US Highway	A-1-b
Fine Fine Sand	13	Plasticity Index (%)	5	Group Index	0

CBR SANS 3001:GR30,GR40			
MDD kg/m ³	2074		
OMC %	8.1		
Comp. Moisture %	7.9		
Dry Density kg/m ³	2074	1972	1868
Compaction %	100.0	95.1	90.1
% Swell	0.67	0.98	1.22
CBR @ % MDD			
@ 100% comp. :	25		
@ 98% comp. :	23		
@ 97% comp. :	22		
@ 95% comp. :	20		
@ 93% comp. :	15		
@ 90% comp. :	10		



Remarks

Technical Signatory: _____

Madoda Ngwenya

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Test report for Maximum Dry Density and Optimum Moisture Content SANS 3001-GR20,GR30

CLIENT: Makhuma Consulting Engineers
1468 Lowveld close
Pretoria
0034

DATE RECEIVED: 10/Feb/2022
DATE TESTED: 18/Feb/2022
DATE REPORTED: 25/Feb/2022
REPORT NO.: QOJ207/8

ATT: Hudson Mabelane

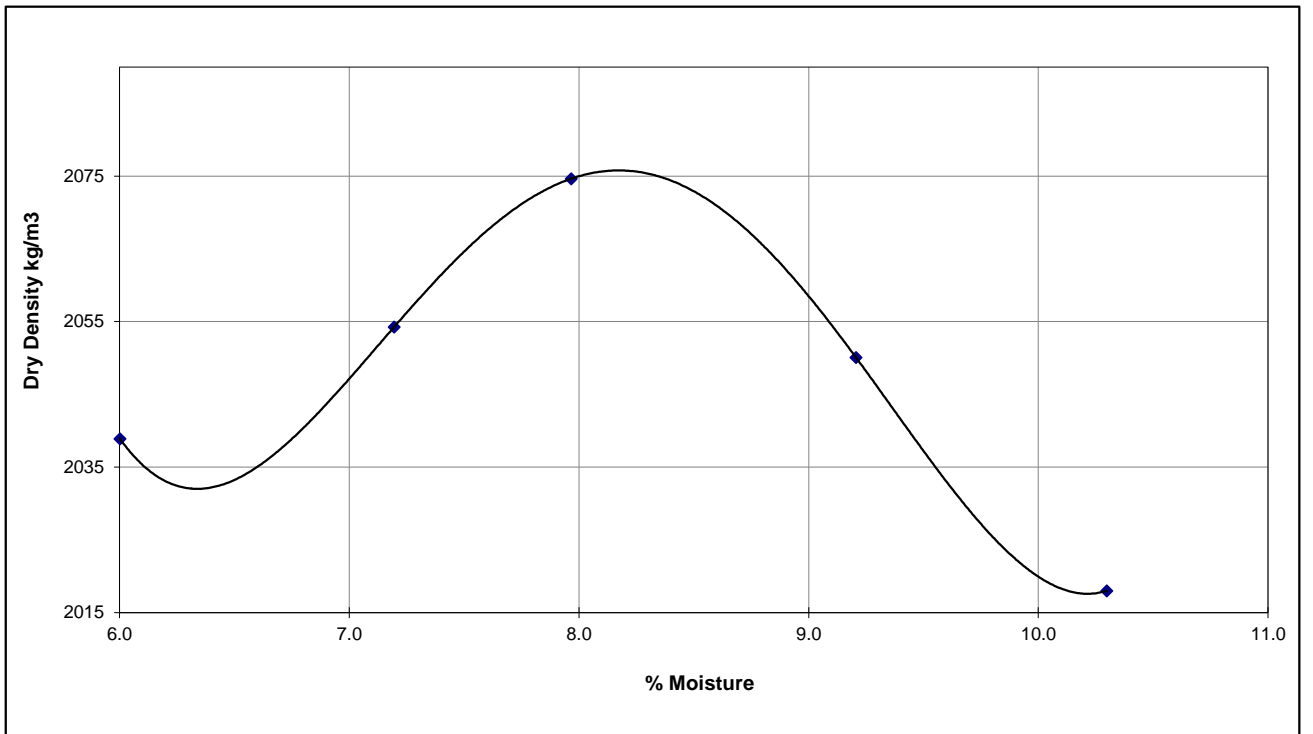
PROJECT: D192 Geotechnical Investigation

DESCRIPTION: Material sampled by Client
DESCRIPTION: It Brown Poorly graded silty/clayey sand
TP : TP 9
DEPTH (m): 0.3-1.3m below EGL


SAMPLE NO: QOJ207/8
JOB NUMBER: QOJ207
PREPERATION METHOD: Scalping

Maximum Dry Density (MDD) - SANS 3001: GR30, GR20

Point No	1	2	3	4	5
Dry Density MDD kg/m ³	2039	2054	2075	2050	2018
Moisture Content OMC %	6.0	7.2	8.0	9.2	10.3



Maximum Dry Density MDD kg/m³	2074
Optimum Moisture Content OMC %	8.1

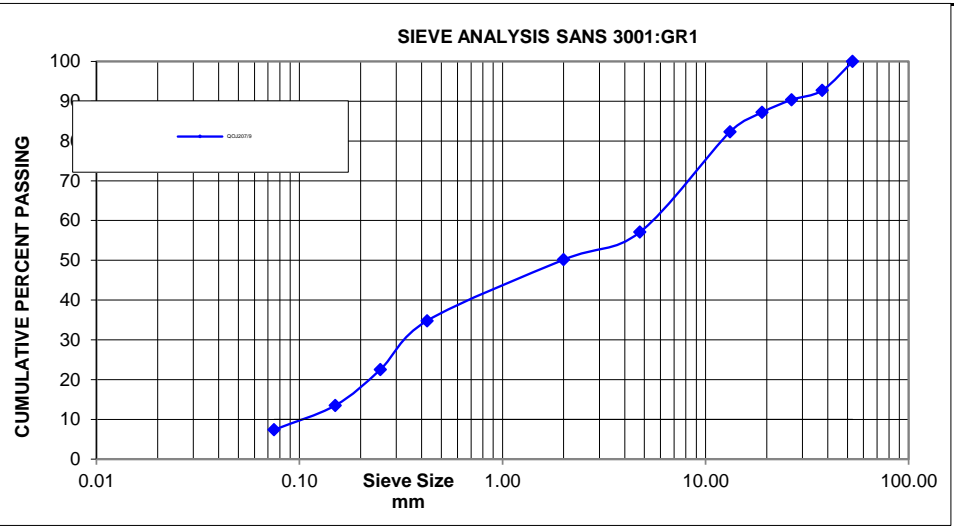
Technical Signatory: 
Madoda Ngwenya

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Results marked "#" in this report are not included in the SANAS schedule of Accreditation for this laboratory.*

Test Report for Mod CBR Road Indicator Report SANS 3001-GR1,GR10,GR20,GR30,GR40

CLIENT:	Makhuma Consulting Engineers	DATE RECEIVED:	10/Feb/2022
	1468 Lowveld close	DATE TESTED:	18/Feb/2022
	Pretoria	DATE REPORTED:	25/Feb/2022
	0034	REPORT NO.:	QOJ207/9
ATT:	Hudson Mabelane		
PROJECT:	D192 Geotechnical Investigation		
DESCRIPTION:	Material sampled by Client	SAMPLE NO:	QOJ207/9
MATERIAL DESCR.:	lt Brown Poorly graded silty sand	JOB NUMBER:	QOJ207
TP :	TP 10	DEPTH (m):	0.75-1.4m below EGL

Sieve mm	% Passing
100.0	
75.0	
63.0	
50.0	100
37.5	93
28.0	90
20.0	87
14.0	82
5.00	57
2.00	50
0.425	35
0.250	23
0.150	13
0.075	7



Soil Mortar % SANS 3001-PR5		Grading Modulus SANS 3001:PR5		*Classifications	
Coarse Sand	31	Grading Modulus	2.08	Unified Soil Classification	sp/sm
Coarse Fine Sand	24	Soil Constants SANS 3001:GR12		COLTO (1998)	-
Medium Fine Sand	18	Liquid Limit (%)		US Highway	A-1-b
Fine Fine Sand	12	Plasticity Index (%)	NP	Group Index	0
Silt and Clay	15	Linear Shrinkage (%)	0.0		

Remarks

Technical Signatory: _____

Madoda Ngwenya

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Test Report for Mod CBR Road Indicator Report SANS 3001-GR1,GR10,GR20,GR30,GR40

CLIENT: Makhuma Consulting Engineers
1468 Lowveld close
Pretoria
0034

DATE RECEIVED: 10/Feb/2022
DATE TESTED: 18/Feb/2022
DATE REPORTED: 25/Feb/2022
REPORT NO.: QOJ207/10

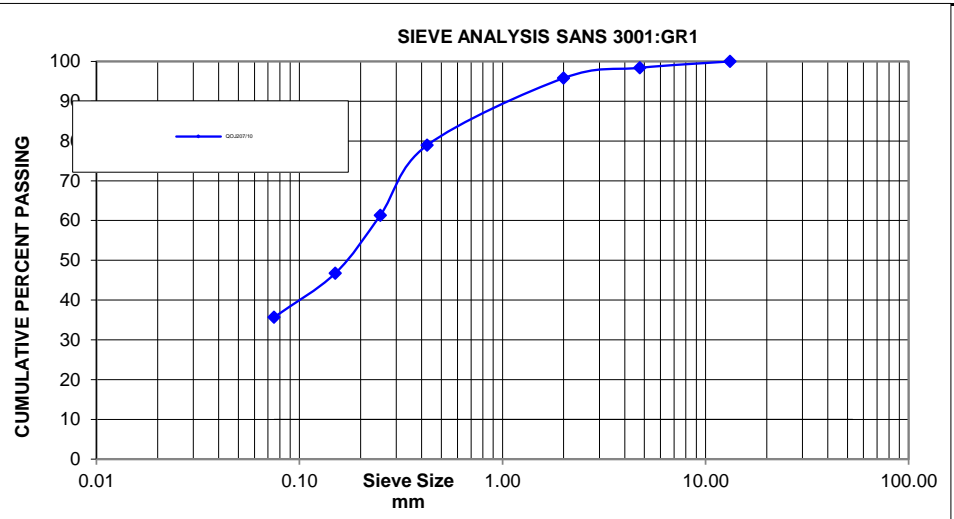
ATT: Hudson Mabelane

PROJECT: D192 Geotechnical Investigation

DESCRIPTION: Material sampled by Client
MATERIAL DESCR.: drk Yellow Silty/Clayey sand
TP : TP 12

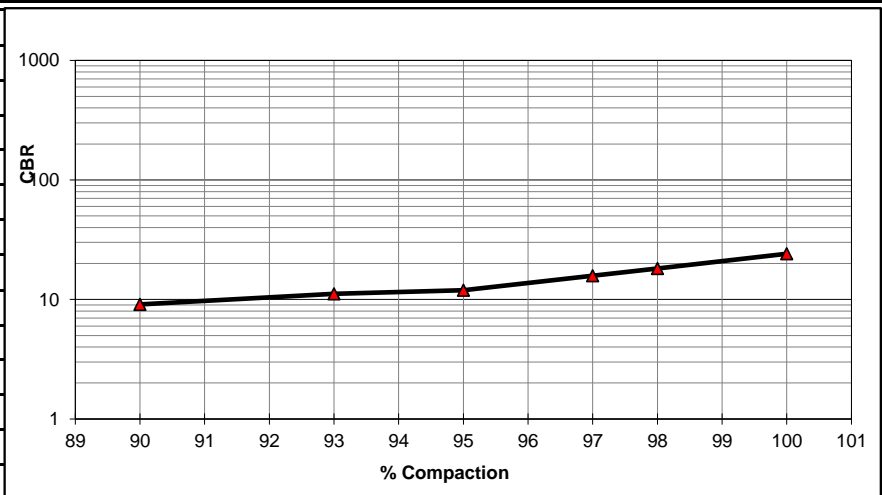
SAMPLE NO: QOJ207/10
JOB NUMBER: QOJ207
DEPTH (m): 0-0.7m below EGL

Sieve mm	% Passing
100.0	
75.0	
63.0	
50.0	
37.5	
28.0	
20.0	
14.0	100
5.00	98
2.00	96
0.425	79
0.250	61
0.150	47
0.075	36



Soil Mortar % SANS 3001-PR5		Grading Modulus SANS 3001:PR5		*Classifications	
Coarse Sand	18	Grading Modulus	0.90	Unified Soil Classification	sm/sc
Coarse Fine Sand	18	Soil Constants SANS 3001:GR12		COLTO (1998)	G8
Medium Fine Sand	15	Liquid Limit (%)	20	US Highway	A-4
Fine Fine Sand	12	Plasticity Index (%)	5	Group Index	0
Silt and Clay	37	Linear Shrinkage (%)	2.5		

CBR SANS 3001:GR30,GR40			
MDD kg/m ³	2078		
OMC %	8.5		
Comp. Moisture %	8.5		
Dry Density kg/m ³	2096	1993	1888
Compaction %	100.9	95.9	90.8
% Swell	0.69	0.83	0.98
CBR @ % MDD			
@ 100% comp. :	24		
@ 98% comp. :	18		
@ 97% comp. :	16		
@ 95% comp. :	12		
@ 93% comp. :	11		
@ 90% comp. :	9		



Remarks

Technical Signatory:

Madoda Ngwenya

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Test report for Maximum Dry Density and Optimum Moisture Content SANS 3001-GR20,GR30

CLIENT: Makhuma Consulting Engineers
1468 Lowveld close
Pretoria
0034

DATE RECEIVED: 10/Feb/2022
DATE TESTED: 18/Feb/2022
DATE REPORTED: 25/Feb/2022
REPORT NO.: QOJ207/10

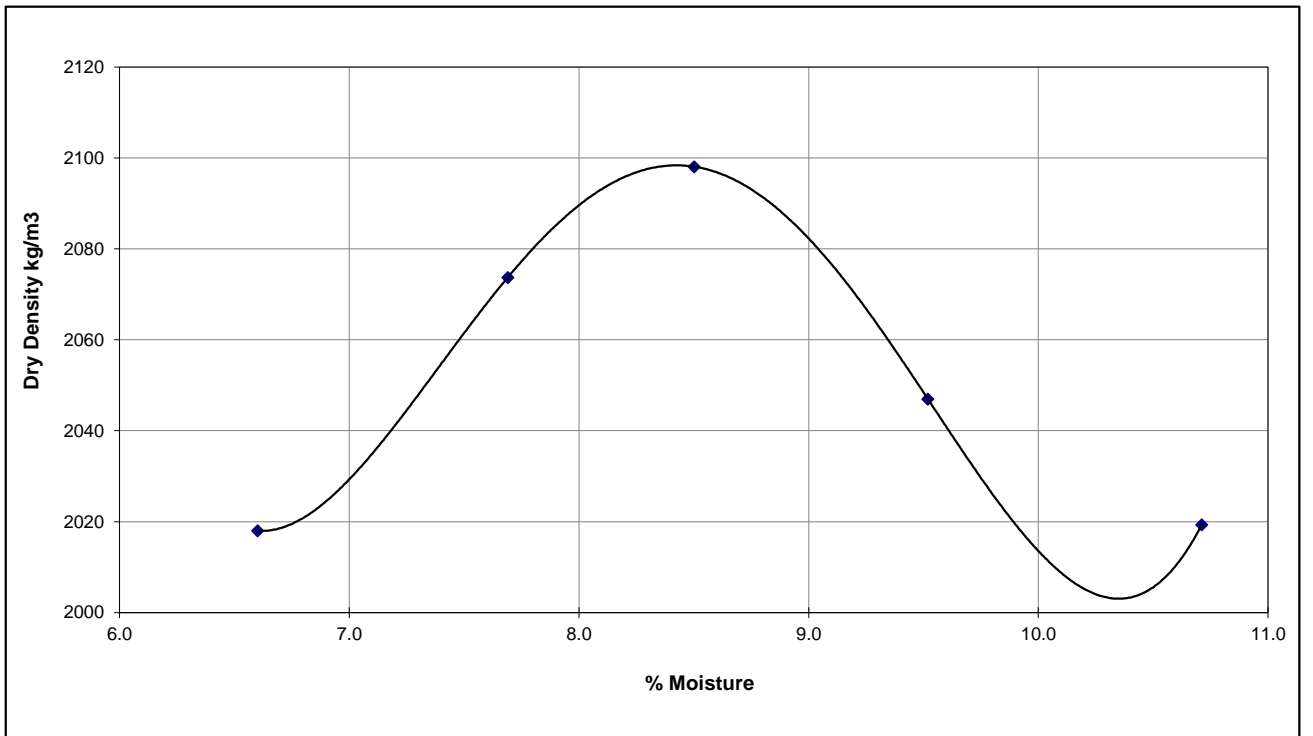
ATT: Hudson Mabelane

PROJECT: D192 Geotechnical Investigation


DESCRIPTION: Material sampled by Client
DESCRIPTION: drk Yellow Silty/Clayey sand
TP : TP 12
DEPTH (m): 0-0.7m below EGL

SAMPLE NO: QOJ207/10
JOB NUMBER: QOJ207
PREPERATION METHOD: Scalping

Maximum Dry Density (MDD) - SANS 3001: GR30, GR20						
Point No	1	2	3	4	5	
Dry Density MDD kg/m ³	2098	2047	2019	2074	2018	
Moisture Content OMC %	8.5	9.5	10.7	7.7	6.6	



Maximum Dry Density MDD kg/m ³	2078
Optimum Moisture Content OMC %	8.5

Technical Signatory: 
Madoda Ngwenya

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Test Report for Mod CBR Road Indicator Report SANS 3001-GR1,GR10,GR20,GR30,GR40

CLIENT: Makhuma Consulting Engineers
1468 Lowveld close
Pretoria
0034

DATE RECEIVED: 10/Feb/2022
DATE TESTED: 18/Feb/2022
DATE REPORTED: 25/Feb/2022
REPORT NO.: QOJ207/11

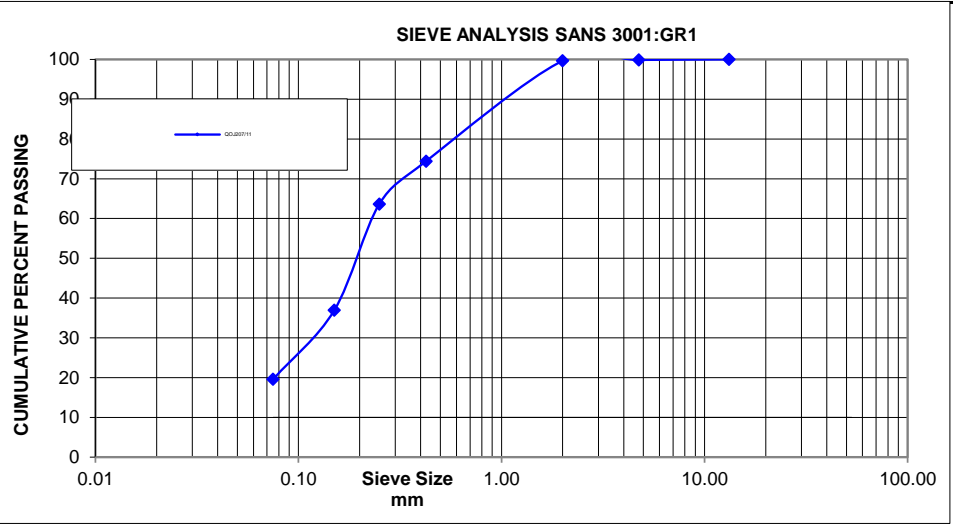
ATT: Hudson Mabelane

PROJECT: D192 Geotechnical Investigation

DESCRIPTION: Material sampled by Client
MATERIAL DESCR.: drk Brown Silty sand
TP : TP 13

SAMPLE NO: QOJ207/11
JOB NUMBER: QOJ207
DEPTH (m): 0.2-1.4m below EGL

Sieve mm	% Passing
100.0	
75.0	
63.0	
50.0	
37.5	
28.0	
20.0	
14.0	100
5.00	100
2.00	100
0.425	74
0.250	64
0.150	37
0.075	20



Soil Mortar % SANS 3001-PR5		Grading Modulus SANS 3001:PR5		*Classifications	
Coarse Sand	25	Grading Modulus	1.06	Unified Soil Classification	SM(d)
Coarse Fine Sand	11	Soil Constants SANS 3001:GR12		COLTO (1998)	#DIV/0!
Medium Fine Sand	27	Liquid Limit (%)		US Highway	A-2-4
Fine Fine Sand	17	Plasticity Index (%)	NP	Group Index	0
Silt and Clay	20	Linear Shrinkage (%)	0.0		

Remarks

Technical Signatory: _____

Madoda Ngwenya

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Results marked "#" in this report are not included in the SANAS schedule of Accreditation for this laboratory.

Test Report for Mod CBR Road Indicator Report SANS 3001-GR1,GR10,GR20,GR30,GR40

CLIENT: Makhuma Consulting Engineers
1468 Lowveld close
Pretoria
0034

DATE RECEIVED: 10/Feb/2022
DATE TESTED: 18/Feb/2022
DATE REPORTED: 25/Feb/2022
REPORT NO.: QOJ207/12

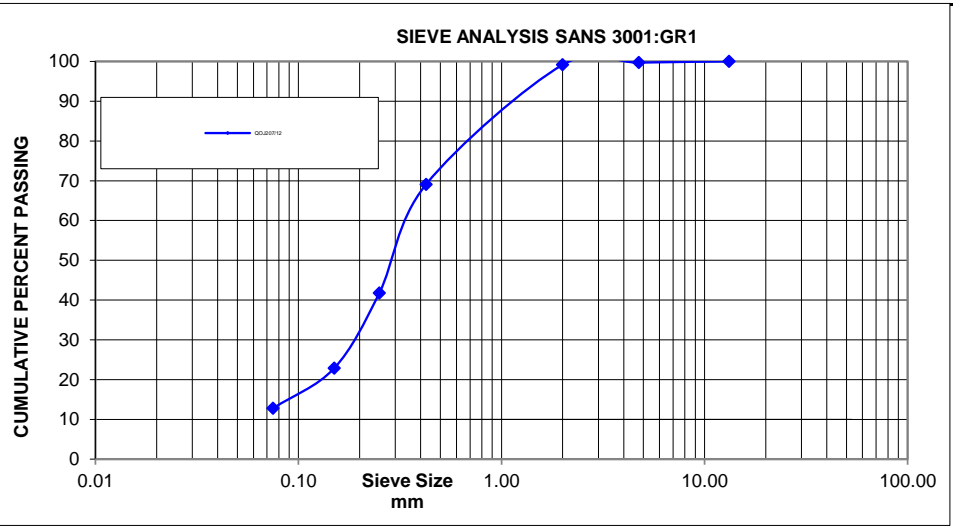
ATT: Hudson Mabelane

PROJECT: D192 Geotechnical Investigation

DESCRIPTION: Material sampled by Client
MATERIAL DESCR.: drk Brown Silty sand
TP : TP 14

SAMPLE NO: QOJ207/12
JOB NUMBER: QOJ207
DEPTH (m): 0.1-1.1m below EGL

Sieve mm	% Passing
100.0	
75.0	
63.0	
50.0	
37.5	
28.0	
20.0	
14.0	100
5.00	100
2.00	99
0.425	69
0.250	42
0.150	23
0.075	13



Soil Mortar % SANS 3001-PR5		Grading Modulus SANS 3001:PR5		*Classifications	
Coarse Sand	30	Grading Modulus	1.19	Unified Soil Classification	SM(d)
Coarse Fine Sand	28	Soil Constants SANS 3001:GR12		COLTO (1998)	-
Medium Fine Sand	19	Liquid Limit (%)		US Highway	A-2-4
Fine Fine Sand	10	Plasticity Index (%)	NP	Group Index	0
Silt and Clay	13	Linear Shrinkage (%)	0.0		

Remarks

Technical Signatory:

The material is too sandy, therefore no MOD & CBR could be tested

Madoda Ngwenya

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Results marked "#" in this report are not included in the SANAS schedule of Accreditation for this laboratory.

Test Report for Mod CBR Road Indicator Report SANS 3001-GR1,GR10,GR20,GR30,GR40

CLIENT: Makhuma Consulting Engineers
1468 Lowveld close
Pretoria
0034

DATE RECEIVED: 10/Feb/2022
DATE TESTED: 18/Feb/2022
DATE REPORTED: 25/Feb/2022
REPORT NO.: QOJ207/13

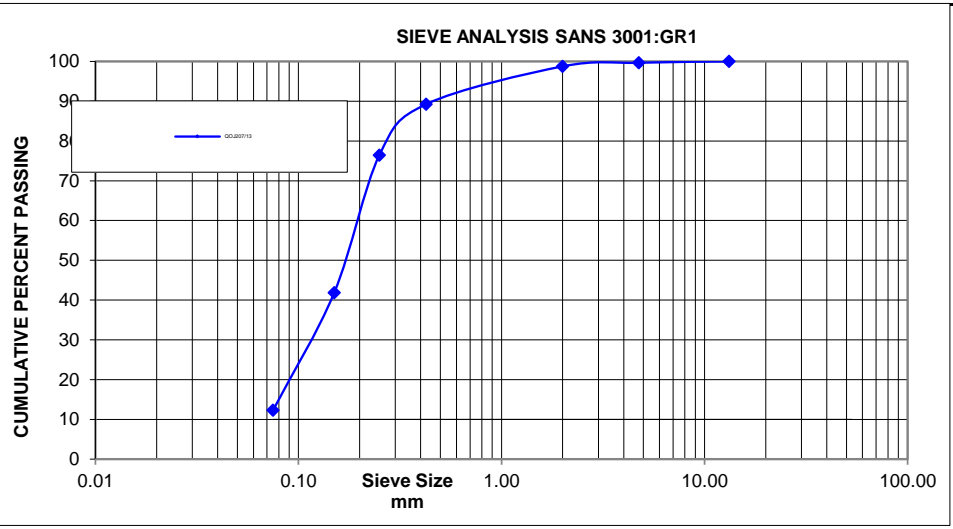
ATT: Hudson Mabelane

PROJECT: D192 Geotechnical Investigation

DESCRIPTION: Material sampled by Client
MATERIAL DESCR.: lt Brown Poorly graded silty sand
TP : TP 16

SAMPLE NO: QOJ207/13
JOB NUMBER: QOJ207
DEPTH (m): 1-1.3m below EGL

Sieve mm	% Passing
100.0	
75.0	
63.0	
50.0	
37.5	
28.0	
20.0	
14.0	100
5.00	100
2.00	99
0.425	89
0.250	76
0.150	42
0.075	12



Soil Mortar % SANS 3001-PR5		Grading Modulus SANS 3001:PR5		*Classifications	
Coarse Sand	10	Grading Modulus	1.00	Unified Soil Classification	sp/sm
Coarse Fine Sand	13	Soil Constants SANS 3001:GR12		COLTO (1998)	-
Medium Fine Sand	35	Liquid Limit (%)		US Highway	A-2-4
Fine Fine Sand	30	Plasticity Index (%)	NP	Group Index	0
Silt and Clay	12	Linear Shrinkage (%)	0.0		

Remarks

Technical Signatory: _____

The material is too sandy, therefore no MOD & CBR could be tested

Madoda Ngwenya

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Results marked "#" in this report are not included in the SANAS schedule of Accreditation for this laboratory.

Test Report for Mod CBR Road Indicator Report SANS 3001-GR1,GR10,GR20,GR30,GR40

CLIENT: Makhuma Consulting Engineers
1468 Lowveld close
Pretoria
0034

DATE RECEIVED: 10/Feb/2022
DATE TESTED: 18/Feb/2022
DATE REPORTED: 25/Feb/2022
REPORT NO.: QOJ207/14

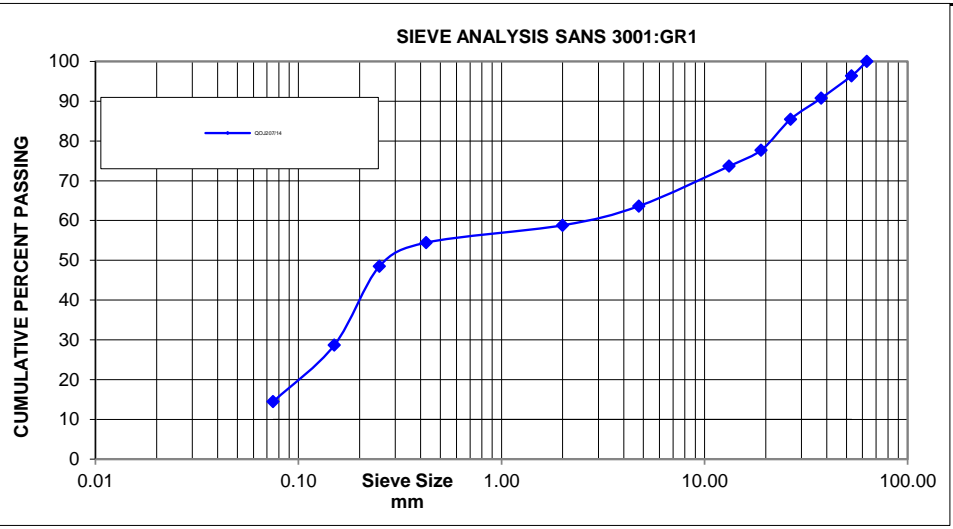
ATT: Hudson Mabelane

PROJECT: D192 Geotechnical Investigation

DESCRIPTION: Material sampled by Client
MATERIAL DESCR.: lt Brown Silty sand
TP : TP 17

SAMPLE NO: QOJ207/14
JOB NUMBER: QOJ207
DEPTH (m): 0.3-1.2m below EGL

Sieve mm	% Passing
100.0	
75.0	
63.0	100
50.0	96
37.5	91
28.0	85
20.0	78
14.0	74
5.00	64
2.00	59
0.425	54
0.250	48
0.150	29
0.075	14



Soil Mortar % SANS 3001-PR5		Grading Modulus SANS 3001:PR5		*Classifications	
Coarse Sand	7	Grading Modulus	1.72	Unified Soil Classification	SM(d)
Coarse Fine Sand	10	Soil Constants SANS 3001:GR12		COLTO (1998)	-
Medium Fine Sand	34	Liquid Limit (%)		US Highway	A-2-4
Fine Fine Sand	24	Plasticity Index (%)	NP	Group Index	0
Silt and Clay	25	Linear Shrinkage (%)	0.0		

Remarks

Technical Signatory: _____

Madoda Ngwenya

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Results marked "#" in this report are not included in the SANAS schedule of Accreditation for this laboratory.

Test Report for Mod CBR Road Indicator Report SANS 3001-GR1,GR10,GR20,GR30,GR40

CLIENT: Makhuma Consulting Engineers
1468 Lowveld close
Pretoria
0034

DATE RECEIVED: 10/Feb/2022
DATE TESTED: 18/Feb/2022
DATE REPORTED: 25/Feb/2022
REPORT NO.: QOJ207/15

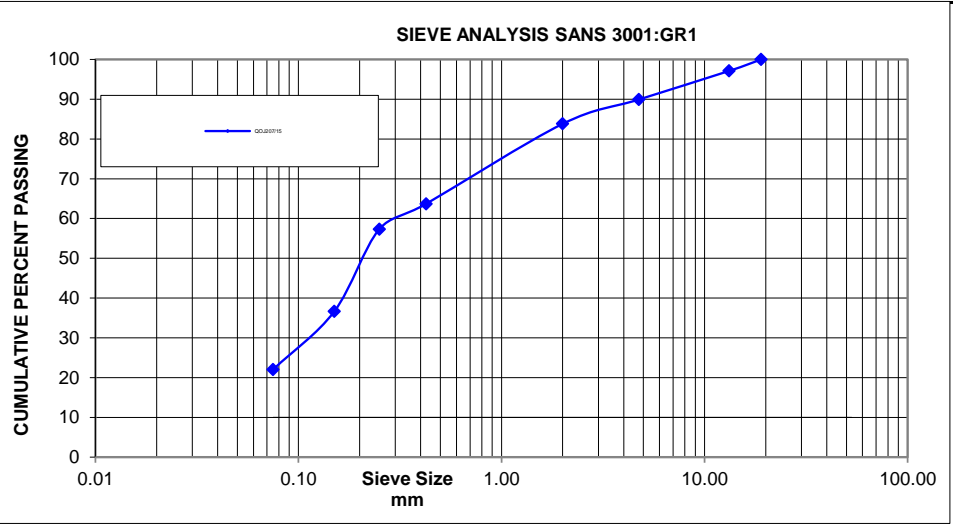
ATT: Hudson Mabelane

PROJECT: D192 Geotechnical Investigation

DESCRIPTION: Material sampled by Client
MATERIAL DESCR.: lt Brown Silty/Clayey sand
TP : TP 18

SAMPLE NO: QOJ207/15
JOB NUMBER: QOJ207
DEPTH (m): 0.4-1.0m below EGL

Sieve mm	% Passing
100.0	
75.0	
63.0	
50.0	
37.5	
28.0	
20.0	100
14.0	97
5.00	90
2.00	84
0.425	64
0.250	57
0.150	37
0.075	22



Soil Mortar % SANS 3001-PR5		Grading Modulus SANS 3001:PR5		*Classifications	
Coarse Sand	24	Grading Modulus	1.30	Unified Soil Classification	sm/sc
Coarse Fine Sand	8	Soil Constants SANS 3001:GR12		COLTO (1998)	-
Medium Fine Sand	25	Liquid Limit (%)	21	US Highway	A-2-4
Fine Fine Sand	17	Plasticity Index (%)	6	Group Index	0
Silt and Clay	26	Linear Shrinkage (%)	2.5		

Remarks

Technical Signatory: _____

The material is too sandy, therefore no MOD & CBR could be tested

Madoda Ngwenya

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Test Report for Mod CBR Road Indicator Report SANS 3001-GR1,GR10,GR20,GR30,GR40

CLIENT: Makhuma Consulting Engineers
1468 Lowveld close
Pretoria
0034

DATE RECEIVED: 10/Feb/2022
DATE TESTED: 18/Feb/2022
DATE REPORTED: 25/Feb/2022
REPORT NO.: QOJ207/16

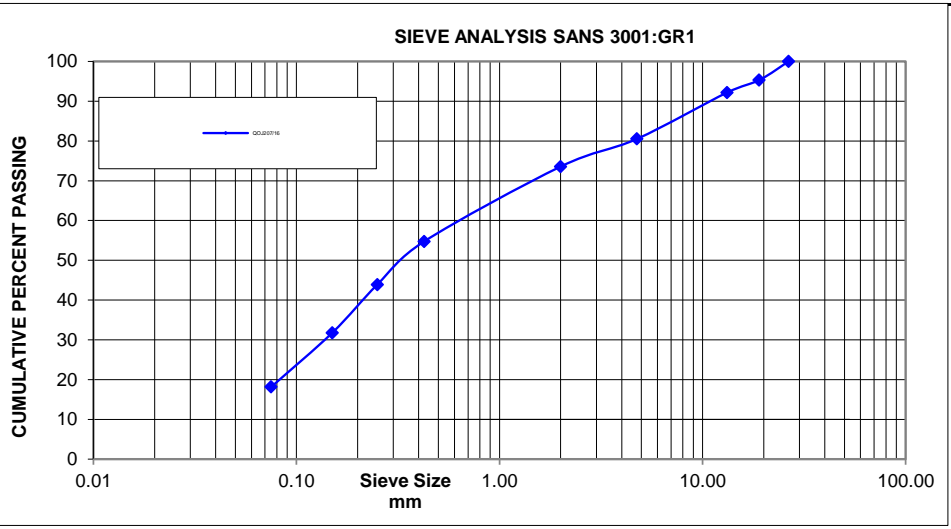
ATT: Hudson Mabelane

PROJECT: D192 Geotechnical Investigation

DESCRIPTION: Material sampled by Client
MATERIAL DESCR.: drk Brown Silty sand
TP : TP 8

SAMPLE NO: QOJ207/16
JOB NUMBER: QOJ207
DEPTH (m): 0-0.5m below EGL

Sieve mm	% Passing
100.0	
75.0	
63.0	
50.0	
37.5	
28.0	100
20.0	95
14.0	92
5.00	81
2.00	74
0.425	55
0.250	44
0.150	32
0.075	18



Soil Mortar % SANS 3001-PR5		Grading Modulus SANS 3001:PR5		*Classifications	
Coarse Sand	26	Grading Modulus	1.54	Unified Soil Classification	SM(d)
Coarse Fine Sand	15	Soil Constants SANS 3001:GR12		COLTO (1998)	-
Medium Fine Sand	16	Liquid Limit (%)		US Highway	A-2-4
Fine Fine Sand	19	Plasticity Index (%)	SP	Group Index	0
Silt and Clay	25	Linear Shrinkage (%)	1.0		

Remarks

Technical Signatory: _____

Madoda Ngwenya

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Results marked "#" in this report are not included in the SANAS schedule of Accreditation for this laboratory.

Test Report for Mod CBR Road Indicator Report SANS 3001-GR1,GR10,GR20,GR30,GR40

CLIENT: Makhuma Consulting Engineers
1468 Lowveld close
Pretoria
0034

DATE RECEIVED: 10/Feb/2022
DATE TESTED: 18/Feb/2022
DATE REPORTED: 25/Feb/2022
REPORT NO.: QOJ207/17

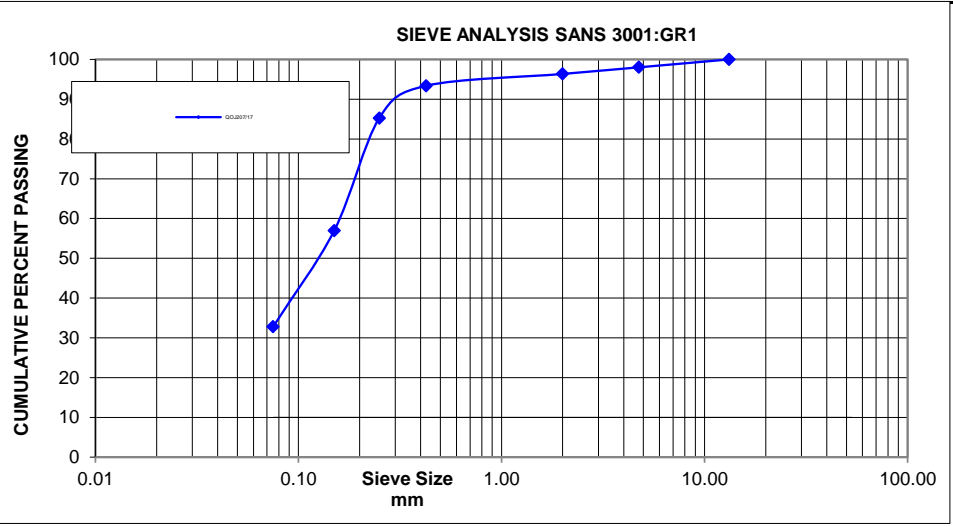
ATT: Hudson Mabelane

PROJECT: D192 Geotechnical Investigation

DESCRIPTION: Material sampled by Client
MATERIAL DESCR.: drk Yellow Clayey sand
TP : TP 20

SAMPLE NO: QOJ207/17
JOB NUMBER: QOJ207
DEPTH (m): 0.6-1.7m below EGL

Sieve mm	% Passing
100.0	
75.0	
63.0	
50.0	
37.5	
28.0	
20.0	
14.0	100
5.00	98
2.00	96
0.425	93
0.250	85
0.150	57
0.075	33



Soil Mortar % SANS 3001-PR5		Grading Modulus SANS 3001:PR5		*Classifications	
Coarse Sand	3	Grading Modulus	0.78	Unified Soil Classification	SC
Coarse Fine Sand	8	Soil Constants SANS 3001:GR12		COLTO (1998)	-
Medium Fine Sand	29	Liquid Limit (%)	23	US Highway	A-2-6
Fine Fine Sand	25	Plasticity Index (%)	12	Group Index	0
Silt and Clay	34	Linear Shrinkage (%)	6.0		

Remarks

Technical Signatory: _____

Madoda Ngwenya

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Results marked "#" in this report are not included in the SANAS schedule of Accreditation for this laboratory.

Test Report for Mod CBR Road Indicator Report SANS 3001-GR1,GR10,GR20,GR30,GR40

CLIENT: Makhuma Consulting Engineers
1468 Lowveld close
Pretoria
0034

DATE RECEIVED: 10/Feb/2022
DATE TESTED: 18/Feb/2022
DATE REPORTED: 25/Feb/2022
REPORT NO.: QOJ207/18

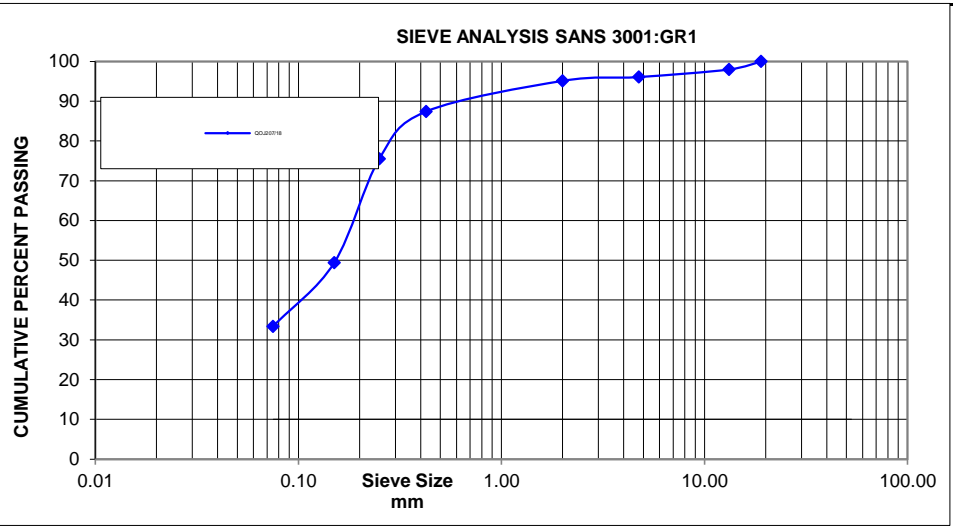
ATT: Hudson Mabelane

PROJECT: D192 Geotechnical Investigation

DESCRIPTION: Material sampled by Client
MATERIAL DESCR.: lt Red. Orange Silty sand
TP : TP 21

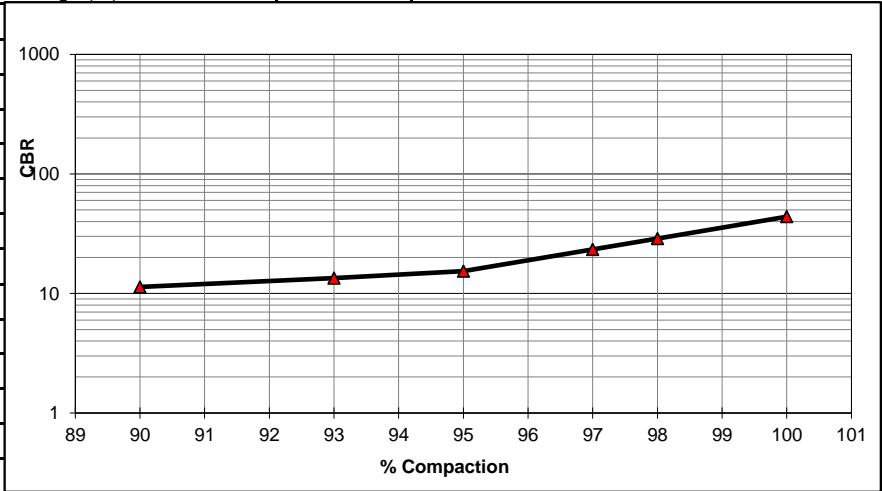
SAMPLE NO: QOJ207/18
JOB NUMBER: QOJ207
DEPTH (m): 0.4-1.3m below EGL

Sieve mm	% Passing
100.0	
75.0	
63.0	
50.0	
37.5	
28.0	
20.0	100
14.0	98
5.00	96
2.00	95
0.425	87
0.250	76
0.150	49
0.075	33




Soil Mortar % SANS 3001-PR5		Grading Modulus SANS 3001:PR5		*Classifications	
Coarse Sand	8	Grading Modulus	0.84	Unified Soil Classification	SM(d)
Coarse Fine Sand	12	Soil Constants SANS 3001:GR12		COLTO (1998)	G8
Medium Fine Sand	27	Liquid Limit (%)		US Highway	A-2-4
Fine Fine Sand	17	Plasticity Index (%)	NP	Group Index	0
Silt and Clay	35	Linear Shrinkage (%)	0.0		

CBR SANS 3001:GR30,GR40			
MDD kg/m ³	2086		
OMC %	7.5		
Comp. Moisture %	7.4		
Dry Density kg/m ³	2080	1980	1875
Compaction %	99.7	94.9	89.9
% Swell	0.59	0.67	0.91
CBR @ % MDD			
@ 100% comp. :	44		
@ 98% comp. :	29		
@ 97% comp. :	23		
@ 95% comp. :	15		
@ 93% comp. :	13		
@ 90% comp. :	11		



Remarks

Technical Signatory: 
Madoda Ngwenya

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Results marked "#" in this report are not included in the SANAS schedule of Accreditation for this laboratory.

Test report for Maximum Dry Density and Optimum Moisture Content SANS 3001-GR20,GR30

CLIENT: Makhuma Consulting Engineers
1468 Lowveld close
Pretoria
0034

DATE RECEIVED: 10/Feb/2022
DATE TESTED: 18/Feb/2022
DATE REPORTED: 25/Feb/2022
REPORT NO.: QOJ207/18

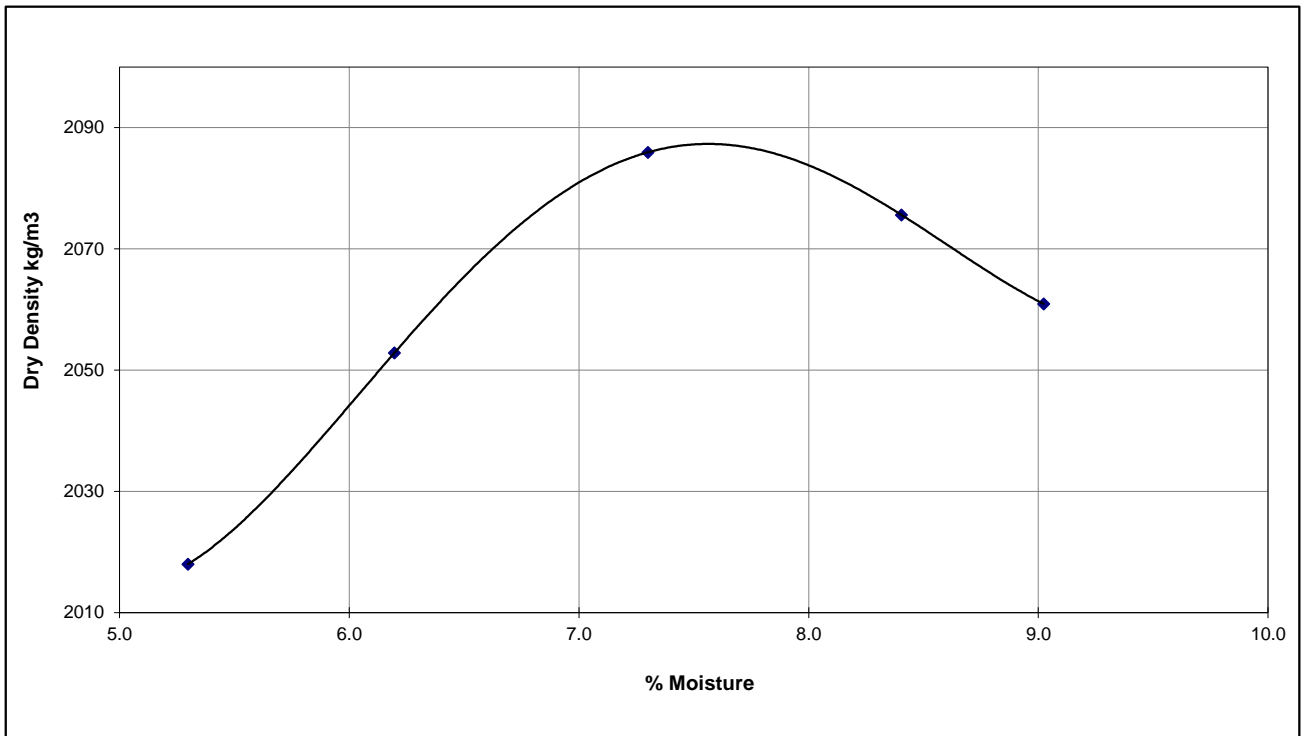
ATT: Hudson Mabelane

PROJECT: D192 Geotechnical Investigation


DESCRIPTION: Material sampled by Client
DESCRIPTION: lt Red. Orange Silty sand
TP : TP 21
DEPTH (m): 0.4-1.3m below EGL

SAMPLE NO: QOJ207/18
JOB NUMBER: QOJ207
PREPERATION METHOD: Scalping

Maximum Dry Density (MDD) - SANS 3001: GR30, GR20						
Point No	1	2	3	4	5	
Dry Density MDD kg/m ³	2086	2076	2061	2053	2018	
Moisture Content OMC %	7.3	8.4	9.0	6.2	5.3	



Maximum Dry Density MDD kg/m ³	2086
Optimum Moisture Content OMC %	7.5

Technical Signatory: 
Madoda Ngwenya

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Results marked "#" in this report are not included in the SANAS schedule of Accreditation for this laboratory.

Test Report for Mod CBR Road Indicator Report SANS 3001-GR1,GR10,GR20,GR30,GR40

CLIENT: Makhuma Consulting Engineers
1468 Lowveld close
Pretoria
0034

DATE RECEIVED: 10/Feb/2022
DATE TESTED: 18/Feb/2022
DATE REPORTED: 25/Feb/2022
REPORT NO.: QOJ207/19

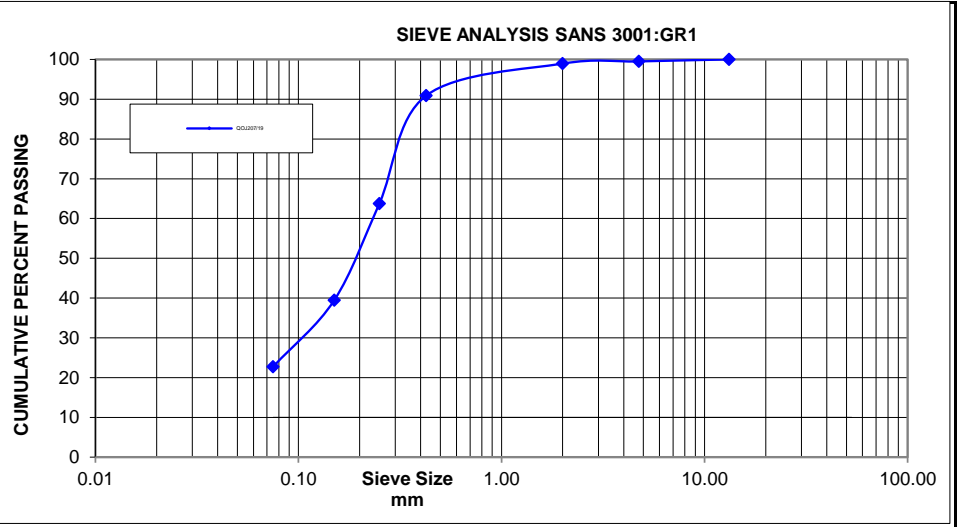
ATT: Hudson Mabelane

PROJECT: D192 Geotechnical Investigation

DESCRIPTION: Material sampled by Client
MATERIAL DESCR.: lt Red. Orange Silty sand
TP : TP 22

SAMPLE NO: QOJ207/19
JOB NUMBER: QOJ207
DEPTH (m): 0.2-1.8m below EGL

Sieve mm	% Passing
100.0	
75.0	
63.0	
50.0	
37.5	
28.0	
20.0	
14.0	100
5.00	100
2.00	99
0.425	91
0.250	64
0.150	39
0.075	23



Soil Mortar % SANS 3001-PR5		Grading Modulus SANS 3001:PR5		*Classifications	
Coarse Sand	8	Grading Modulus	0.87	Unified Soil Classification	SM(d)
Coarse Fine Sand	27	Soil Constants SANS 3001:GR12		COLTO (1998)	-
Medium Fine Sand	25	Liquid Limit (%)		US Highway	A-2-4
Fine Fine Sand	17	Plasticity Index (%)	NP	Group Index	0
Silt and Clay	23	Linear Shrinkage (%)	0.0		

Remarks

Technical Signatory: _____

Madoda Ngwenya

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Test Report for Mod CBR Road Indicator Report SANS 3001-GR1,GR10,GR20,GR30,GR40

CLIENT: Makhuma Consulting Engineers
1468 Lowveld close
Pretoria
0034

DATE RECEIVED: 10/Feb/2022
DATE TESTED: 18/Feb/2022
DATE REPORTED: 25/Feb/2022
REPORT NO.: QOJ207/20

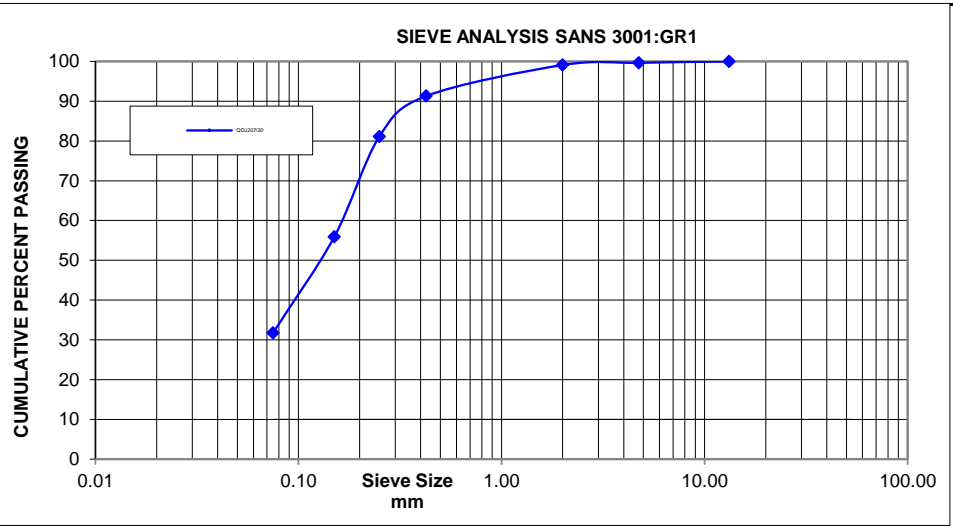
ATT: Hudson Mabelane

PROJECT: D192 Geotechnical Investigation

DESCRIPTION: Material sampled by Client
MATERIAL DESCR.: lt Brown Silty/Clayey sand
TP : TP 23

SAMPLE NO: QOJ207/20
JOB NUMBER: QOJ207
DEPTH (m): 0.1-0.9m below EGL

Sieve mm	% Passing
100.0	
75.0	
63.0	
50.0	
37.5	
28.0	
20.0	
14.0	100
5.00	100
2.00	99
0.425	91
0.250	81
0.150	56
0.075	32



Soil Mortar % SANS 3001-PR5		Grading Modulus SANS 3001:PR5		*Classifications	
Coarse Sand	8	Grading Modulus	0.78	Unified Soil Classification	sm/sc
Coarse Fine Sand	10	Soil Constants SANS 3001:GR12		COLTO (1998)	-
Medium Fine Sand	25	Liquid Limit (%)	17	US Highway	A-2-4
Fine Fine Sand	24	Plasticity Index (%)	7	Group Index	0
Silt and Clay	32	Linear Shrinkage (%)	2.5		

Remarks

Technical Signatory: _____

Madoda Ngwenya

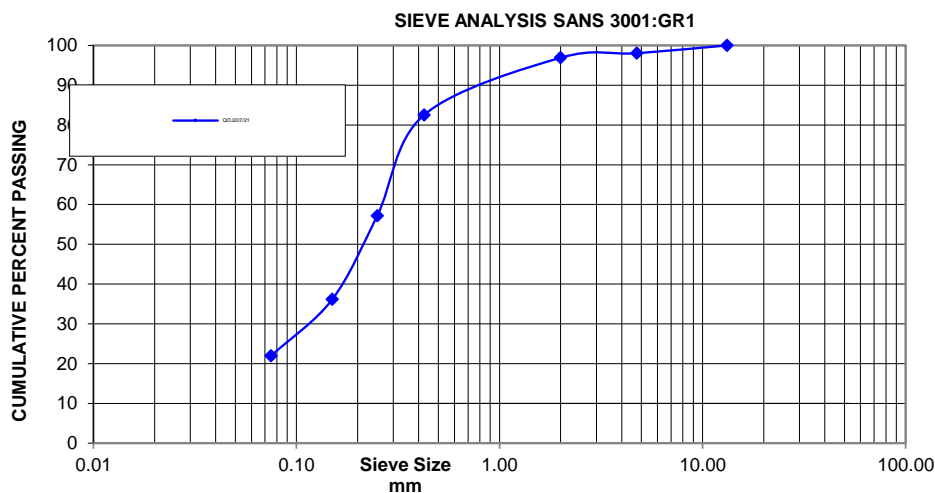
*The above test results are only relevant to samples delivered and tested at the laboratory. This report shall not be reproduced or altered without the prior consent of the laboratory, except copied in full. * Opinions and interpretations expressed herein are outside the scope of SANAS accreditation.*

Results marked "#" in this report are not included in the SANAS schedule of Accreditation for this laboratory.

Test Report for Mod CBR Road Indicator Report SANS 3001-GR1,GR10,GR20,GR30,GR40

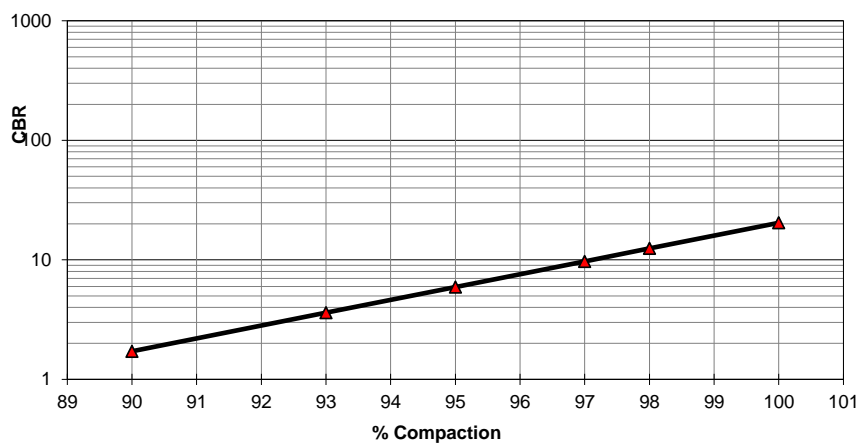
CLIENT:	Makhuma Consulting Engineers	DATE RECEIVED:	10/Feb/2022
	1468 Lowveld close	DATE TESTED:	18/Feb/2022
	Pretoria	DATE REPORTED:	25/Feb/2022
	0034	REPORT NO.:	QOJ207/21
ATT:	Hudson Mabelane		
PROJECT:	D192 Geotechnical Investigation		
DESCRIPTION:	Material sampled by Client	SAMPLE NO:	QOJ207/21
MATERIAL DESCR.:	drk Yellow Silty sand	JOB NUMBER:	QOJ207
TP :	TP 24	DEPTH (m):	0.1-1.3m below EGL

Sieve mm	% Passing
100.0	
75.0	
63.0	
50.0	
37.5	
28.0	
20.0	
14.0	100
5.00	98
2.00	97
0.425	83
0.250	57
0.150	36
0.075	22



Soil Mortar % SANS 3001-PR5		Grading Modulus SANS 3001:PR5		*Classifications	
Coarse Sand	15	Grading Modulus	0.99	Unified Soil Classification	SM(d)
Coarse Fine Sand	26	Soil Constants SANS 3001:GR12		COLTO (1998)	<G9
Medium Fine Sand	22	Liquid Limit (%)		US Highway	A-2-4
Fine Fine Sand	15	Plasticity Index (%)	NP	Group Index	0
Silt and Clay	23	Linear Shrinkage (%)	0.0		

CBR SANS 3001:GR30,GR40			
MDD kg/m ³	1835		
OMC %	9.2		
Comp. Moisture %	9.3		
Dry Density kg/m ³	1829	1737	1649
Compaction %	99.7	94.6	89.8
% Swell	0.16	0.43	1.02
CBR @ % MDD			
@ 100% comp. :	20		
@ 98% comp. :	12		
@ 97% comp. :	10		
@ 95% comp. :	6		
@ 93% comp. :	4		
@ 90% comp. :	2		



Remarks

Technical Signatory: _____

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Results marked "#" in this report are not included in the SANAS schedule of Accreditation for this laboratory.

Test report for Maximum Dry Density and Optimum Moisture Content SANS 3001-GR20,GR30

CLIENT: Makhuma Consulting Engineers
1468 Lowveld close
Pretoria
0034

DATE RECEIVED: 10/Feb/2022
DATE TESTED: 18/Feb/2022
DATE REPORTED: 25/Feb/2022
REPORT NO.: QOJ207/21

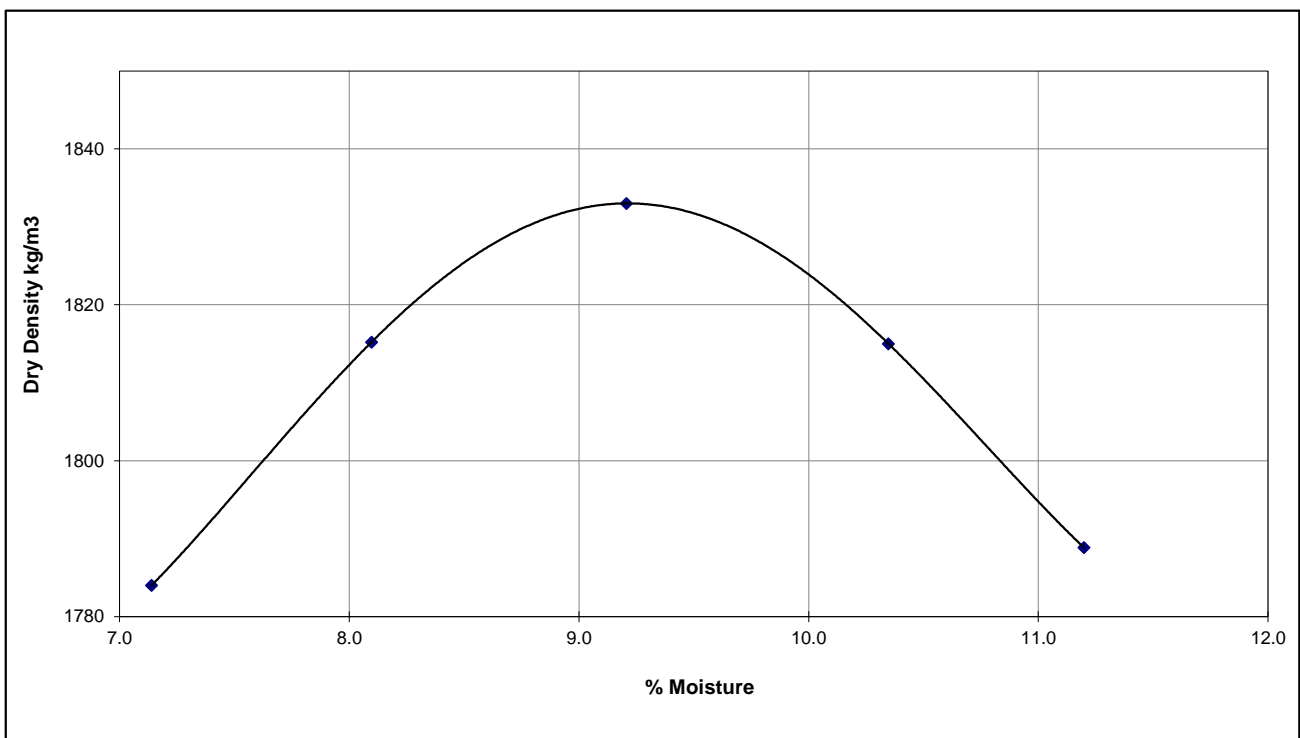
ATT: Hudson Mabelane

PROJECT: D192 Geotechnical Investigation


DESCRIPTION: Material sampled by Client
DESCRIPTION: drk Yellow Silty sand
TP : TP 24
DEPTH (m): 0.1-1.3m below EGL

SAMPLE NO: QOJ207/21
JOB NUMBER: QOJ207
PREPERATION METHOD: Scalping

Maximum Dry Density (MDD) - SANS 3001: GR30, GR20						
Point No	1	2	3	4	5	
Dry Density MDD kg/m ³	1833	1815	1789	1815	1784	
Moisture Content OMC %	9.2	10.3	11.2	8.1	7.1	



Maximum Dry Density MDD kg/m ³	1835
Optimum Moisture Content OMC %	9.2

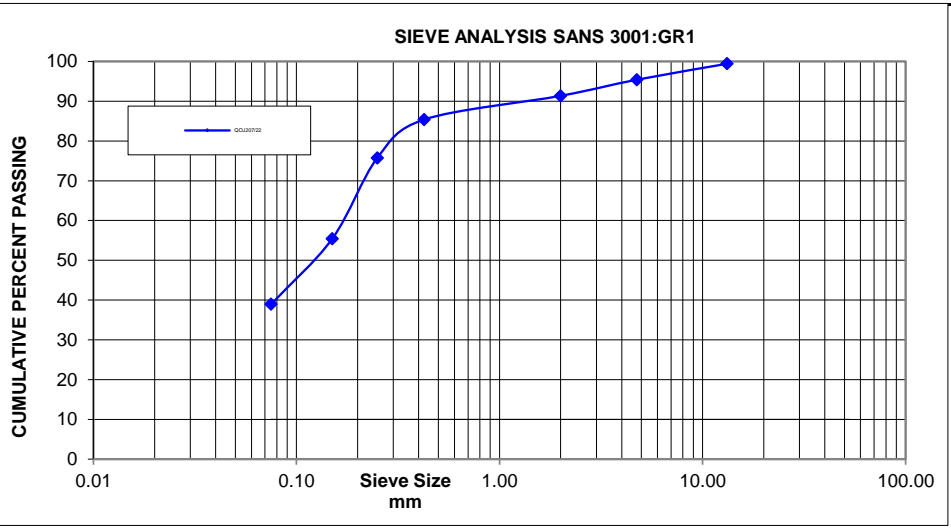
Technical Signatory: 
Madoda Ngwenya

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Results marked "#" in this report are not included in the SANAS schedule of Accreditation for this laboratory.

Test Report for Mod CBR Road Indicator Report SANS 3001-GR1,GR10,GR20,GR30,GR40

CLIENT:	Makhuma Consulting Engineers	DATE RECEIVED:	10/Feb/2022
	1468 Lowveld close	DATE TESTED:	18/Feb/2022
	Pretoria	DATE REPORTED:	25/Feb/2022
	0034	REPORT NO.:	QOJ207/22
ATT:	Hudson Mabelane		
PROJECT:	D192 Geotechnical Investigation		
DESCRIPTION:	Material sampled by Client	SAMPLE NO:	QOJ207/22
MATERIAL DESCR.:	drk Olive Silty/Clayey sand	JOB NUMBER:	QOJ207
TP :	TP 25	DEPTH (m):	0.15-0.8m below EGL

Sieve mm	% Passing
100.0	
75.0	
63.0	
50.0	
37.5	
28.0	
20.0	
14.0	99
5.00	95
2.00	91
0.425	85
0.250	76
0.150	55
0.075	39



Soil Mortar % SANS 3001-PR5		Grading Modulus SANS 3001:PR5		*Classifications	
Coarse Sand	7	Grading Modulus	0.84	Unified Soil Classification	sm/sc
Coarse Fine Sand	11	Soil Constants SANS 3001:GR12		COLTO (1998)	-
Medium Fine Sand	22	Liquid Limit (%)	20	US Highway	A-4
Fine Fine Sand	18	Plasticity Index (%)	5	Group Index	1
Silt and Clay	43	Linear Shrinkage (%)	2.0		

Remarks

Technical Signatory: _____

Madoda Ngwenya

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Results marked "#" in this report are not included in the SANAS schedule of Accreditation for this laboratory.

Test Report for Mod CBR Road Indicator Report SANS 3001-GR1,GR10,GR20,GR30,GR40

CLIENT: Makhuma Consulting Engineers
1468 Lowveld close
Pretoria
0034

DATE RECEIVED: 10/Feb/2022
DATE TESTED: 18/Feb/2022
DATE REPORTED: 25/Feb/2022
REPORT NO.: QOJ207/23

ATT: Hudson Mabelane

PROJECT: D192 Geotechnical Investigation

DESCRIPTION: Material sampled by Client

SAMPLE NO: QOJ207/23

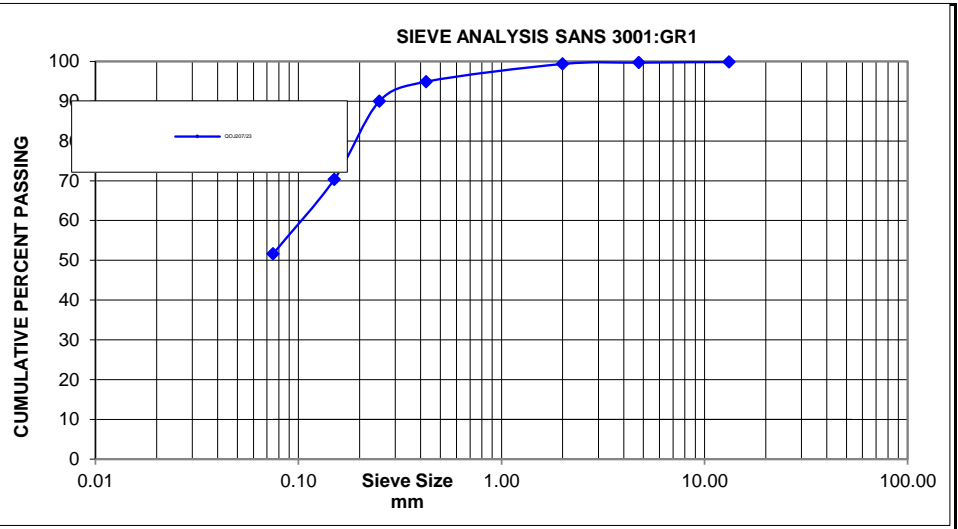
MATERIAL DESCR.: drk Brown Inorganic clay

JOB NUMBER: QOJ207

TP : TP 27

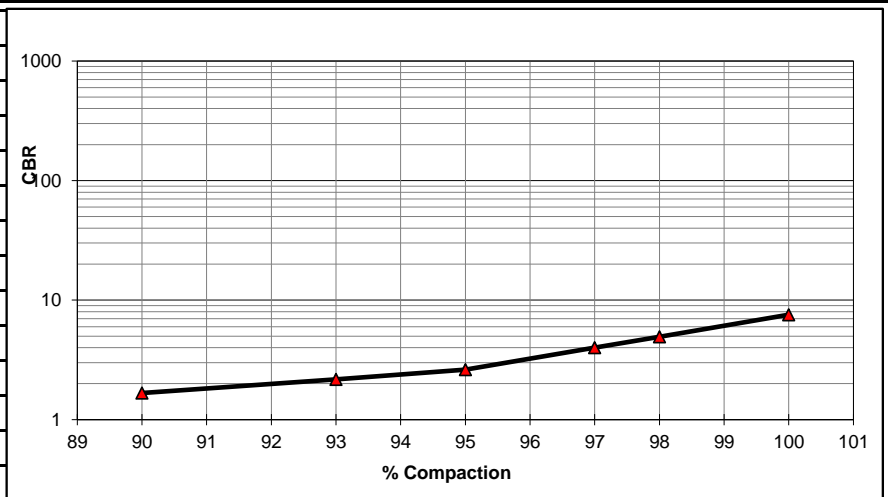
DEPTH (m): 0.2-1.3m below EGL

Sieve mm	% Passing
100.0	
75.0	
63.0	
50.0	
37.5	
28.0	
20.0	
14.0	100
5.00	100
2.00	99
0.425	95
0.250	90
0.150	70
0.075	52



Soil Mortar % SANS 3001-PR5		Grading Modulus SANS 3001:PR5		*Classifications	
Coarse Sand	4	Grading Modulus	0.54	Unified Soil Classification	CL
Coarse Fine Sand	5	Soil Constants SANS 3001:GR12		COLTO (1998)	<G9
Medium Fine Sand	20	Liquid Limit (%)	30	US Highway	A-6
Fine Fine Sand	19	Plasticity Index (%)	13	Group Index	4
Silt and Clay	52	Linear Shrinkage (%)	7.0		

CBR SANS 3001:GR30,GR40			
MDD kg/m ³	1750		
OMC %	13.1		
Comp. Moisture %	13.1		
Dry Density kg/m ³	1746	1660	1573
Compaction %	99.8	94.9	89.9
% Swell	1.77	2.05	2.20
CBR @ % MDD			
@ 100% comp. :	8		
@ 98% comp. :	5		
@ 97% comp. :	4		
@ 95% comp. :	3		
@ 93% comp. :	2		
@ 90% comp. :	2		



Remarks

Technical Signatory: _____

Madoda Ngwenya

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Results marked "#" in this report are not included in the SANAS schedule of Accreditation for this laboratory.

Test report for Maximum Dry Density and Optimum Moisture Content SANS 3001-GR20,GR30

CLIENT: Makhuma Consulting Engineers
1468 Lowveld close
Pretoria
0034

DATE RECEIVED: 10/Feb/2022
DATE TESTED: 18/Feb/2022
DATE REPORTED: 25/Feb/2022
REPORT NO.: QOJ207/23

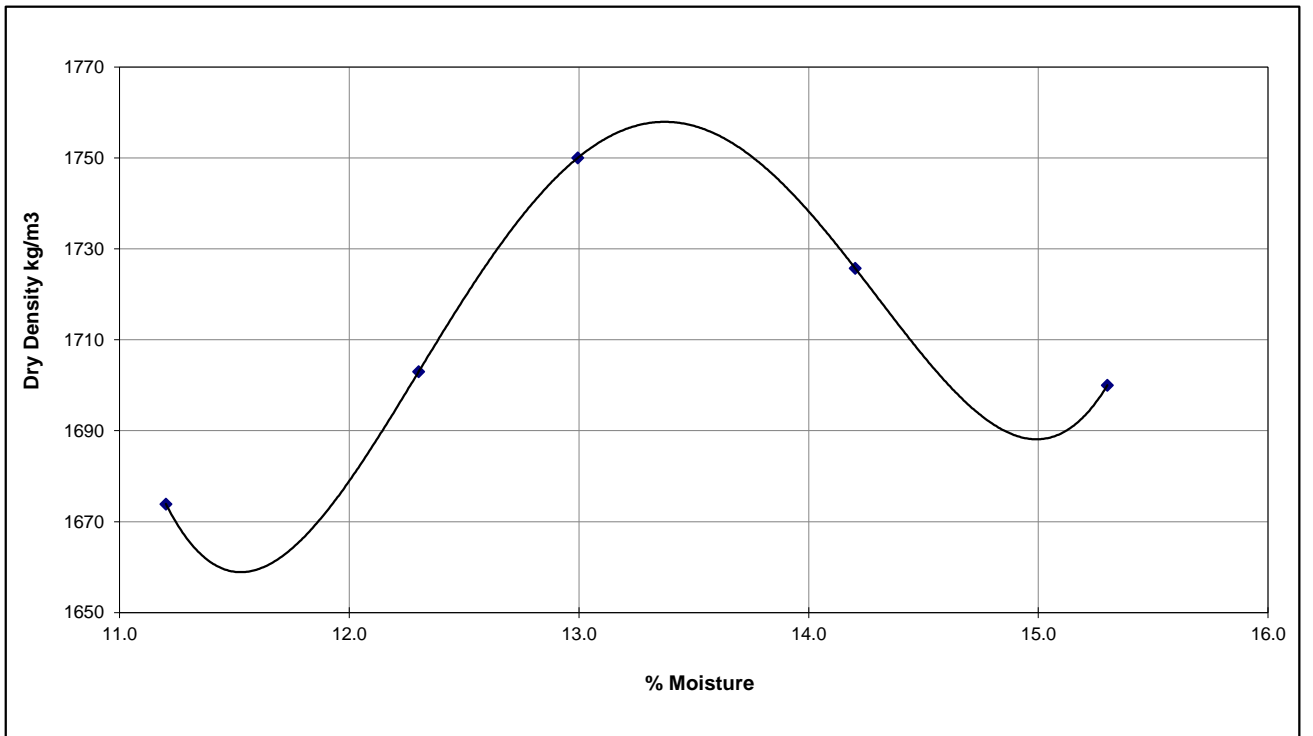
ATT: Hudson Mabelane

PROJECT: D192 Geotechnical Investigation


DESCRIPTION: Material sampled by Client
DESCRIPTION: drk Brown Inorganic clay
TP : TP 27
DEPTH (m): 0.2-1.3m below EGL

SAMPLE NO: QOJ207/23
JOB NUMBER: QOJ207
PREPERATION METHOD: Scalping

Maximum Dry Density (MDD) - SANS 3001: GR30, GR20						
Point No	1	2	3	4	5	
Dry Density MDD kg/m ³	1674	1703	1750	1726	1700	
Moisture Content OMC %	11.2	12.3	13.0	14.2	15.3	



Maximum Dry Density MDD kg/m ³	1750
Optimum Moisture Content OMC %	13.1

Technical Signatory: 
Madoda Ngwenya

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Results marked "#" in this report are not included in the SANAS schedule of Accreditation for this laboratory.

Test Report for Mod CBR Road Indicator Report SANS 3001-GR1,GR10,GR20,GR30,GR40

CLIENT: Makhuma Consulting Engineers
1468 Lowveld close
Pretoria
0034

DATE RECEIVED: 10/Feb/2022
DATE TESTED: 18/Feb/2022
DATE REPORTED: 25/Feb/2022
REPORT NO.: QOJ207/24

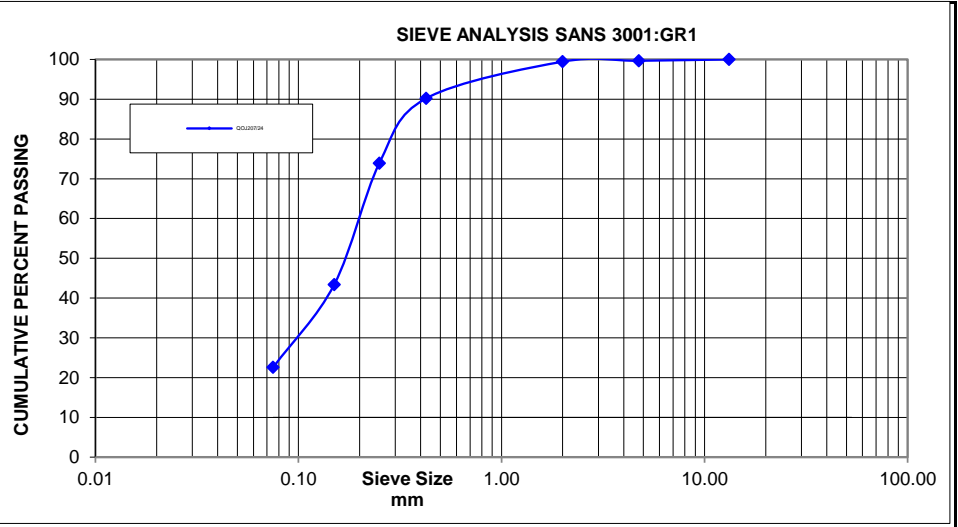
ATT: Hudson Mabelane

PROJECT: D192 Geotechnical Investigation

DESCRIPTION: Material sampled by Client
MATERIAL DESCR.: drk Yellow Silty sand
TP : TP 28

SAMPLE NO: QOJ207/24
JOB NUMBER: QOJ207
DEPTH (m): 0.3-1.6m below EGL

Sieve mm	% Passing
100.0	
75.0	
63.0	
50.0	
37.5	
28.0	
20.0	
14.0	100
5.00	100
2.00	99
0.425	90
0.250	74
0.150	43
0.075	23



Soil Mortar % SANS 3001-PR5		Grading Modulus SANS 3001:PR5		*Classifications	
Coarse Sand	9	Grading Modulus	0.88	Unified Soil Classification	SM(d)
Coarse Fine Sand	16	Soil Constants SANS 3001:GR12		COLTO (1998)	-
Medium Fine Sand	31	Liquid Limit (%)		US Highway	A-2-4
Fine Fine Sand	21	Plasticity Index (%)	NP	Group Index	0
Silt and Clay	23	Linear Shrinkage (%)	0.0		

Remarks

Technical Signatory:

Madoda Ngwenya

The material is too sandy, therefore no MOD & CBR could be tested

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Test Report for Mod CBR Road Indicator Report SANS 3001-GR1,GR10,GR20,GR30,GR40

CLIENT: Makhuma Consulting Engineers
1468 Lowveld close
Pretoria
0034

DATE RECEIVED: 10/Feb/2022
DATE TESTED: 18/Feb/2022
DATE REPORTED: 25/Feb/2022
REPORT NO.: QOJ207/25

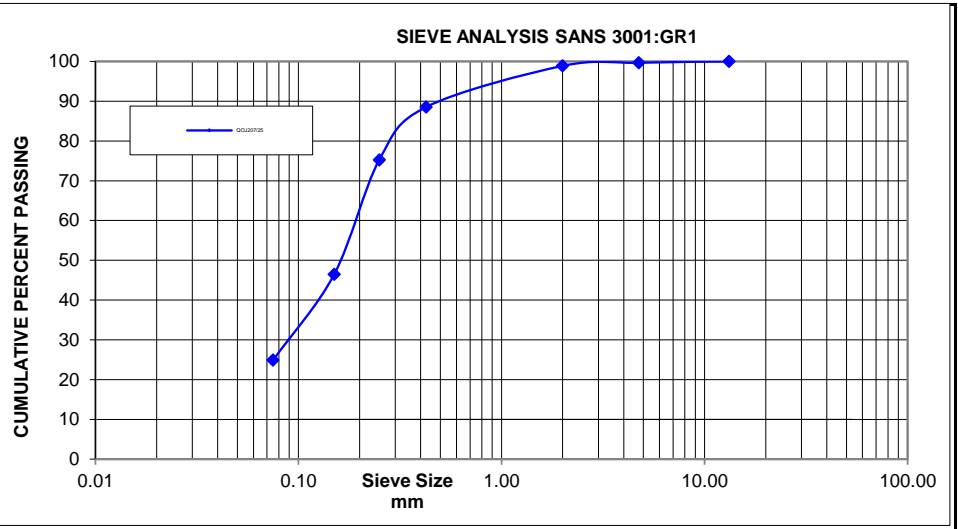
ATT: Hudson Mabelane

PROJECT: D192 Geotechnical Investigation

DESCRIPTION: Material sampled by Client
MATERIAL DESCR.: lt Brown Silty sand
TP : TP 29

SAMPLE NO: QOJ207/25
JOB NUMBER: QOJ207
DEPTH (m): 0.5-1.9m below EGL

Sieve mm	% Passing
100.0	
75.0	
63.0	
50.0	
37.5	
28.0	
20.0	
14.0	100
5.00	100
2.00	99
0.425	89
0.250	75
0.150	46
0.075	25



Soil Mortar % SANS 3001-PR5		Grading Modulus SANS 3001:PR5		*Classifications	
Coarse Sand	10	Grading Modulus	0.88	Unified Soil Classification	SM(d)
Coarse Fine Sand	13	Soil Constants SANS 3001:GR12		COLTO (1998)	-
Medium Fine Sand	29	Liquid Limit (%)		US Highway	A-2-4
Fine Fine Sand	22	Plasticity Index (%)	NP	Group Index	0
Silt and Clay	25	Linear Shrinkage (%)	0.0		

Remarks

Technical Signatory: 

Madoda Ngwenya

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Results marked "#" in this report are not included in the SANAS schedule of Accreditation for this laboratory.

Test Report for Mod CBR Road Indicator Report SANS 3001-GR1,GR10,GR20,GR30,GR40

CLIENT: Makhuma Consulting Engineers
1468 Lowveld close
Pretoria
0034

DATE RECEIVED: 10/Feb/2022
DATE TESTED: 18/Feb/2022
DATE REPORTED: 25/Feb/2022
REPORT NO.: QOJ207/26

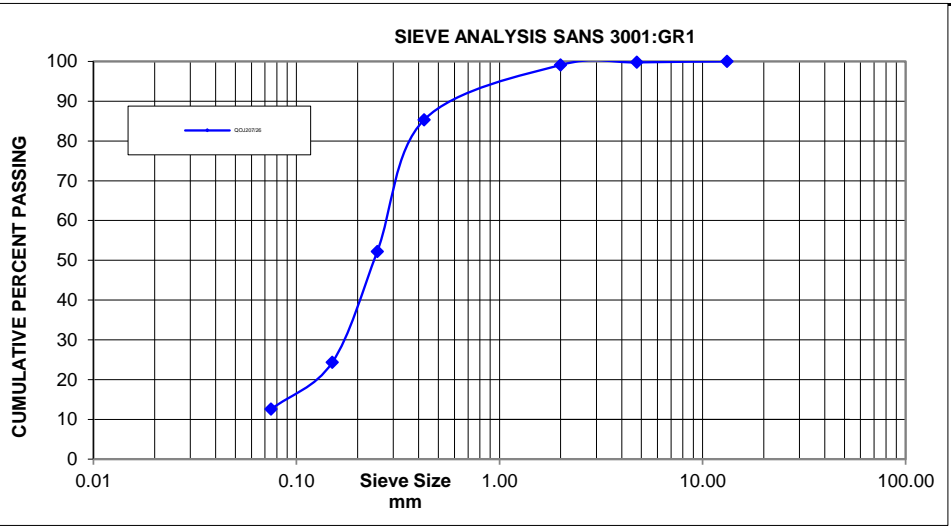
ATT: Hudson Mabelane

PROJECT: D192 Geotechnical Investigation

DESCRIPTION: Material sampled by Client
MATERIAL DESCR.: lt Brown Silty sand
TP : TP 31

SAMPLE NO: QOJ207/26
JOB NUMBER: QOJ207
DEPTH (m): 0.1-1.3m below EGL

Sieve mm	% Passing
100.0	
75.0	
63.0	
50.0	
37.5	
28.0	
20.0	
14.0	100
5.00	100
2.00	99
0.425	85
0.250	52
0.150	24
0.075	13



Soil Mortar % SANS 3001-PR5		Grading Modulus SANS 3001:PR5		*Classifications	
Coarse Sand	14	Grading Modulus	1.03	Unified Soil Classification	SM(d)
Coarse Fine Sand	33	Soil Constants SANS 3001:GR12		COLTO (1998)	-
Medium Fine Sand	28	Liquid Limit (%)		US Highway	A-2-4
Fine Fine Sand	12	Plasticity Index (%)	NP	Group Index	0
Silt and Clay	13	Linear Shrinkage (%)	0.0		

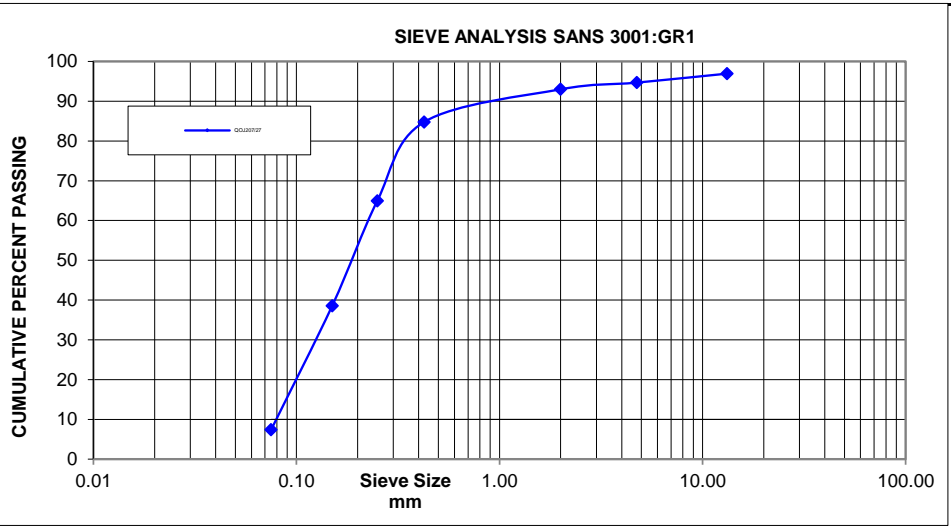
[Signature]
Madoda Ngwenya

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Test Report for Mod CBR Road Indicator Report SANS 3001-GR1,GR10,GR20,GR30,GR40

CLIENT:	Makhuma Consulting Engineers	DATE RECEIVED:	10/Feb/2022
	1468 Lowveld close	DATE TESTED:	18/Feb/2022
	Pretoria	DATE REPORTED:	25/Feb/2022
	0034	REPORT NO.:	QOJ207/27
ATT:	Hudson Mabelane		
PROJECT:	D192 Geotechnical Investigation		
DESCRIPTION:	Material sampled by Client	SAMPLE NO:	QOJ207/27
MATERIAL DESCR.:	drk Olive Poorly graded clayey sand	JOB NUMBER:	QOJ207
TP :	TP 32	DEPTH (m):	0.3--0.7m below EGL

Sieve mm	% Passing
100.0	
75.0	
63.0	
50.0	
37.5	
28.0	
20.0	
14.0	97
5.00	95
2.00	93
0.425	85
0.250	65
0.150	39
0.075	7



Soil Mortar % SANS 3001-PR5		Grading Modulus SANS 3001:PR5		*Classifications	
Coarse Sand	9	Grading Modulus	1.15	Unified Soil Classification	sp/sc
Coarse Fine Sand	21	Soil Constants SANS 3001:GR12		COLTO (1998)	-
Medium Fine Sand	28	Liquid Limit (%)	24	US Highway	A-2-6
Fine Fine Sand	34	Plasticity Index (%)	17	Group Index	0
Silt and Clay	8	Linear Shrinkage (%)	3.0		

Remarks

Technical Signatory: _____

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Test Report for Mod CBR Road Indicator Report SANS 3001-GR1,GR10,GR20,GR30,GR40

CLIENT: Makhuma Consulting Engineers
1468 Lowveld close
Pretoria
0034

DATE RECEIVED: 10/Feb/2022
DATE TESTED: 18/Feb/2022
DATE REPORTED: 25/Feb/2022
REPORT NO.: QOJ207/28

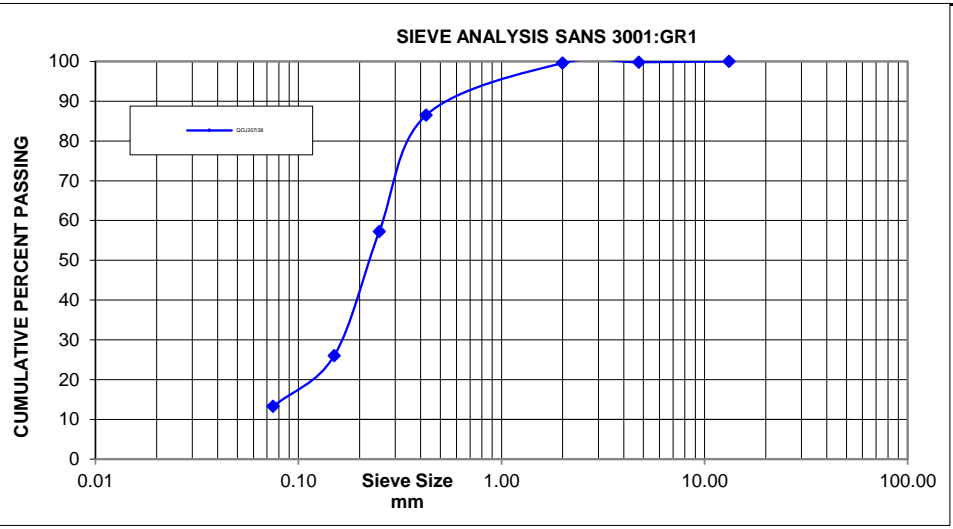
ATT: Hudson Mabelane

PROJECT: D192 Geotechnical Investigation

DESCRIPTION: Material sampled by Client
MATERIAL DESCR.: lt Yellow Silty sand
TP : TP 34

SAMPLE NO: QOJ207/28
JOB NUMBER: QOJ207
DEPTH (m): 0.1-1.4m below EGL

Sieve mm	% Passing
100.0	
75.0	
63.0	
50.0	
37.5	
28.0	
20.0	
14.0	100
5.00	100
2.00	100
0.425	86
0.250	57
0.150	26
0.075	13



Soil Mortar % SANS 3001-PR5		Grading Modulus SANS 3001:PR5		*Classifications	
Coarse Sand	13	Grading Modulus	1.01	Unified Soil Classification	SM(d)
Coarse Fine Sand	29	Soil Constants SANS 3001:GR12		COLTO (1998)	-
Medium Fine Sand	31	Liquid Limit (%)		US Highway	A-2-4
Fine Fine Sand	13	Plasticity Index (%)	NP	Group Index	0
Silt and Clay	13	Linear Shrinkage (%)	0.0		

Remarks

Technical Signatory: _____

Madoda Ngwenya

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Results marked "#" in this report are not included in the SANAS schedule of Accreditation for this laboratory.

Test Report for Mod CBR Road Indicator Report SANS 3001-GR1,GR10,GR20,GR30,GR40

CLIENT: Makhuma Consulting Engineers
1468 Lowveld close
Pretoria
0034

DATE RECEIVED: 10/Feb/2022
DATE TESTED: 18/Feb/2022
DATE REPORTED: 25/Feb/2022
REPORT NO.: QOJ207/29

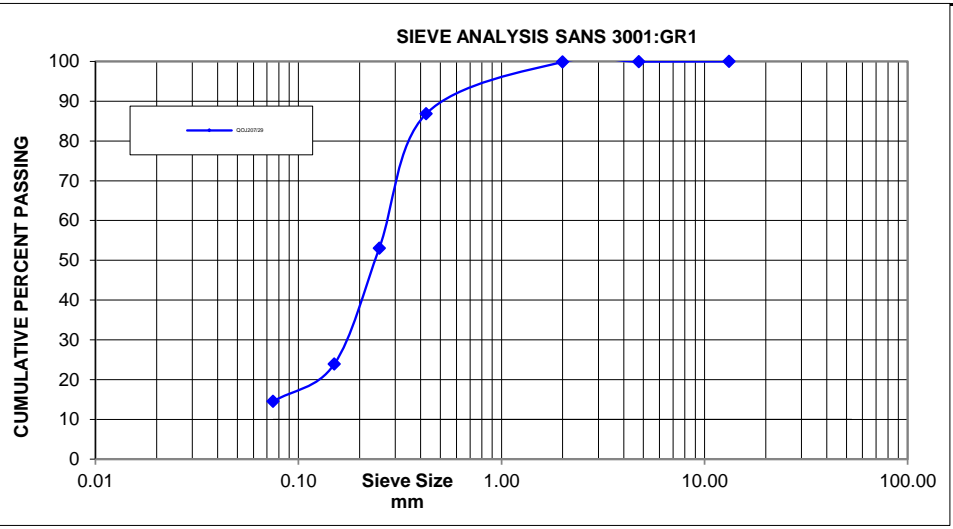
ATT: Hudson Mabelane

PROJECT: D192 Geotechnical Investigation

DESCRIPTION: Material sampled by Client
MATERIAL DESCR.: lt Olive Silty sand
TP : TP 35

SAMPLE NO: QOJ207/29
JOB NUMBER: QOJ207
DEPTH (m): 0.3-1.8m below EGL

Sieve mm	% Passing
100.0	
75.0	
63.0	
50.0	
37.5	
28.0	
20.0	
14.0	100
5.00	100
2.00	100
0.425	87
0.250	53
0.150	24
0.075	14



Soil Mortar % SANS 3001-PR5		Grading Modulus SANS 3001:PR5		*Classifications	
Coarse Sand	13	Grading Modulus	0.99	Unified Soil Classification	SM(d)
Coarse Fine Sand	34	Soil Constants SANS 3001:GR12		COLTO (1998)	-
Medium Fine Sand	29	Liquid Limit (%)		US Highway	A-2-4
Fine Fine Sand	9	Plasticity Index (%)	NP	Group Index	0
Silt and Clay	15	Linear Shrinkage (%)	0.0		

Remarks

Technical Signatory:

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Results marked "#" in this report are not included in the SANAS schedule of Accreditation for this laboratory.

Test Report for Mod CBR Road Indicator Report SANS 3001-GR1,GR10,GR20,GR30,GR40

CLIENT: Makhuma Consulting Engineers
1468 Lowveld close
Pretoria
0034

DATE RECEIVED: 10/Feb/2022
DATE TESTED: 18/Feb/2022
DATE REPORTED: 25/Feb/2022
REPORT NO.: QOJ207/30

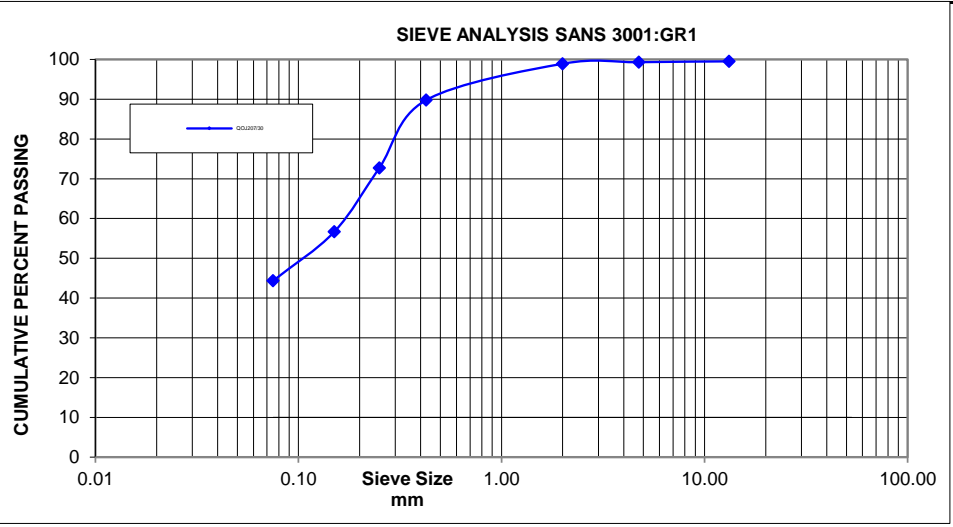
ATT: Hudson Mabelane

PROJECT: D192 Geotechnical Investigation

DESCRIPTION: Material sampled by Client
MATERIAL DESCR.: drk Brown Clayey sand
TP : TP 37

SAMPLE NO: QOJ207/30
JOB NUMBER: QOJ207
DEPTH (m): 0.1-1.1m below EGL

Sieve mm	% Passing
100.0	
75.0	
63.0	
50.0	
37.5	
28.0	
20.0	
14.0	100
5.00	99
2.00	99
0.425	90
0.250	73
0.150	57
0.075	44



Soil Mortar % SANS 3001-PR5		Grading Modulus SANS 3001:PR5		*Classifications	
Coarse Sand	9	Grading Modulus	0.67	Unified Soil Classification	SC
Coarse Fine Sand	17	Soil Constants SANS 3001:GR12		COLTO (1998)	-
Medium Fine Sand	16	Liquid Limit (%)	32	US Highway	A-6
Fine Fine Sand	12	Plasticity Index (%)	18	Group Index	4
Silt and Clay	45	Linear Shrinkage (%)	8.5		

Remarks

Technical Signatory: _____

Madoda Ngwenya

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Results marked "#" in this report are not included in the SANAS schedule of Accreditation for this laboratory.

Test Report for Mod CBR Road Indicator Report SANS 3001-GR1,GR10,GR20,GR30,GR40

CLIENT: Makhuma Consulting Engineers
1468 Lowveld close
Pretoria
0034

DATE RECEIVED: 10/Feb/2022
DATE TESTED: 18/Feb/2022
DATE REPORTED: 25/Feb/2022
REPORT NO.: QOJ207/31

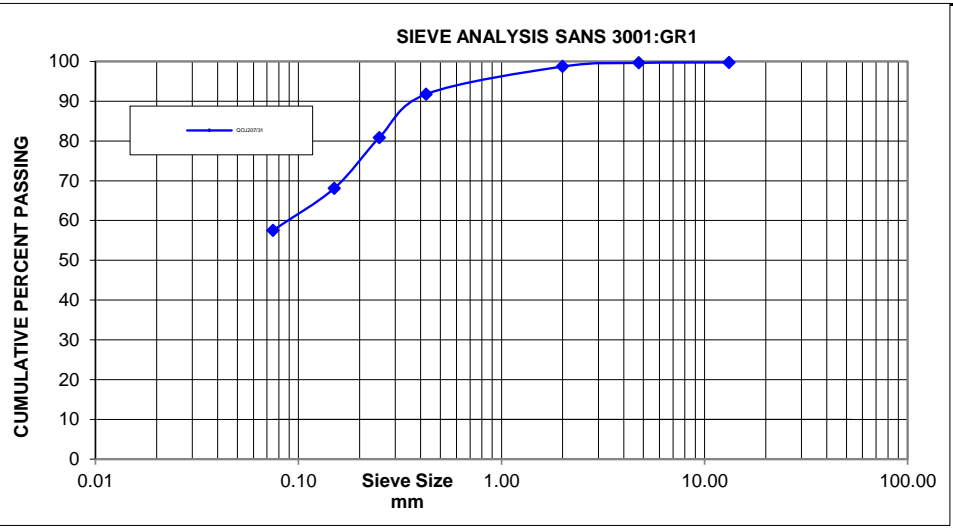
ATT: Hudson Mabelane

PROJECT: D192 Geotechnical Investigation

DESCRIPTION: Material sampled by Client
MATERIAL DESCR.: drk Brown Inorganic clay
TP : TP 39

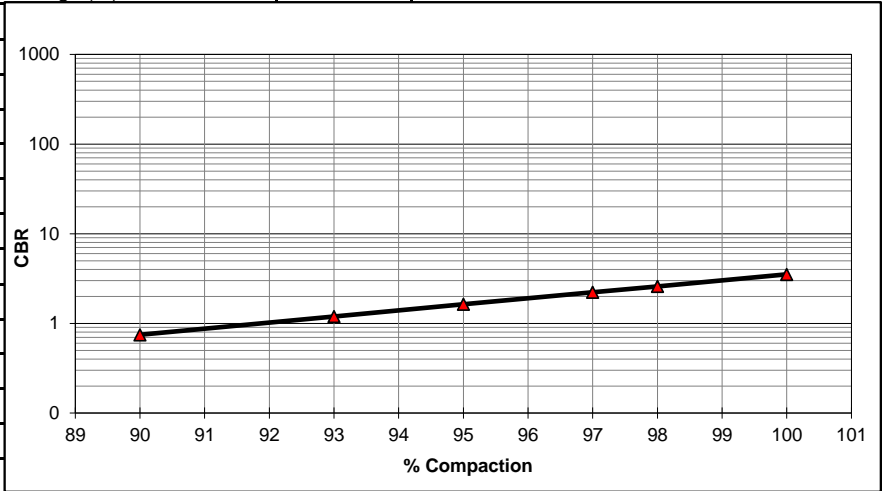
SAMPLE NO: QOJ207/31
JOB NUMBER: QOJ207
DEPTH (m): 0.1-0.9m below EGL

Sieve mm	% Passing
100.0	
75.0	
63.0	
50.0	
37.5	
28.0	
20.0	
14.0	100
5.00	100
2.00	99
0.425	92
0.250	81
0.150	68
0.075	58




Soil Mortar % SANS 3001-PR5		Grading Modulus SANS 3001:PR5		*Classifications	
Coarse Sand	7	Grading Modulus	0.52	Unified Soil Classification	CL
Coarse Fine Sand	11	Soil Constants SANS 3001:GR12		COLTO (1998)	<G9
Medium Fine Sand	13	Liquid Limit (%)	34	US Highway	A-6
Fine Fine Sand	11	Plasticity Index (%)	22	Group Index	9
Silt and Clay	58	Linear Shrinkage (%)	11.5		

CBR SANS 3001:GR30,GR40			
MDD kg/m ³	1760		
OMC %	17.4		
Comp. Moisture %	17.3		
Dry Density kg/m ³	1758	1673	1585
Compaction %	99.9	95.1	90.0
% Swell	2.43	3.46	4.41
CBR @ % MDD			
@ 100% comp. :	4		
@ 98% comp. :	3		
@ 97% comp. :	2		
@ 95% comp. :	2		
@ 93% comp. :	1		
@ 90% comp. :	1		



Remarks

Technical Signatory: 
Madoda Ngwenya

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Results marked "#" in this report are not included in the SANAS schedule of Accreditation for this laboratory.

Test report for Maximum Dry Density and Optimum Moisture Content SANS 3001-GR20,GR30

CLIENT: Makhuma Consulting Engineers
1468 Lowveld close
Pretoria
0034

DATE RECEIVED: 10/Feb/2022
DATE TESTED: 18/Feb/2022
DATE REPORTED: 25/Feb/2022
REPORT NO.: QOJ207/31

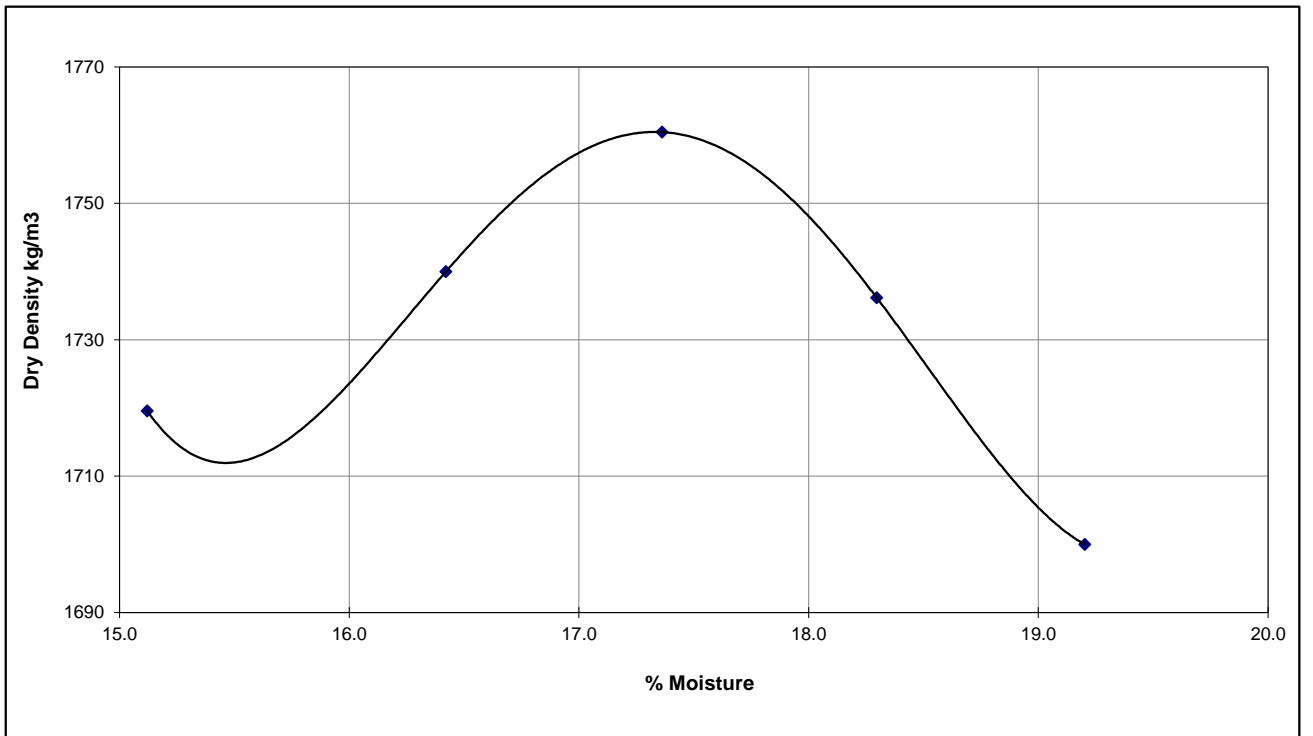
ATT: Hudson Mabelane

PROJECT: D192 Geotechnical Investigation


DESCRIPTION: Material sampled by Client
DESCRIPTION: drk Brown Inorganic clay
TP : TP 39
DEPTH (m): 0.1-0.9m below EGL

SAMPLE NO: QOJ207/31
JOB NUMBER: QOJ207
PREPERATION METHOD: Scalping

Maximum Dry Density (MDD) - SANS 3001: GR30, GR20						
Point No	1	2	3	4	5	
Dry Density MDD kg/m ³	1720	1740	1760	1736	1700	
Moisture Content OMC %	15.1	16.4	17.4	18.3	19.2	



Maximum Dry Density MDD kg/m ³	1760
Optimum Moisture Content OMC %	17.4

Technical Signatory: 
Madoda Ngwenya

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Results marked "#" in this report are not included in the SANAS schedule of Accreditation for this laboratory.

Test Report for Mod CBR Road Indicator Report SANS 3001-GR1,GR10,GR20,GR30,GR40

CLIENT: Makhuma Consulting Engineers
1468 Lowveld close
Pretoria
0034

DATE RECEIVED: 10/Feb/2022
DATE TESTED: 18/Feb/2022
DATE REPORTED: 25/Feb/2022
REPORT NO.: QOJ207/32

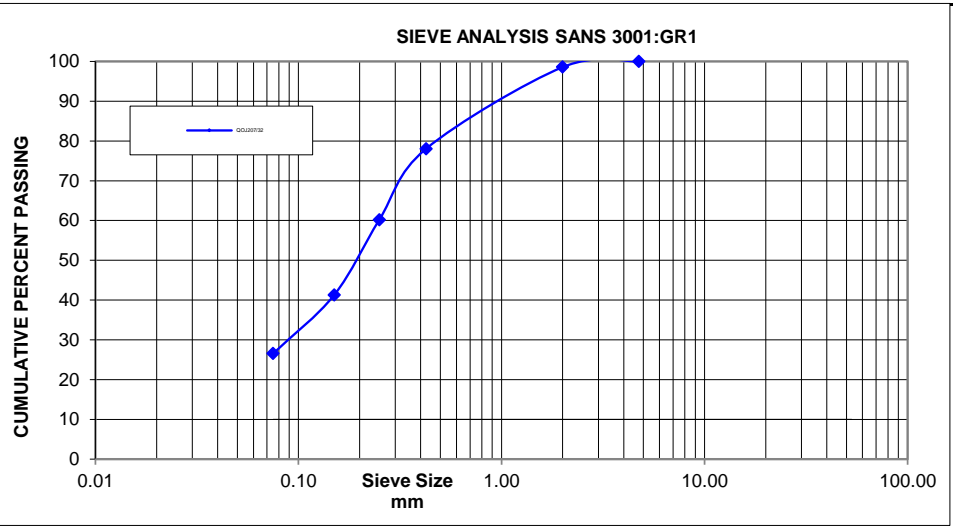
ATT: Hudson Mabelane

PROJECT: D192 Geotechnical Investigation

DESCRIPTION: Material sampled by Client
MATERIAL DESCR.: drk Yel. Orange Silty sand
TP : TP 42

SAMPLE NO: QOJ207/32
JOB NUMBER: QOJ207
DEPTH (m): 0.1-1.4m below EGL

Sieve mm	% Passing
100.0	
75.0	
63.0	
50.0	
37.5	
28.0	
20.0	
14.0	
5.00	100
2.00	99
0.425	78
0.250	60
0.150	41
0.075	27



Soil Mortar % SANS 3001-PR5		Grading Modulus SANS 3001:PR5		*Classifications	
Coarse Sand	21	Grading Modulus	0.97	Unified Soil Classification	SM(d)
Coarse Fine Sand	18	Soil Constants SANS 3001:GR12		COLTO (1998)	-
Medium Fine Sand	19	Liquid Limit (%)		US Highway	A-2-4
Fine Fine Sand	15	Plasticity Index (%)	NP	Group Index	0
Silt and Clay	27	Linear Shrinkage (%)	0.0		

Remarks

Technical Signatory: _____

Madoda Ngwenya

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Results marked "#" in this report are not included in the SANAS schedule of Accreditation for this laboratory.

Test Report for Mod CBR Road Indicator Report SANS 3001-GR1,GR10,GR20,GR30,GR40

CLIENT: Makhuma Consulting Engineers
1468 Lowveld close
Pretoria
0034

DATE RECEIVED: 10/Feb/2022
DATE TESTED: 18/Feb/2022
DATE REPORTED: 25/Feb/2022
REPORT NO.: QOJ207/33

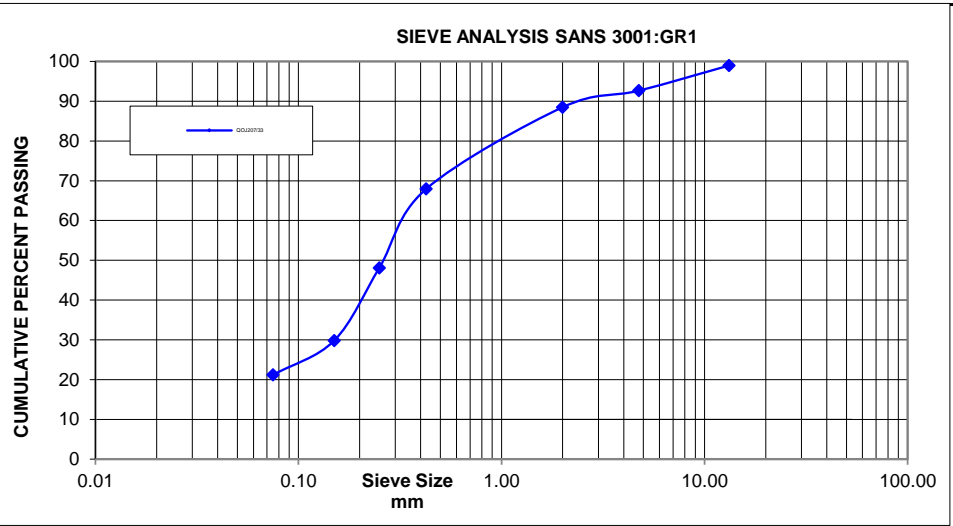
ATT: Hudson Mabelane

PROJECT: D192 Geotechnical Investigation

DESCRIPTION: Material sampled by Client
MATERIAL DESCR.: lt Reddish Brown Silty sand
TP : TP 43

SAMPLE NO: QOJ207/33
JOB NUMBER: QOJ207
DEPTH (m): 0.4-2.1m below EGL

Sieve mm	% Passing
100.0	
75.0	
63.0	
50.0	
37.5	
28.0	
20.0	
14.0	99
5.00	93
2.00	88
0.425	68
0.250	48
0.150	30
0.075	21



Soil Mortar % SANS 3001-PR5		Grading Modulus SANS 3001:PR5		*Classifications	
Coarse Sand	23	Grading Modulus	1.22	Unified Soil Classification	SM(d)
Coarse Fine Sand	22	Soil Constants SANS 3001:GR12		COLTO (1998)	-
Medium Fine Sand	21	Liquid Limit (%)		US Highway	A-2-4
Fine Fine Sand	10	Plasticity Index (%)	NP	Group Index	0
Silt and Clay	24	Linear Shrinkage (%)	0.0		

Remarks

Technical Signatory: _____

Madoda Ngwenya

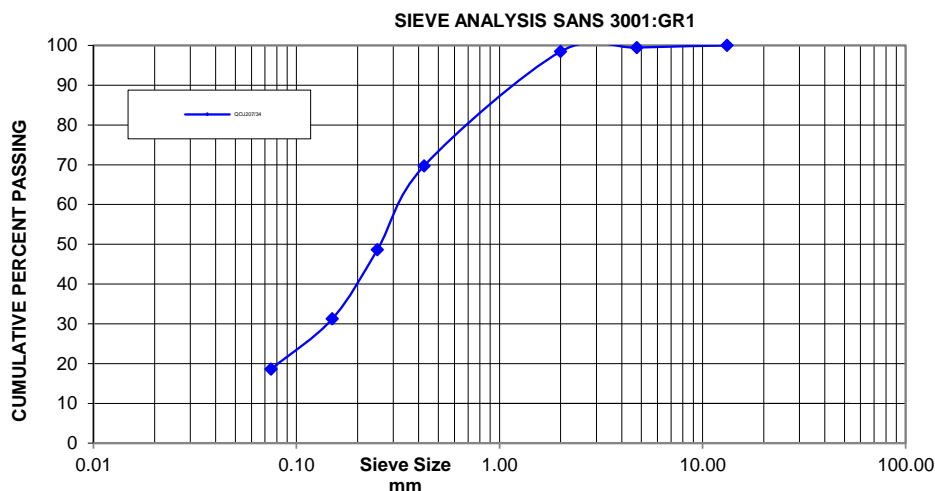
*The above test results are only relevant to samples delivered and tested at the laboratory. This report shall not be reproduced or altered without the prior consent of the laboratory, except copied in full. * Opinions and interpretations expressed herein are outside the scope of SANAS accreditation.*

Results marked "#" in this report are not included in the SANAS schedule of Accreditation for this laboratory.

Test Report for Mod CBR Road Indicator Report SANS 3001-GR1,GR10,GR20,GR30,GR40

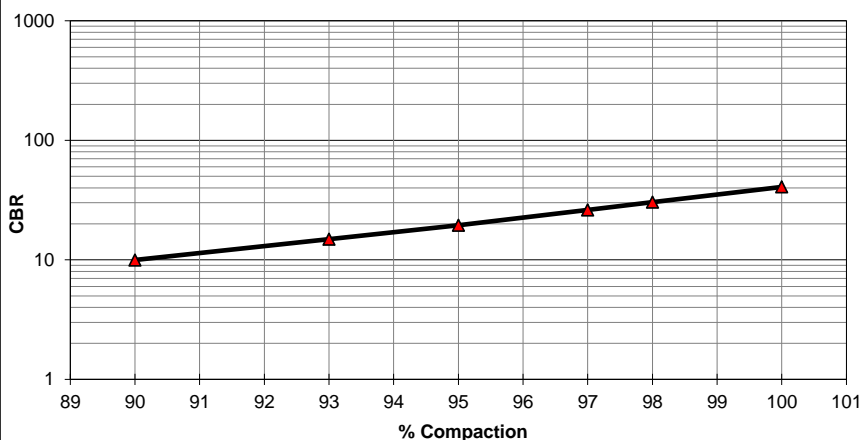
CLIENT:	Makhuma Consulting Engineers	DATE RECEIVED:	10/Feb/2022
	1468 Lowveld close	DATE TESTED:	18/Feb/2022
	Pretoria	DATE REPORTED:	25/Feb/2022
	0034	REPORT NO.:	QOJ207/34
ATT:	Hudson Mabelane		
PROJECT:	D192 Geotechnical Investigation		
DESCRIPTION:	Material sampled by Client	SAMPLE NO:	QOJ207/34
MATERIAL DESCR.:	lt Brown Silty sand	JOB NUMBER:	QOJ207
TP :	TP 44	DEPTH (m):	0.4-1.4m below EGL

Sieve mm	% Passing
100.0	
75.0	
63.0	
50.0	
37.5	
28.0	
20.0	
14.0	100
5.00	99
2.00	98
0.425	70
0.250	49
0.150	31
0.075	19



Soil Mortar % SANS 3001-PR5		Grading Modulus SANS 3001:PR5		*Classifications	
Coarse Sand	29	Grading Modulus	1.13	Unified Soil Classification	SM(d)
Coarse Fine Sand	21	Soil Constants SANS 3001:GR12		COLTO (1998)	G7
Medium Fine Sand	18	Liquid Limit (%)		US Highway	A-2-4
Fine Fine Sand	13	Plasticity Index (%)	NP	Group Index	0
Silt and Clay	19	Linear Shrinkage (%)	0.0		

CBR SANS 3001:GR30,GR40			
MDD kg/m ³	2010		
OMC %	7.8		
Comp. Moisture %	7.9		
Dry Density kg/m ³	2002	1904	1804
Compaction %	99.6	94.7	89.7
% Swell	1.42	1.73	2.05
CBR @ % MDD			
@ 100% comp. :	41		
@ 98% comp. :	30		
@ 97% comp. :	26		
@ 95% comp. :	19		
@ 93% comp. :	15		
@ 90% comp. :	10		



Remarks

Technical Signatory:

Madoda Ngwenya

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Results marked "#" in this report are not included in the SANAS schedule of Accreditation for this laboratory.

Test report for Maximum Dry Density and Optimum Moisture Content SANS 3001-GR20,GR30

CLIENT: Makhuma Consulting Engineers
1468 Lowveld close
Pretoria
0034

DATE RECEIVED: 10/Feb/2022
DATE TESTED: 18/Feb/2022
DATE REPORTED: 25/Feb/2022
REPORT NO.: QOJ207/34

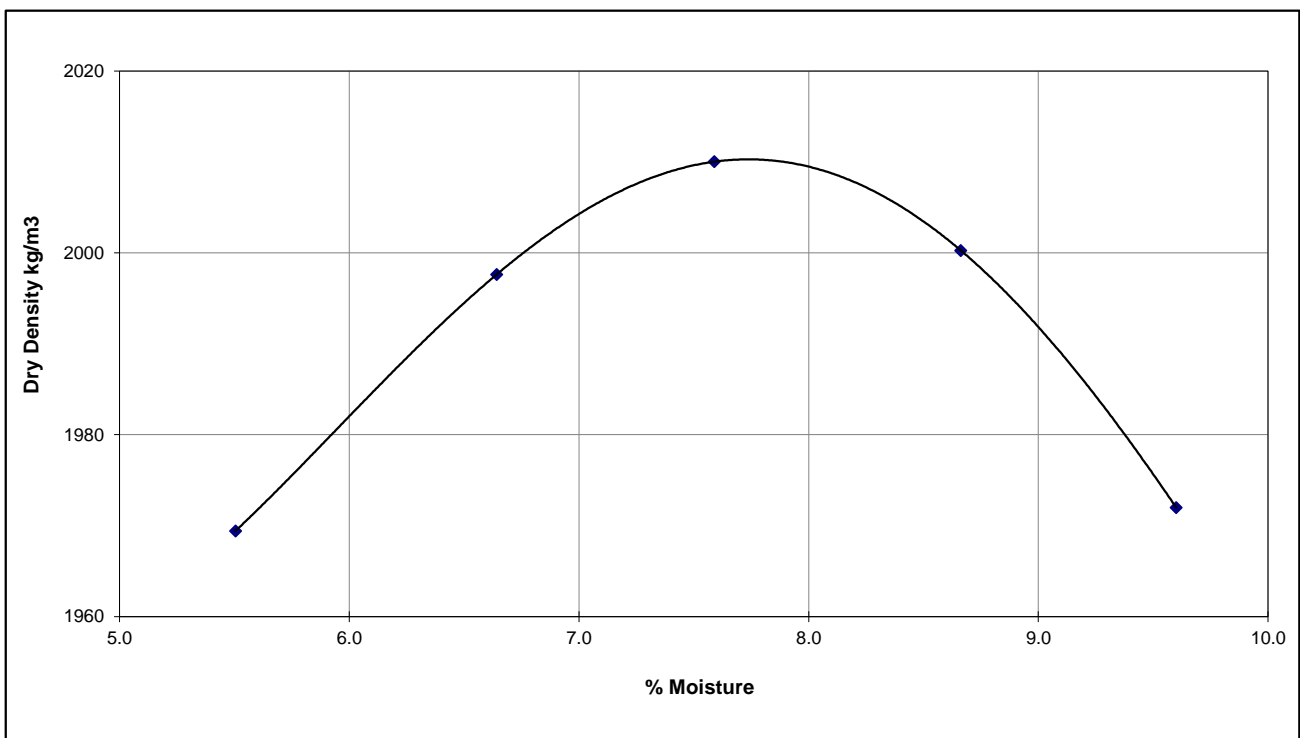
ATT: Hudson Mabelane

PROJECT: D192 Geotechnical Investigation


DESCRIPTION: Material sampled by Client
DESCRIPTION: It Brown Silty sand
TP : TP 44
DEPTH (m): 0.4-1.4m below EGL

SAMPLE NO: QOJ207/34
JOB NUMBER: QOJ207
PREPERATION METHOD: Scalping

Maximum Dry Density (MDD) - SANS 3001: GR30, GR20						
Point No	1	2	3	4	5	
Dry Density MDD kg/m ³	1969	1998	2010	2000	1972	
Moisture Content OMC %	5.5	6.6	7.6	8.7	9.6	



Maximum Dry Density MDD kg/m ³	2010
Optimum Moisture Content OMC %	7.8

Technical Signatory: 
Madoda Ngwenya

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Results marked "#" in this report are not included in the SANAS schedule of Accreditation for this laboratory.

Test Report for Mod CBR Road Indicator Report SANS 3001-GR1,GR10,GR20,GR30,GR40

CLIENT: Makhuma Consulting Engineers
1468 Lowveld close
Pretoria
0034

DATE RECEIVED: 10/Feb/2022
DATE TESTED: 18/Feb/2022
DATE REPORTED: 25/Feb/2022
REPORT NO.: QOJ207/35

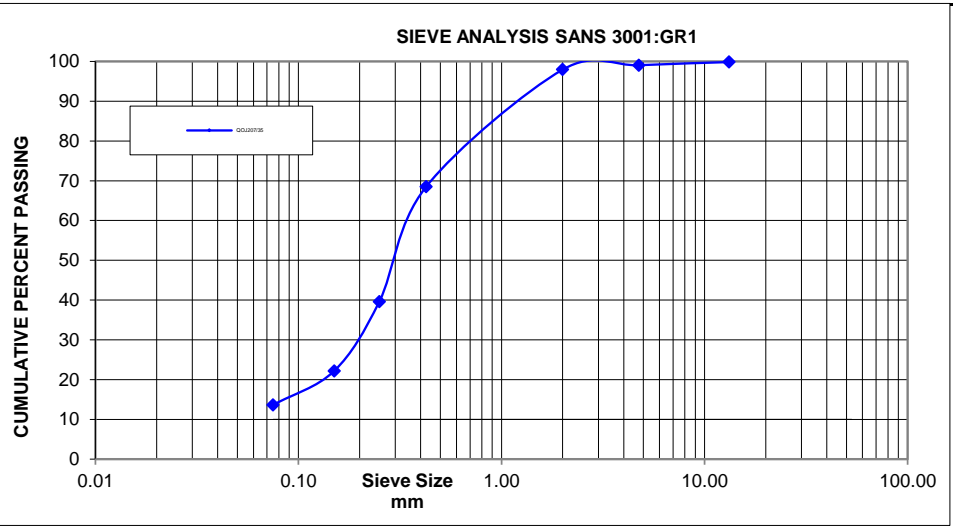
ATT: Hudson Mabelane

PROJECT: D192 Geotechnical Investigation

DESCRIPTION: Material sampled by Client
MATERIAL DESCR.: lt Brown Silty sand
TP : TP 45

SAMPLE NO: QOJ207/35
JOB NUMBER: QOJ207
DEPTH (m): 0.2-1.7m below EGL

Sieve mm	% Passing
100.0	
75.0	
63.0	
50.0	
37.5	
28.0	
20.0	
14.0	100
5.00	99
2.00	98
0.425	68
0.250	40
0.150	22
0.075	14



Soil Mortar % SANS 3001-PR5		Grading Modulus SANS 3001:PR5		*Classifications	
Coarse Sand	30	Grading Modulus	1.20	Unified Soil Classification	SM(d)
Coarse Fine Sand	30	Soil Constants SANS 3001:GR12		COLTO (1998)	-
Medium Fine Sand	18	Liquid Limit (%)		US Highway	A-2-4
Fine Fine Sand	9	Plasticity Index (%)	NP	Group Index	0
Silt and Clay	14	Linear Shrinkage (%)	0.0		

Remarks

Technical Signatory: _____

The material is too sandy, therefore no MOD & CBR could be tested

Madoda Ngwenya

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Test Report for Mod CBR Road Indicator Report SANS 3001-GR1,GR10,GR20,GR30,GR40

CLIENT: Makhuma Consulting Engineers
1468 Lowveld close
Pretoria
0034

DATE RECEIVED: 10/Feb/2022
DATE TESTED: 18/Feb/2022
DATE REPORTED: 25/Feb/2022
REPORT NO.: QOJ207/36

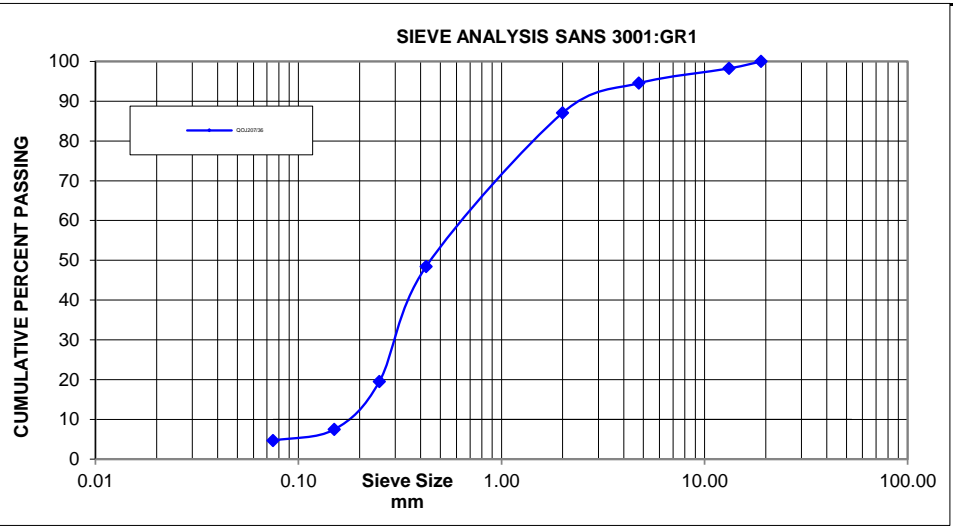
ATT: Hudson Mabelane

PROJECT: D192 Geotechnical Investigation

DESCRIPTION: Material sampled by Client
MATERIAL DESCR.: lt Brown Poorly graded silty sand
TP : TP 46

SAMPLE NO: QOJ207/36
JOB NUMBER: QOJ207
DEPTH (m): 0.4-1.5m below EGL

Sieve mm	% Passing
100.0	
75.0	
63.0	
50.0	
37.5	
28.0	
20.0	100
14.0	98
5.00	95
2.00	87
0.425	48
0.250	19
0.150	7
0.075	5



Soil Mortar % SANS 3001-PR5		Grading Modulus SANS 3001:PR5		*Classifications	
Coarse Sand	44	Grading Modulus	1.60	Unified Soil Classification	sp/sm
Coarse Fine Sand	33	Soil Constants SANS 3001:GR12		COLTO (1998)	-
Medium Fine Sand	14	Liquid Limit (%)		US Highway	A-1-b
Fine Fine Sand	3	Plasticity Index (%)	NP	Group Index	0
Silt and Clay	5	Linear Shrinkage (%)	0.0		

Remarks

Technical Signatory: _____

Madoda Ngwenya

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Results marked "#" in this report are not included in the SANAS schedule of Accreditation for this laboratory.

Test Report for Mod CBR Road Indicator Report SANS 3001-GR1,GR10,GR20,GR30,GR40

CLIENT: Makhuma Consulting Engineers
1468 Lowveld close
Pretoria
0034

DATE RECEIVED: 10/Feb/2022
DATE TESTED: 18/Feb/2022
DATE REPORTED: 25/Feb/2022
REPORT NO.: QOJ207/37

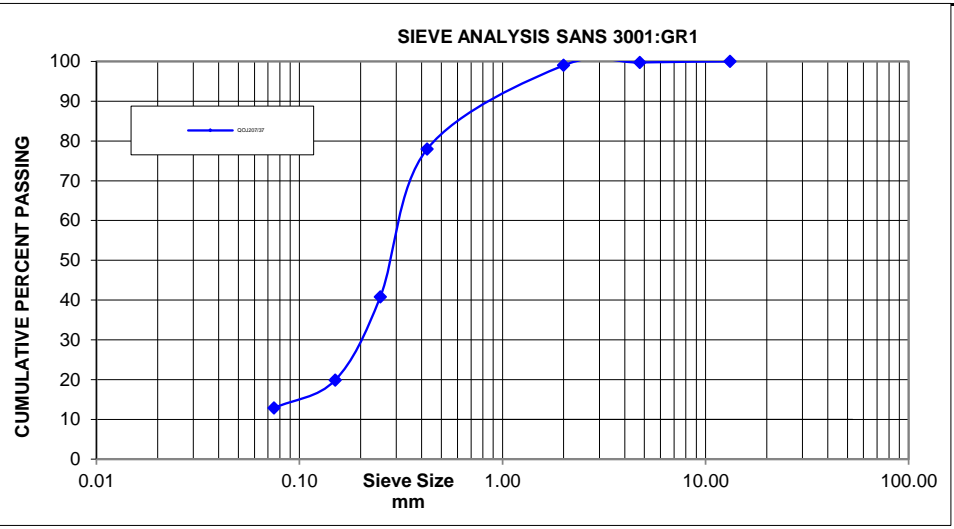
ATT: Hudson Mabelane

PROJECT: D192 Geotechnical Investigation

DESCRIPTION: Material sampled by Client
MATERIAL DESCR.: lt Brown Silty sand
TP : TP 47

SAMPLE NO: QOJ207/37
JOB NUMBER: QOJ207
DEPTH (m): 0.3-1.7m below EGL

Sieve mm	% Passing
100.0	
75.0	
63.0	
50.0	
37.5	
28.0	
20.0	
14.0	100
5.00	100
2.00	99
0.425	78
0.250	41
0.150	20
0.075	13



Soil Mortar % SANS 3001-PR5		Grading Modulus SANS 3001:PR5		*Classifications	
Coarse Sand	21	Grading Modulus	1.10	Unified Soil Classification	SM(d)
Coarse Fine Sand	38	Soil Constants SANS 3001:GR12		COLTO (1998)	-
Medium Fine Sand	21	Liquid Limit (%)		US Highway	A-2-4
Fine Fine Sand	7	Plasticity Index (%)	NP	Group Index	0
Silt and Clay	13	Linear Shrinkage (%)	0.0		

Remarks

Technical Signatory: _____

The material is too sandy, therefore no MOD & CBR could be tested

Madoda Ngwenya

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Results marked "#" in this report are not included in the SANAS schedule of Accreditation for this laboratory.

Test Report for Mod CBR Road Indicator Report SANS 3001-GR1,GR10,GR20,GR30,GR40

CLIENT: Makhuma Consulting Engineers
1468 Lowveld close
Pretoria
0034

DATE RECEIVED: 10/Feb/2022
DATE TESTED: 18/Feb/2022
DATE REPORTED: 25/Feb/2022
REPORT NO.: QOJ207/38

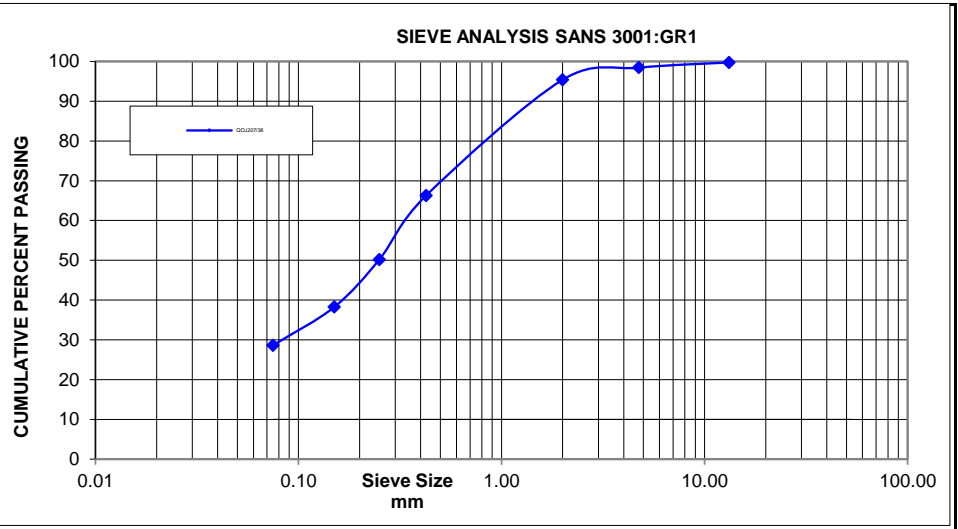
ATT: Hudson Mabelane

PROJECT: D192 Geotechnical Investigation

DESCRIPTION: Material sampled by Client
MATERIAL DESCR.: lt Brown Silty sand
TP : TP 48

SAMPLE NO: QOJ207/38
JOB NUMBER: QOJ207
DEPTH (m): 0.4-1.2m below EGL

Sieve mm	% Passing
100.0	
75.0	
63.0	
50.0	
37.5	
28.0	
20.0	
14.0	100
5.00	98
2.00	95
0.425	66
0.250	50
0.150	38
0.075	29



Soil Mortar % SANS 3001-PR5		Grading Modulus SANS 3001:PR5		*Classifications	
Coarse Sand	31	Grading Modulus	1.10	Unified Soil Classification	SM(d)
Coarse Fine Sand	17	Soil Constants SANS 3001:GR12		COLTO (1998)	-
Medium Fine Sand	13	Liquid Limit (%)		US Highway	A-2-4
Fine Fine Sand	10	Plasticity Index (%)	NP	Group Index	0
Silt and Clay	30	Linear Shrinkage (%)	0.0		

Remarks

Technical Signatory: _____

The material is too sandy, therefore no MOD & CBR could be tested

Madoda Ngwenya

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Test Report for Mod CBR Road Indicator Report SANS 3001-GR1,GR10,GR20,GR30,GR40

CLIENT: Makhuma Consulting Engineers
1468 Lowveld close
Pretoria
0034

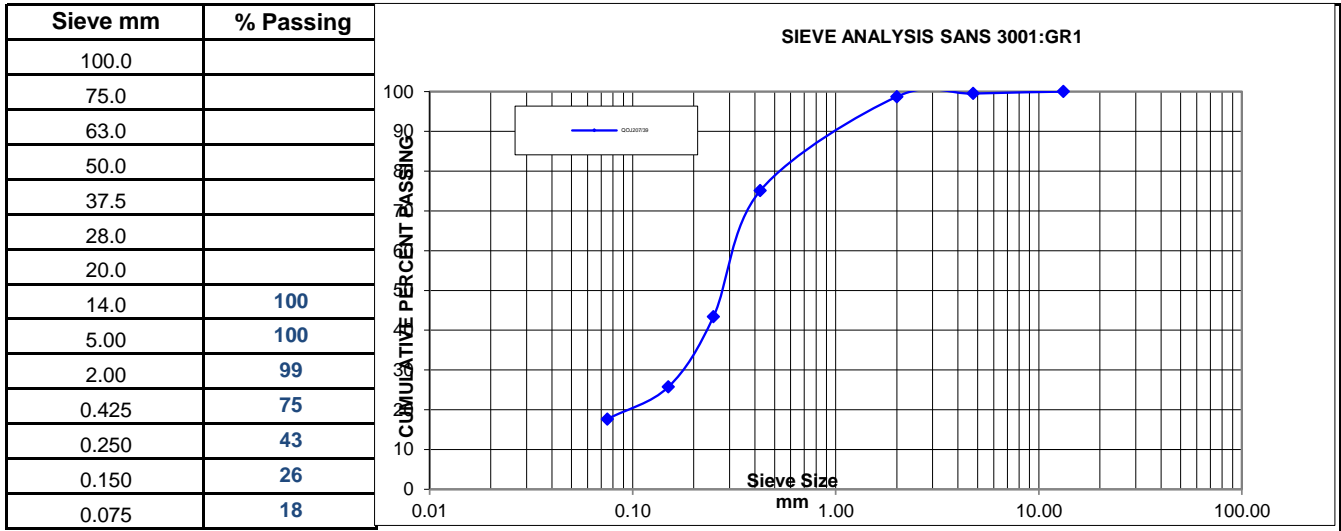
DATE RECEIVED: 10/Feb/2022
DATE TESTED: 18/Feb/2022
DATE REPORTED: 25/Feb/2022
REPORT NO.: QOJ207/39

ATT: Hudson Mabelane

PROJECT: D192 Geotechnical Investigation

DESCRIPTION: Material sampled by Client
MATERIAL DESCR.: lt Brown Silty sand
TP : TP 49

SAMPLE NO: QOJ207/39
JOB NUMBER: QOJ207
DEPTH (m): 0.4-1.9m below EGL



Soil Mortar % SANS 3001-PR5		Grading Modulus SANS 3001:PR5		*Classifications	
Coarse Sand	24	Grading Modulus	1.09	Unified Soil Classification	SM(d)
Coarse Fine Sand	32	Soil Constants SANS 3001:GR12		COLTO (1998)	-
Medium Fine Sand	18	Liquid Limit (%)		US Highway	A-2-4
Fine Fine Sand	8	Plasticity Index (%)	NP	Group Index	0
Silt and Clay	18	Linear Shrinkage (%)	0.0		

Remarks

Technical Signatory: _____

The material is sandy with a PI of zero, therefore MOD and CBR have not been tested

Madoda Ngwenya

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Test Report for Mod CBR Road Indicator Report SANS 3001-GR1,GR10,GR20,GR30,GR40

CLIENT: Makhuma Consulting Engineers
1468 Lowveld close
Pretoria
0034

DATE RECEIVED: 10/Feb/2022
DATE TESTED: 18/Feb/2022
DATE REPORTED: 25/Feb/2022
REPORT NO.: QOJ207/40

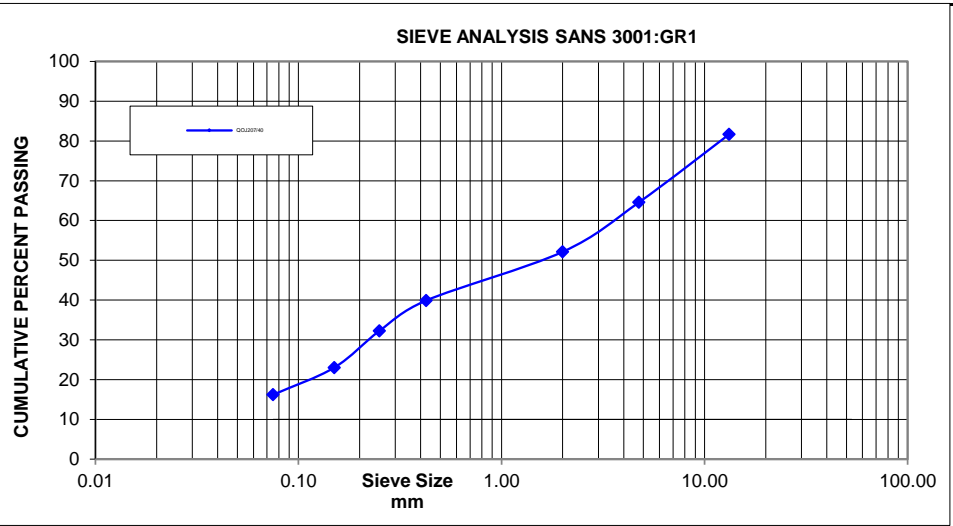
ATT: Hudson Mabelane

PROJECT: D192 Geotechnical Investigation

DESCRIPTION: Material sampled by Client
MATERIAL DESCR.: lt Brown Silty/Clayey sand
TP : Boorowpit 1

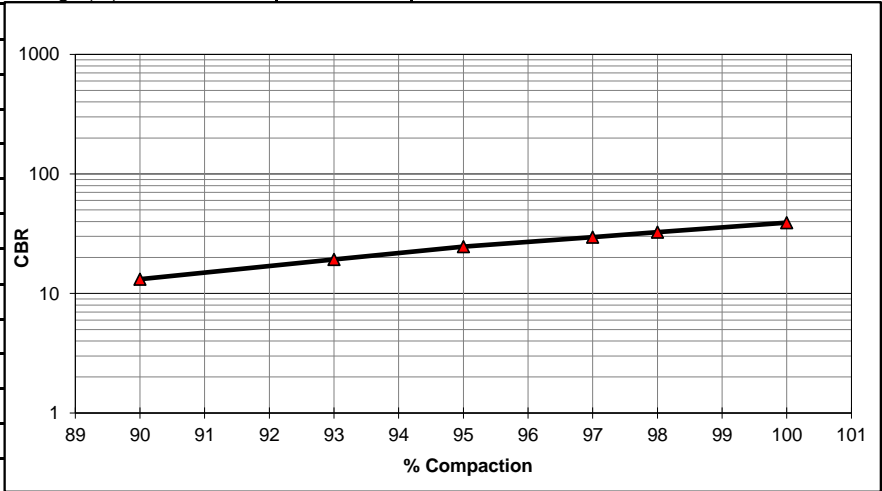
SAMPLE NO: QOJ207/40
JOB NUMBER: QOJ207
DEPTH (m): N/A

Sieve mm	% Passing
100.0	
75.0	
63.0	
50.0	
37.5	
28.0	
20.0	
14.0	82
5.00	65
2.00	52
0.425	40
0.250	32
0.150	23
0.075	16




Soil Mortar % SANS 3001-PR5		Grading Modulus SANS 3001:PR5		*Classifications	
Coarse Sand	23	Grading Modulus	1.92	Unified Soil Classification	sm/sc
Coarse Fine Sand	15	Soil Constants SANS 3001:GR12		COLTO (1998)	G6
Medium Fine Sand	18	Liquid Limit (%)	16	US Highway	A-1-b
Fine Fine Sand	13	Plasticity Index (%)	6	Group Index	0
Silt and Clay	31	Linear Shrinkage (%)	2.5		

CBR SANS 3001:GR30,GR40			
MDD kg/m ³	2132		
OMC %	6.6		
Comp. Moisture %	6.8		
Dry Density kg/m ³	2126	2022	1916
Compaction %	99.7	94.8	89.9
% Swell	0.39	0.47	0.59
CBR @ % MDD			
@ 100% comp. :	39		
@ 98% comp. :	33		
@ 97% comp. :	30		
@ 95% comp. :	25		
@ 93% comp. :	19		
@ 90% comp. :	13		



Remarks

Technical Signatory: 
Madoda Ngwenya

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Test report for Maximum Dry Density and Optimum Moisture Content SANS 3001-GR20,GR30

CLIENT: Makhuma Consulting Engineers
1468 Lowveld close
Pretoria
0034

DATE RECEIVED: 10/Feb/2022
DATE TESTED: 18/Feb/2022
DATE REPORTED: 25/Feb/2022
REPORT NO.: QOJ207/40

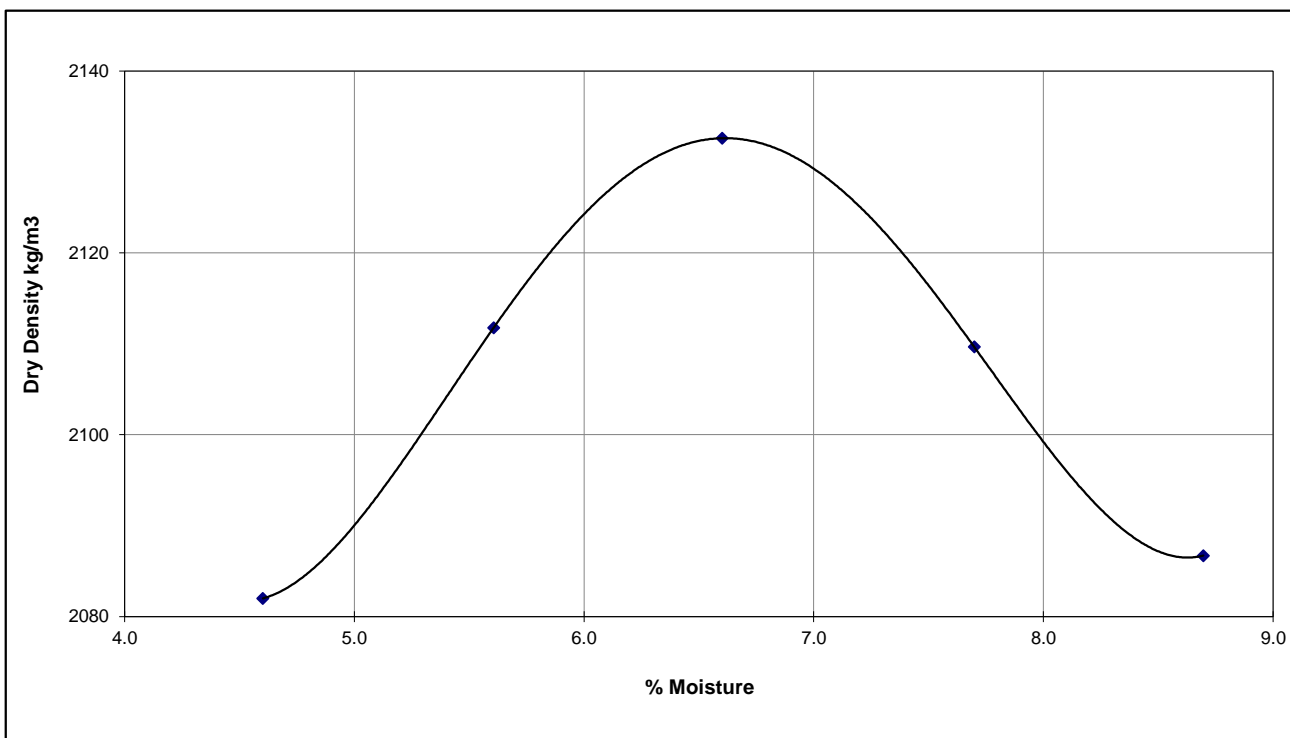
ATT: Hudson Mabelane

PROJECT: D192 Geotechnical Investigation


DESCRIPTION: Material sampled by Client
DESCRIPTION: It Brown Silty/Clayey sand
TP : Boorowpit 1
DEPTH (m): N/A

SAMPLE NO: QOJ207/40
JOB NUMBER: QOJ207
PREPERATION METHOD: Scalping

Maximum Dry Density (MDD) - SANS 3001: GR30, GR20						
Point No	1	2	3	4	5	
Dry Density MDD kg/m ³	2133	2110	2087	2112	2082	
Moisture Content OMC %	6.6	7.7	8.7	5.6	4.6	



Maximum Dry Density MDD kg/m ³	2132
Optimum Moisture Content OMC %	6.6

Technical Signatory: 
Madoda Ngwenya

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Results marked "#" in this report are not included in the SANAS schedule of Accreditation for this laboratory.

Test Report for Mod CBR Road Indicator Report SANS 3001-GR1,GR10,GR20,GR30,GR40

CLIENT: Makhuma Consulting Engineers
1468 Lowveld close
Pretoria
0034

DATE RECEIVED: 10/Feb/2022
DATE TESTED: 18/Feb/2022
DATE REPORTED: 25/Feb/2022
REPORT NO.: QOJ207/41

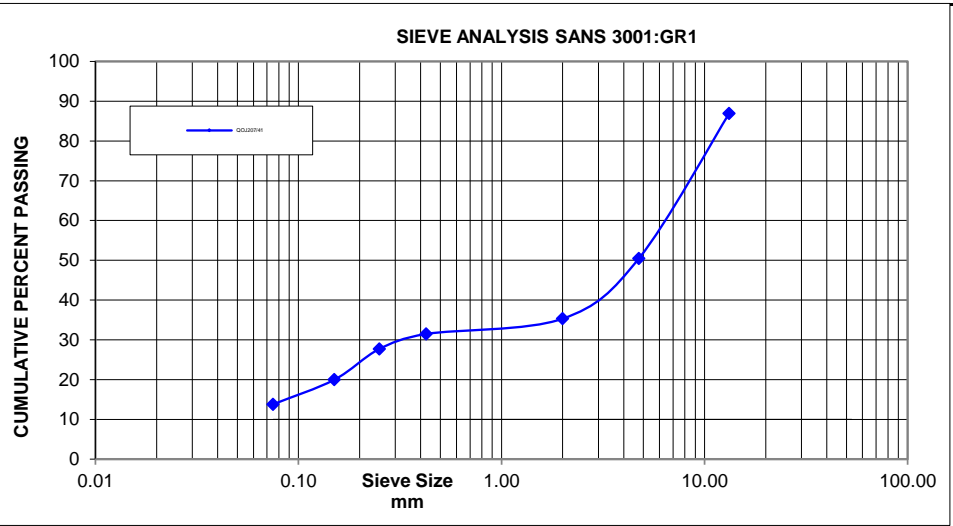
ATT: Hudson Mabelane

PROJECT: D192 Geotechnical Investigation

DESCRIPTION: Material sampled by Client
MATERIAL DESCR.: lt Brown Clayey sand
TP : Boorowpit 2

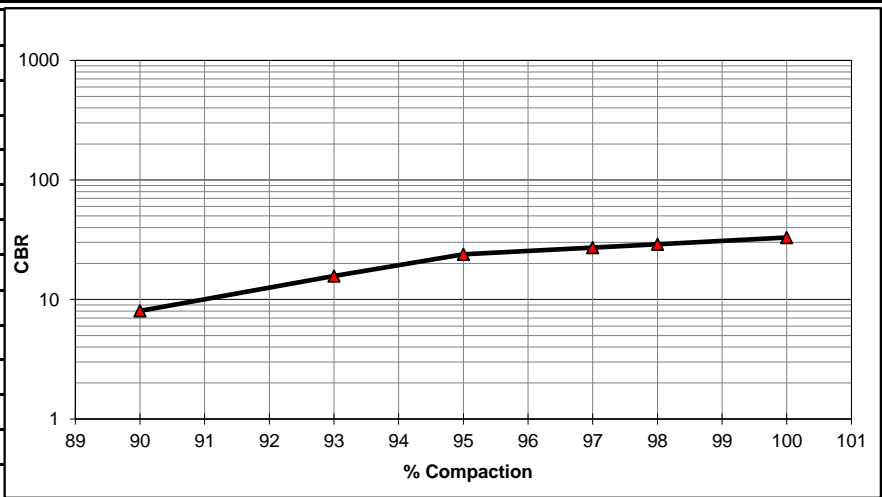
SAMPLE NO: QOJ207/41
JOB NUMBER: QOJ207
DEPTH (m): N/A

Sieve mm	% Passing
100.0	
75.0	
63.0	
50.0	
37.5	
28.0	
20.0	
14.0	87
5.00	50
2.00	35
0.425	31
0.250	28
0.150	20
0.075	14



Soil Mortar % SANS 3001-PR5		Grading Modulus SANS 3001:PR5		*Classifications	
Coarse Sand	11	Grading Modulus	2.19	Unified Soil Classification	SC
Coarse Fine Sand	11	Soil Constants SANS 3001:GR12		COLTO (1998)	G7
Medium Fine Sand	22	Liquid Limit (%)	33	US Highway	A-2-4
Fine Fine Sand	17	Plasticity Index (%)	10	Group Index	0
Silt and Clay	39	Linear Shrinkage (%)	4.0		

CBR SANS 3001:GR30,GR40			
MDD kg/m ³	2082		
OMC %	9.0		
Comp. Moisture %	9.2		
Dry Density kg/m ³	2076	1974	1870
Compaction %	99.7	94.8	89.8
% Swell	0.59	0.83	1.34
CBR @ % MDD			
@ 100% comp. :	33		
@ 98% comp. :	29		
@ 97% comp. :	27		
@ 95% comp. :	24		
@ 93% comp. :	16		
@ 90% comp. :	8		



Remarks

Technical Signatory:

Madoda Ngwenya

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Results marked "#" in this report are not included in the SANAS schedule of Accreditation for this laboratory.

Test report for Maximum Dry Density and Optimum Moisture Content SANS 3001-GR20,GR30

CLIENT: Makhuma Consulting Engineers
1468 Lowveld close
Pretoria
0034

DATE RECEIVED: 10/Feb/2022
DATE TESTED: 18/Feb/2022
DATE REPORTED: 25/Feb/2022
REPORT NO.: QOJ207/41

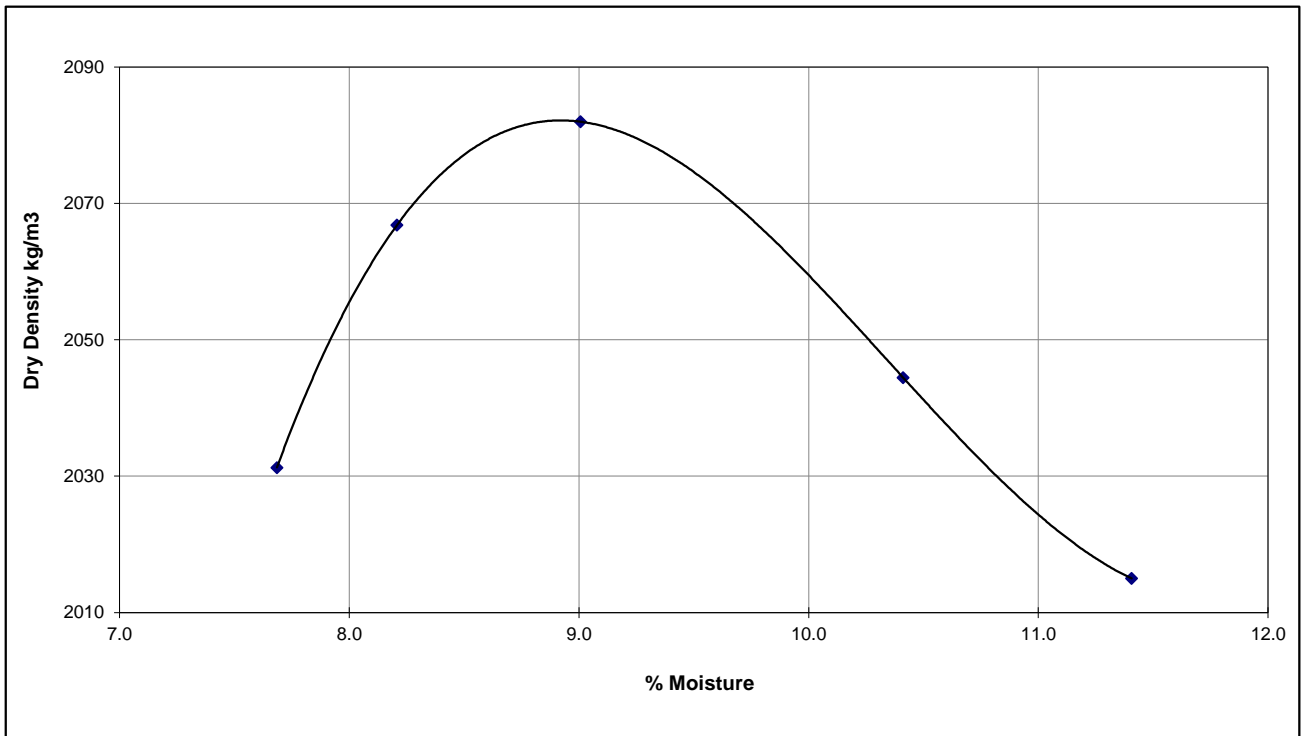
ATT: Hudson Mabelane

PROJECT: D192 Geotechnical Investigation


DESCRIPTION: Material sampled by Client
DESCRIPTION: It Brown Clayey sand
TP : Boorowpit 2
DEPTH (m): N/A

SAMPLE NO: QOJ207/41
JOB NUMBER: QOJ207
PREPERATION METHOD: Scalping

Maximum Dry Density (MDD) - SANS 3001: GR30, GR20						
Point No	1	2	3	4	5	
Dry Density MDD kg/m ³	2067	2082	2044	2031	2015	
Moisture Content OMC %	8.2	9.0	10.4	7.7	11.4	



Maximum Dry Density MDD kg/m ³	2082
Optimum Moisture Content OMC %	9

Technical Signatory: 
Madoda Ngwenya

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Results marked "#" in this report are not included in the SANAS schedule of Accreditation for this laboratory.

Test Report for Mod CBR Road Indicator Report SANS 3001-GR1,GR10,GR20,GR30,GR40

CLIENT: Makhuma Consulting Engineers
1468 Lowveld close
Pretoria
0034

DATE RECEIVED: 10/Feb/2022
DATE TESTED: 18/Feb/2022
DATE REPORTED: 25/Feb/2022
REPORT NO.: QOJ207/42

ATT: Hudson Mabelane

PROJECT: D192 Geotechnical Investigation

DESCRIPTION: Material sampled by Client

SAMPLE NO: QOJ207/42

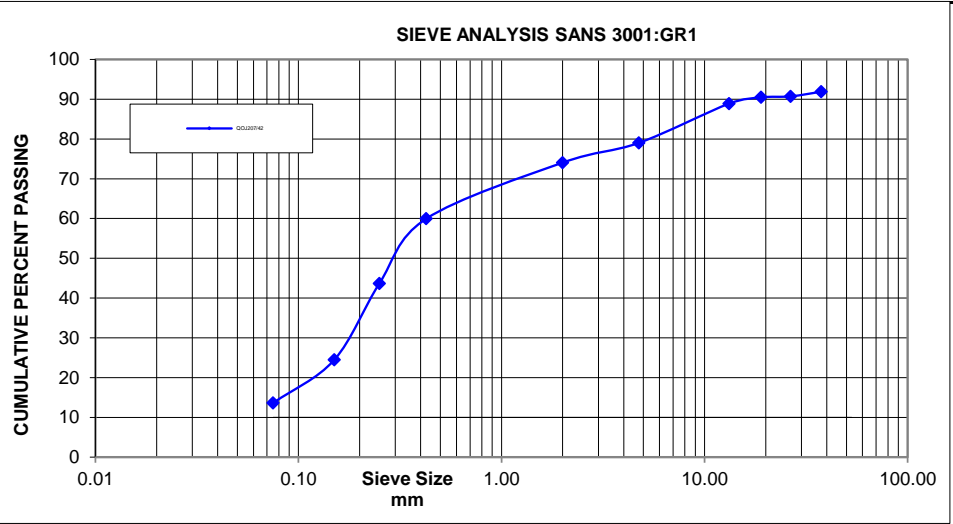
MATERIAL DESCR.: drk Yellow Silty sand

JOB NUMBER: QOJ207

TP : TP 41

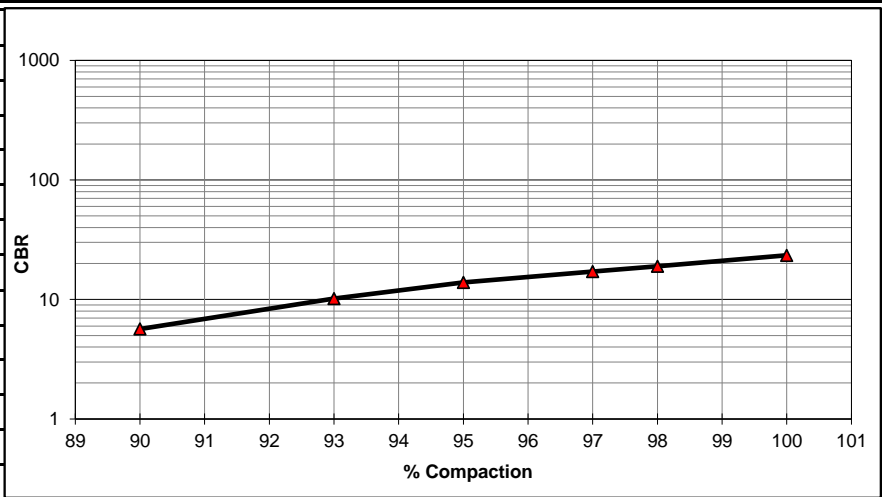
DEPTH (m): 0.3-0.9m below EGL

Sieve mm	% Passing
100.0	
75.0	
63.0	
50.0	
37.5	92
28.0	91
20.0	90
14.0	89
5.00	79
2.00	74
0.425	60
0.250	44
0.150	24
0.075	14



Soil Mortar % SANS 3001-PR5		Grading Modulus SANS 3001:PR5		*Classifications	
Coarse Sand	19	Grading Modulus	1.52	Unified Soil Classification	SM(d)
Coarse Fine Sand	22	Soil Constants SANS 3001:GR12		COLTO (1998)	G8
Medium Fine Sand	26	Liquid Limit (%)		US Highway	A-2-4
Fine Fine Sand	15	Plasticity Index (%)	NP	Group Index	0
Silt and Clay	18	Linear Shrinkage (%)	0.0		

CBR SANS 3001:GR30,GR40			
MDD kg/m ³	2090		
OMC %	8.2		
Comp. Moisture %	9.2		
Dry Density kg/m ³	2069	1967	1864
Compaction %	99.0	94.1	89.2
% Swell	0.43	0.55	0.98
CBR @ % MDD			
@ 100% comp. :	23		
@ 98% comp. :	19		
@ 97% comp. :	17		
@ 95% comp. :	14		
@ 93% comp. :	10		
@ 90% comp. :	6		



Remarks

Technical Signatory:

Madoda Ngwenya

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Results marked "#" in this report are not included in the SANAS schedule of Accreditation for this laboratory.

Test report for Maximum Dry Density and Optimum Moisture Content SANS 3001-GR20,GR30

CLIENT: Makhuma Consulting Engineers
1468 Lowveld close
Pretoria
0034

DATE RECEIVED: 10/Feb/2022
DATE TESTED: 18/Feb/2022
DATE REPORTED: 25/Feb/2022
REPORT NO.: QOJ207/42

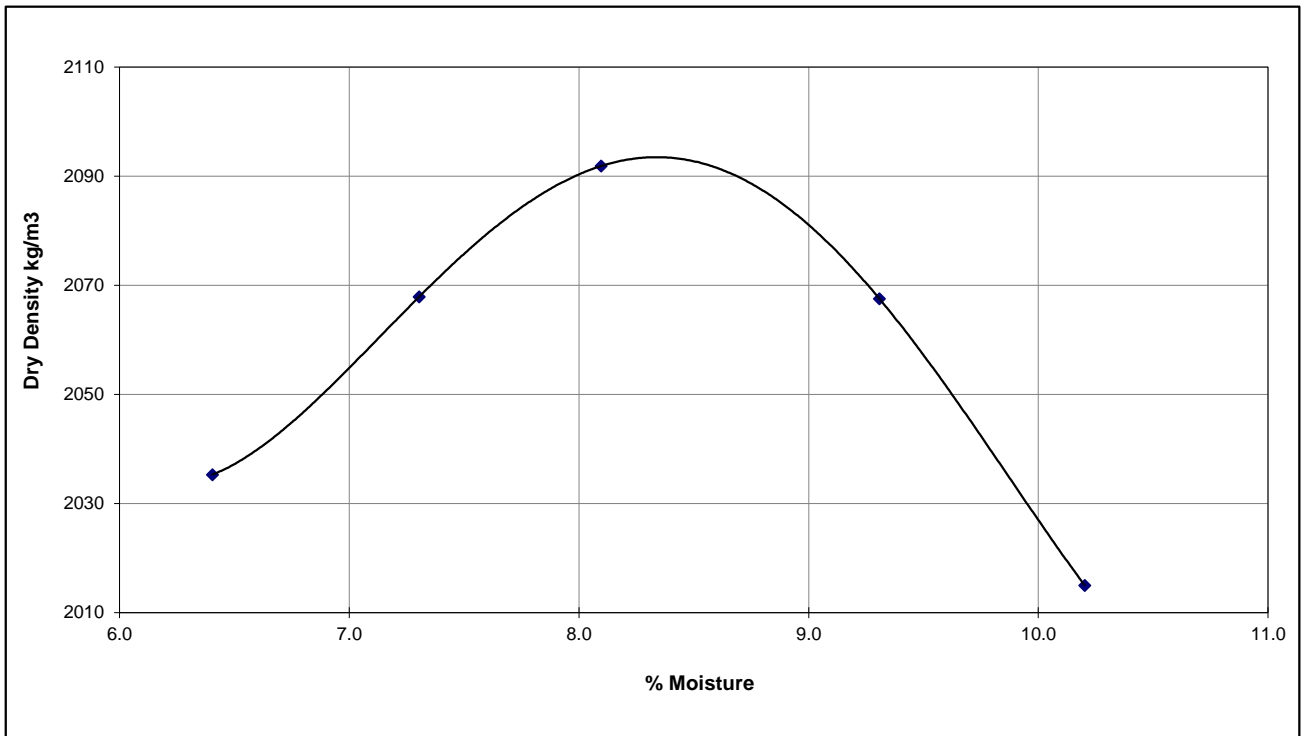
ATT: Hudson Mabelane

PROJECT: D192 Geotechnical Investigation


DESCRIPTION: Material sampled by Client
DESCRIPTION: drk Yellow Silty sand
TP : TP 41
DEPTH (m): 0.3-0.9m below EGL

SAMPLE NO: QOJ207/42
JOB NUMBER: QOJ207
PREPERATION METHOD: Scalping

Maximum Dry Density (MDD) - SANS 3001: GR30, GR20						
Point No	1	2	3	4	5	
Dry Density MDD kg/m ³	2035	2068	2092	2068	2015	
Moisture Content OMC %	6.4	7.3	8.1	9.3	10.2	



Maximum Dry Density MDD kg/m ³	2090
Optimum Moisture Content OMC %	8.2

Technical Signatory: 
Madoda Ngwenya

The above test results are only relevant to samples delivered and tested at the laboratory. This report shall not be reproduced or altered without the prior consent of the laboratory, except copied in full. * Opinions and interpretations expressed herein are outside the scope of SANAS accreditation.

Results marked "#" in this report are not included in the SANAS schedule of Accreditation for this laboratory.

APPENDIX D: DYNAMIC CONE PENETROMETER RESULTS

(Use and interpretation of the dynamic cone penetrometer test (DCP), Paige-Green et al (2009)

SUMMARY OF DYNAMIC CONE PENETROMETER TEST RESULTS

		DCP TEST POSITIONS															
		DCP1	DCP2	DCP3	DCP4	DCP5	DCP6	DCP7	DCP8	DCP9	DCP10	DCP11	DCP12	DCP13	DCP14	DCP15	
Insitu C.B.R at following depths in mm	1-150	74	81	59	50	81	68		94	76							
	151-300	115	52	72	81	94	94		127								
	301-450	115	54	47	59	40	61		50								
	451-600	67	159	31	65	52	40		110								
	601-750	37	72	26	159	193			106								
	751-900								46								
	901-1050																
Max. Pen.		880	830	850	810	830	730	45	955	270	60	140	10	90	60	40	
		DCP TEST POSITIONS															
		DCP16	DCP17	DCP18	DCP19	DCP20	DCP21	DCP22	DCP23	DCP24	DCP25	DCP26	DCP27	DCP28	DCP29	DCP30	
Insitu C.B.R at following depths in mm	1-150			40			44		118				49	64	51	51	
	151-300			27			59		87				18	98	38	46	
	301-450			34			35		104				27	49	19	33	
	451-600			51			8		103				27	43	12	20	
	601-750			59			4		64				29	20	13	9	
	751-900																
	901-1050																
Max. Pen.		30	50	870	90	80	880	155	870	15	10	32	875	870	825	860	

TEST REPORT FOR DYNAMIC CONE PENETROMETER BY TEST METHOD TMH6-ST6

CLIENT: Morula Consulting Engineers

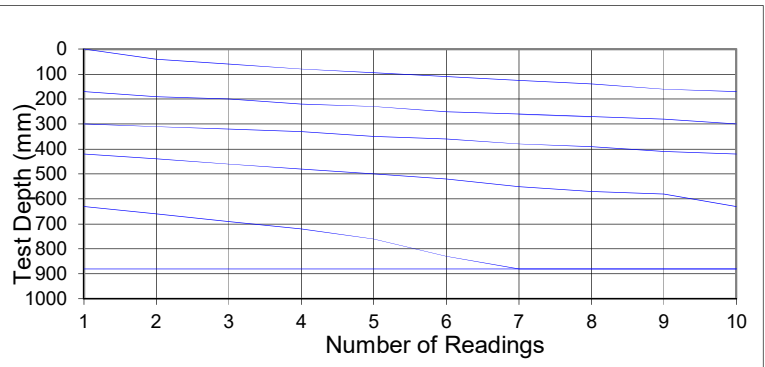
DATE REPORTED: 03-Feb-2022
 OUR REF: MAK0830203

PROJECT: Geotechnical Investigation: D192 ROAD
 ATTENTION: Hulisani Tsanawani
 Tel/Email: shoegra@morulaconsulting.co.za

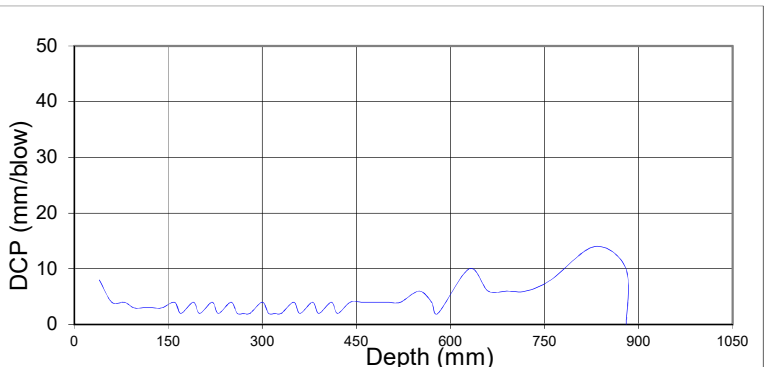
DESCRIPTION: DCP test was done from existing ground level
 DCP No: 1 at TP1 - D192 ROAD

DATE TESTED: 2-Feb-22

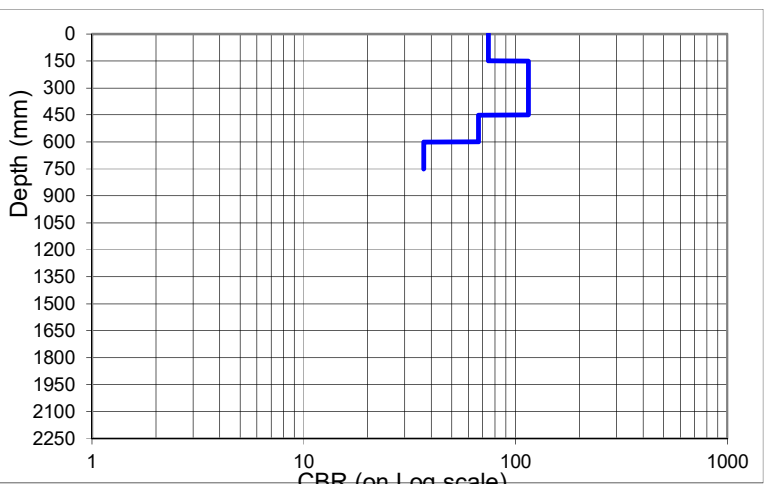
DCP Readings		Blows per reading: 5							
no.	mm	no.	mm	no.	mm	no.	mm	no.	mm
1	40	11	200	21	330	31	500	41	830
2	60	12	220	22	350	32	520	42	880
3	80	13	230	23	360	33	550	43	
4	95	14	250	24	380	34	570	44	
5	110	15	260	25	390	35	580	45	
6	125	16	270	26	410	36	630	46	
7	140	17	280	27	420	37	660	47	
8	160	18	300	28	440	38	690	48	
9	170	19	310	29	460	39	720	49	
10	190	20	320	30	480	40	760	50	



DCP number (mm / Blow) DN									
DN	mm	DN	mm	DN	mm	DN	mm	DN	mm
8	40	2	200	2	330	4	500	14	830
4	60	4	220	4	350	4	520	10	880
4	80	2	230	2	360	6	550		
3	95	4	250	4	380	4	570		
3	110	2	260	2	390	2	580		
3	125	2	270	4	410	10	630		
3	140	2	280	2	420	6	660		
4	160	4	300	4	440	6	690		
2	170	2	310	4	460	6	720		
4	190	2	320	4	480	8	760		



no.	Depth (mm)			In situ		Blows/mm	
	From	-	To	DN	CBR	150mm	300mm
1	1	-	150	4,0	74	38	45,0
2	151	-	300	2,9	115	53	
3	301	-	450	2,9	115	53	43,5
4	451	-	600	4,3	67	35	
5	601	-	750	6,9	37	22	
6	751	-	900				
8	901	-	1050				
9	1051	-	1200				
10	1201	-	1350				
11	1351	-	1500				
12	1501	-	1650				
13	1651	-	1800				
14	1801	-	1950				
15	1951	-	2100				



REMARKS:

Max penetration depth **880 mm**
 Where values are presented as continued "cont", refer to the adjacent graphs where DN values vs depth and penetration vs depths can be read.

Signature 

TEST REPORT FOR DYNAMIC CONE PENETROMETER BY TEST METHOD TMH6-ST6

CLIENT: Morula Consulting Engineers

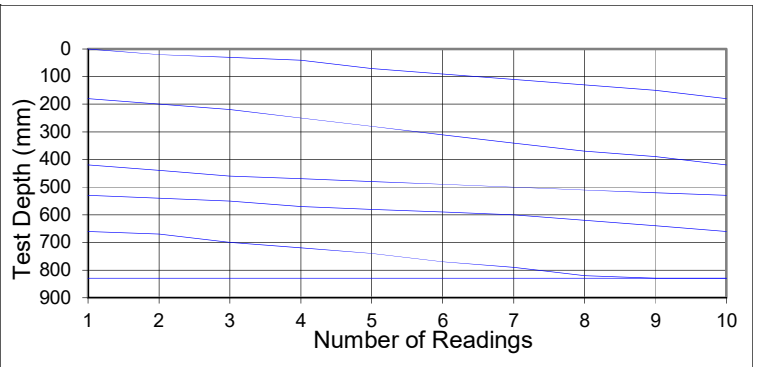
DATE REPORTED: 03-Feb-2022
 OUR REF: MAK0830203

PROJECT: Geotechnical Investigation: D192 ROAD
 ATTENTION: Hulisani Tsanawani
 Tel/Email: shoegra@morulaconsulting.co.za

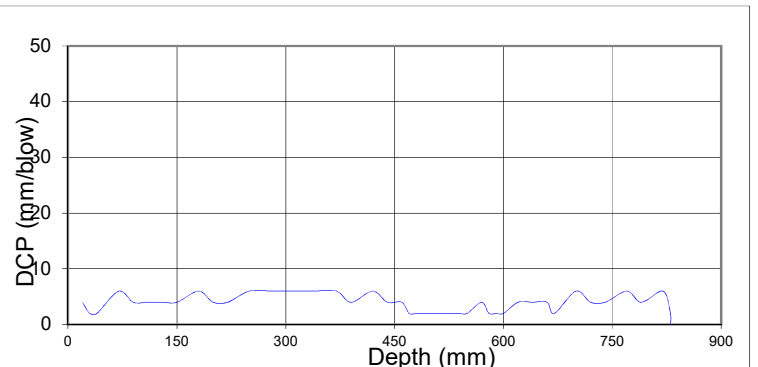
DESCRIPTION: DCP test was done from existing ground level
 DCP No: 1 at TP2 - D192 ROAD

DATE TESTED: 2-Feb-22

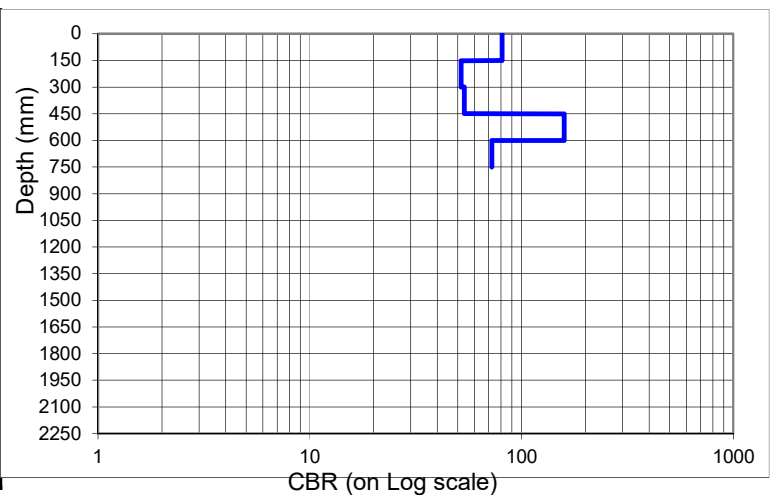
DCP Readings		Blows per reading: 5							
no.	mm	no.	mm	no.	mm	no.	mm	no.	mm
1	20	11	220	21	470	31	580	41	770
2	30	12	250	22	480	32	590	42	790
3	40	13	280	23	490	33	600	43	820
4	70	14	310	24	500	34	620	44	830
5	90	15	340	25	510	35	640	45	
6	110	16	370	26	520	36	660	46	
7	130	17	390	27	530	37	670	47	
8	150	18	420	28	540	38	700	48	
9	180	19	440	29	550	39	720	49	
10	200	20	460	30	570	40	740	50	



DCP number (mm / Blow) DN									
DN	mm	DN	mm	DN	mm	DN	mm	DN	mm
4	20	4	220	2	470	2	580	6	770
2	30	6	250	2	480	2	590	4	790
2	40	6	280	2	490	2	600	6	820
6	70	6	310	2	500	4	620	2	830
4	90	6	340	2	510	4	640		
4	110	6	370	2	520	4	660		
4	130	4	390	2	530	2	670		
4	150	6	420	2	540	6	700		
6	180	4	440	2	550	4	720		
4	200	4	460	4	570	4	740		



no.	Depth (mm)			In situ		Blows/mm	
	From	-	To	DN	CBR	150mm	300mm
1	1	-	150	3,8	81	40	34,2
2	151	-	300	5,3	52	28	
3	301	-	450	5,1	54	29	48,3
4	451	-	600	2,2	159	68	
5	601	-	750	4,1	72	37	
6	751	-	900				
8	901	-	1050				
9	1051	-	1200				
10	1201	-	1350				
11	1351	-	1500				
12	1501	-	1650				
13	1651	-	1800				
14	1801	-	1950				
15	1951	-	2100				



REMARKS:

Max penetration depth **830 mm**

Where values are presented as continued "cont", refer to the adjacent graphs where DN values vs depth and penetration vs depths can be read.

Signature 

TEST REPORT FOR DYNAMIC CONE PENETROMETER BY TEST METHOD TMH6-ST6

CLIENT: Morula Consulting Engineers

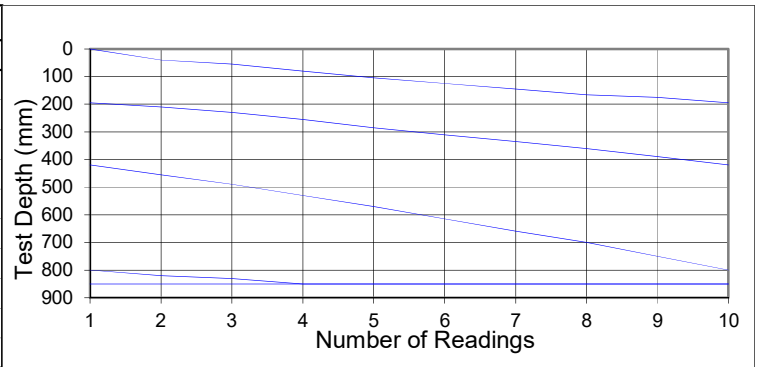
DATE REPORTED: 03-Feb-2022
 OUR REF: MAK0830203

PROJECT: Geotechnical Investigation: D192 ROAD
 ATTENTION: Hulisani Tsanawani
 Tel/Email: shoegra@morulaconsulting.co.za

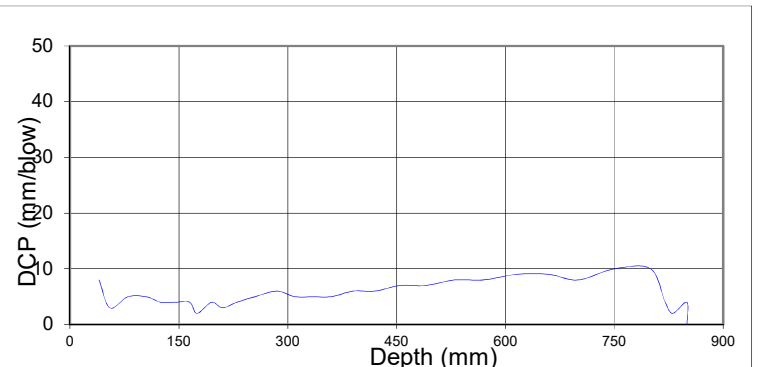
DESCRIPTION: DCP test was done from existing ground level
 DCP No: 1 at TP3 - D192 ROAD

DATE TESTED: 2-Feb-22

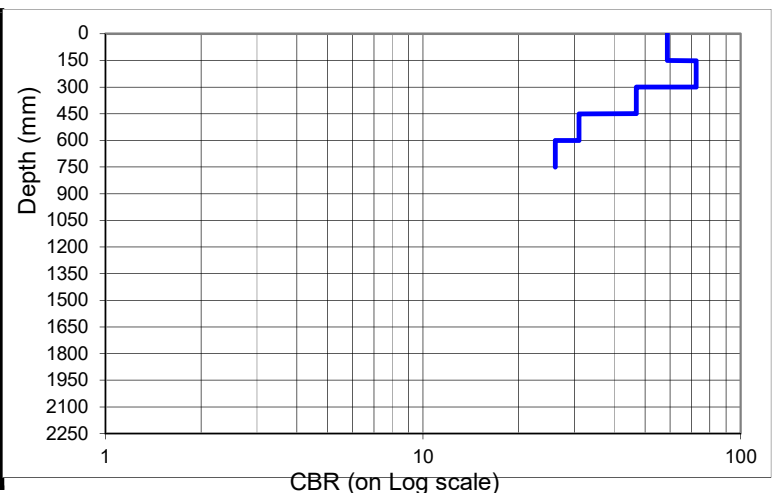
DCP Readings		Blows per reading: 5							
no.	mm	no.	mm	no.	mm	no.	mm	no.	mm
1	40	11	230	21	530	31		41	
2	55	12	255	22	570	32		42	
3	80	13	285	23	615	33		43	
4	105	14	310	24	660	34		44	
5	125	15	335	25	700	35		45	
6	145	16	360	26	750	36		46	
7	165	17	390	27	800	37		47	
8	175	18	420	28	820	38		48	
9	195	19	455	29	830	39		49	
10	210	20	490	30	850	40		50	



DCP number (mm / Blow) DN									
DN	mm	DN	mm	DN	mm	DN	mm	DN	mm
8	40	4	230	8	530				
3	55	5	255	8	570				
5	80	6	285	9	615				
5	105	5	310	9	660				
4	125	5	335	8	700				
4	145	5	360	10	750				
4	165	6	390	10	800				
2	175	6	420	4	820				
4	195	7	455	2	830				
3	210	7	490	4	850				



no.	Depth (mm)			In situ		Blows/mm	
	From	-	To	DN	CBR	150mm	300mm
1	1	-	150	4,8	59	31	34,0
2	151	-	300	4,1	72	37	
3	301	-	450	5,7	47	26	22,7
4	451	-	600	7,9	31	19	
5	601	-	750	9,0	26	17	
6	751	-	900				
8	901	-	1050				
9	1051	-	1200				
10	1201	-	1350				
11	1351	-	1500				
12	1501	-	1650				
13	1651	-	1800				
14	1801	-	1950				
15	1951	-	2100				



REMARKS:

Max penetration depth **850 mm**

Where values are presented as continued "cont", refer to the adjacent graphs where DN values vs depth and penetration vs depths can be read.

Signature 

TEST REPORT FOR DYNAMIC CONE PENETROMETER BY TEST METHOD TMH6-ST6

CLIENT: Morula Consulting Engineers

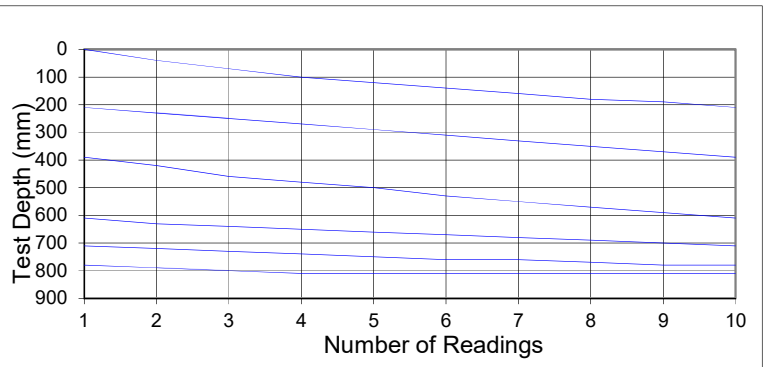
DATE REPORTED: 03-Feb-2022
 OUR REF: MAK0830203

PROJECT: Geotechnical Investigation: D192 ROAD
 ATTENTION: Hulisani Tsanawani
 Tel/Email: shoegra@morulaconsulting.co.za

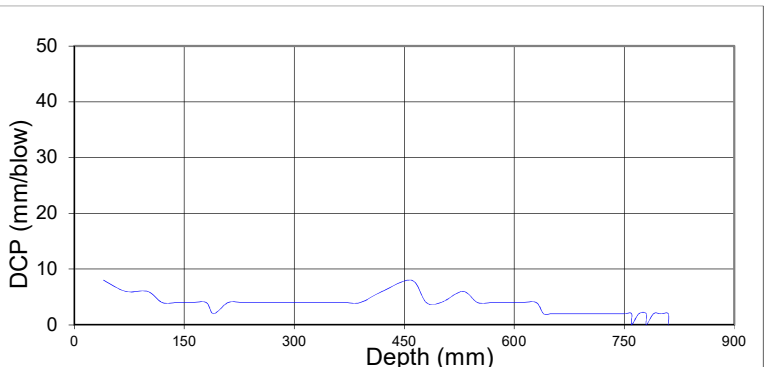
DESCRIPTION: DCP test was done from existing ground level
 DCP No: 1 at TP4 - D192 ROAD

DATE TESTED: 2-Feb-22

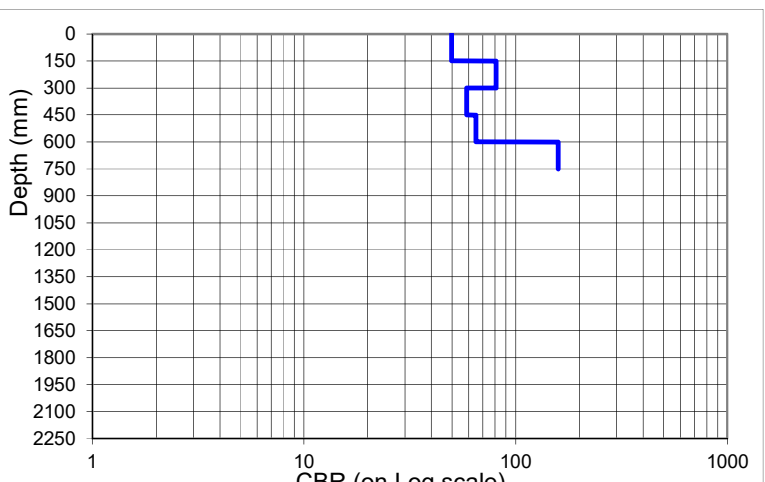
DCP Readings		Blows per reading: 5							
no.	mm	no.	mm	no.	mm	no.	mm	no.	mm
1	40	11	250	21	480	31	660	41	760
2	70	12	270	22	500	32	670	42	
3	100	13	290	23	530	33	680	43	
4	120	14	310	24	550	34	690	44	
5	140	15	330	25	570	35	700	45	
6	160	16	350	26	590	36	710	46	
7	180	17	370	27	610	37	720	47	
8	190	18	390	28	630	38	730	48	
9	210	19	420	29	640	39	740	49	
10	230	20	460	30	650	40	750	50	



DCP number (mm / Blow) DN									
DN	mm	DN	mm	DN	mm	DN	mm	DN	mm
8	40	4	250	4	480	2	660	2	760
6	70	4	270	4	500	2	670		
6	100	4	290	6	530	2	680	2	
4	120	4	310	4	550	2	690	2	
4	140	4	330	4	570	2	700		
4	160	4	350	4	590	2	710	2	
4	180	4	370	4	610	2	720	2	
2	190	4	390	4	630	2	730	2	
4	210	6	420	2	640	2	740		
4	230	8	460	2	650	2	750		



no.	Depth (mm)			In situ		Blows/mm		300mm
	From	-	To	DN	CBR	150mm	300mm	
1	1	-	150	5,5	50	28		33,8
2	151	-	300	3,8	81	40		
3	301	-	450	4,8	59	31		32,5
4	451	-	600	4,4	65	34		
5	601	-	750	2,2	159	68		
6	751	-	900					
8	901	-	1050					
9	1051	-	1200					
10	1201	-	1350					
11	1351	-	1500					
12	1501	-	1650					
13	1651	-	1800					
14	1801	-	1950					
15	1951	-	2100					



REMARKS:

Max penetration depth **810 mm**
 Where values are presented as continued "cont", refer to the adjacent graphs where DN values vs depth and penetration vs depths can be read.

Signature 

TEST REPORT FOR DYNAMIC CONE PENETROMETER BY TEST METHOD TMH6-ST6

CLIENT: Morula Consulting Engineers

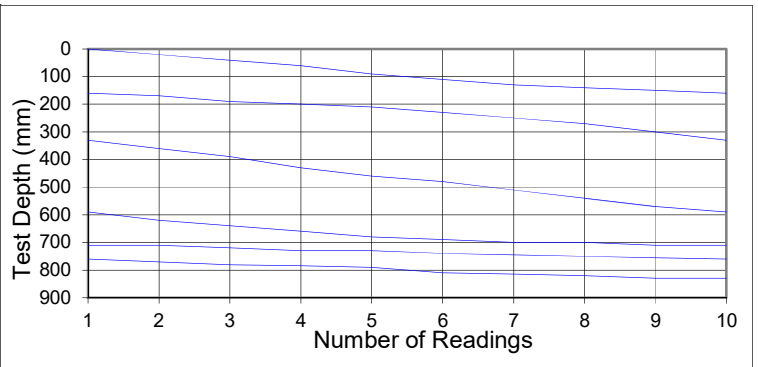
DATE REPORTED: 03-Feb-2022
 OUR REF: MAK0830203

PROJECT: Geotechnical Investigation: D192 ROAD
 ATTENTION: Hulisani Tsanawani
 Tel/Email: shoegra@morulaconsulting.co.za

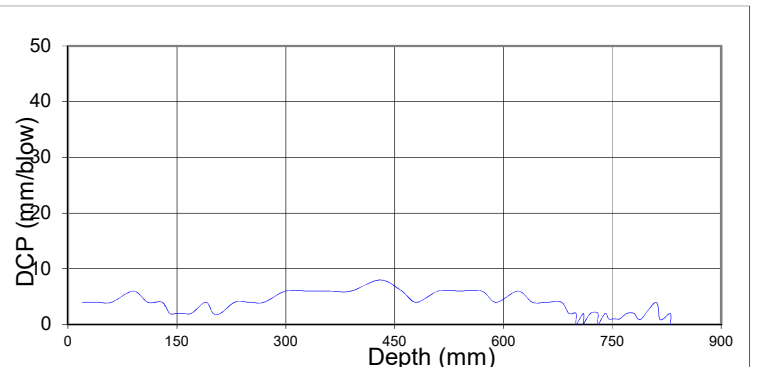
DESCRIPTION: DCP test was done from existing ground level
 DCP No: 1 at TP5 - D192 ROAD

DATE TESTED: 2-Feb-22

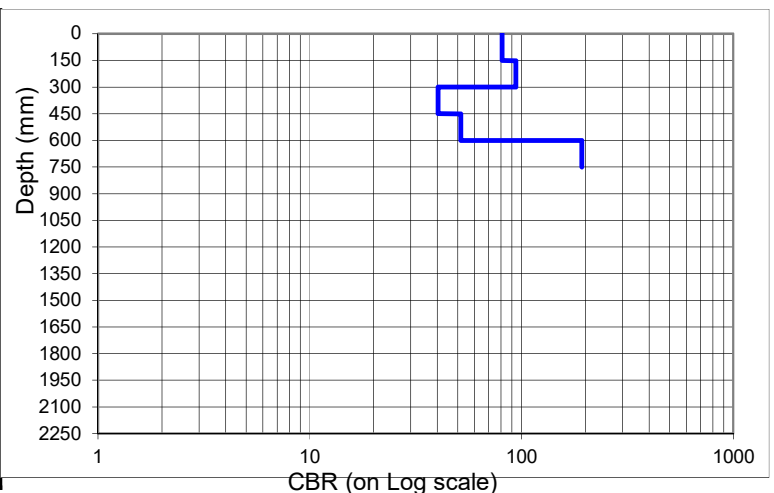
DCP Readings		Blows per reading: 5							
no.	mm	no.	mm	no.	mm	no.	mm	no.	mm
1	20	11	190	21	430	31	680	41	
2	40	12	200	22	460	32	690	42	
3	60	13	210	23	480	33	700	43	
4	90	14	230	24	510	34		44	
5	110	15	250	25	540	35		45	
6	130	16	270	26	570	36		46	
7	140	17	300	27	590	37		47	
8	150	18	330	28	620	38		48	
9	160	19	360	29	640	39		49	
10	170	20	390	30	660	40		50	



DCP number (mm / Blow) DN									
DN	mm	DN	mm	DN	mm	DN	mm	DN	mm
4	20	4	190	8	430	4	680	2	
4	40	2	200	6	460	2	690	1	
4	60	2	210	4	480	2	700	1	
6	90	4	230	6	510			1	
4	110	4	250	6	540	2		1	
4	130	4	270	6	570			2	
2	140	6	300	4	590			2	
2	150	6	330	6	620	2		1	
2	160	6	360	4	640	2		1	
2	170	6	390	4	660			4	



no.	Depth (mm)			In situ		Blows/mm	
	From	-	To	DN	CBR	150mm	300mm
1	1	-	150	3,8	81	40	42,5
2	151	-	300	3,3	94	45	
3	301	-	450	6,4	40	23	25,8
4	451	-	600	5,3	52	28	
5	601	-	750	1,9	193	78	
6	751	-	900				
8	901	-	1050				
9	1051	-	1200				
10	1201	-	1350				
11	1351	-	1500				
12	1501	-	1650				
13	1651	-	1800				
14	1801	-	1950				
15	1951	-	2100				



REMARKS:

Max penetration depth **830 mm**

Where values are presented as continued "cont", refer to the adjacent graphs where DN values vs depth and penetration vs depths can be read.

Signature



TEST REPORT FOR DYNAMIC CONE PENETROMETER BY TEST METHOD TMH6-ST6

CLIENT: Morula Consulting Engineers

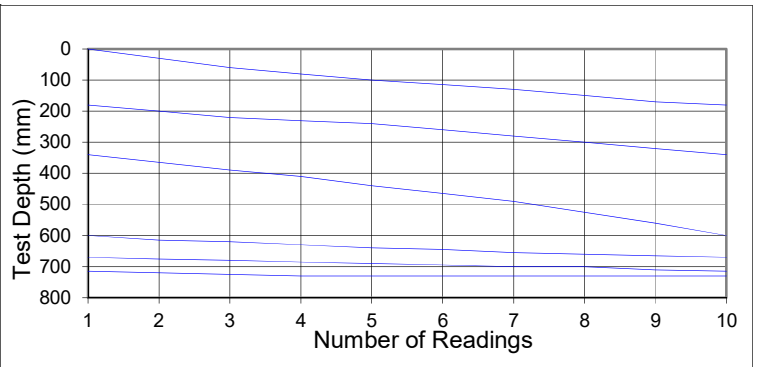
DATE REPORTED: 03-Feb-2022
 OUR REF: MAK0830203

PROJECT: Geotechnical Investigation: D192 ROAD
 ATTENTION: Hulisani Tsanawani
 Tel/Email: shoegra@morulaconsulting.co.za

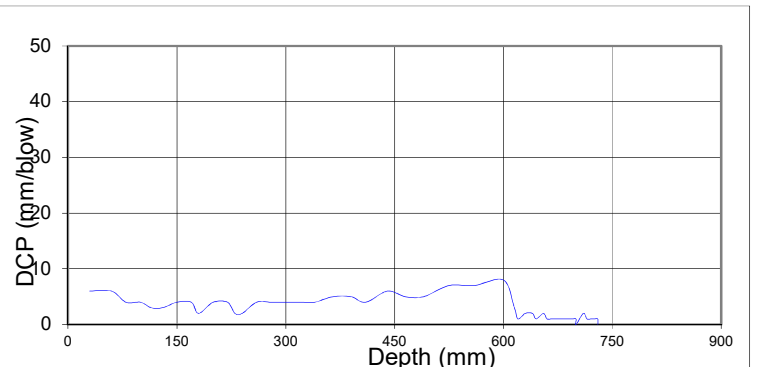
DESCRIPTION: DCP test was done from existing ground level
 DCP No: 1 at TP6 - D192 ROAD

DATE TESTED: 2-Feb-22

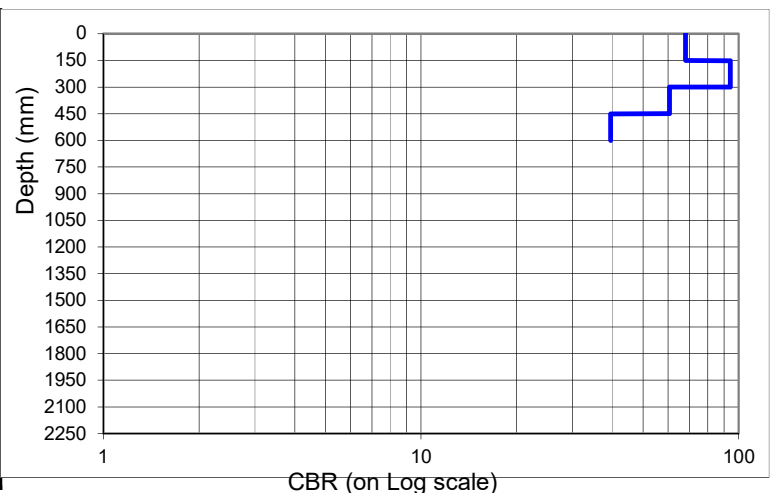
DCP Readings		Blows per reading: 5							
no.	mm	no.	mm	no.	mm	no.	mm	no.	mm
1	30	11	220	21	410	31	640	41	695
2	60	12	230	22	440	32	645	42	700
3	80	13	240	23	465	33	655	43	
4	100	14	260	24	490	34	660	44	
5	115	15	280	25	525	35	665	45	
6	130	16	300	26	560	36	670	46	
7	150	17	320	27	600	37	675	47	
8	170	18	340	28	615	38	680	48	
9	180	19	365	29	620	39	685	49	
10	200	20	390	30	630	40	690	50	



DCP number (mm / Blow) DN									
DN	mm	DN	mm	DN	mm	DN	mm	DN	mm
6	30	4	220	4	410	2	640	1	695
6	60	2	230	6	440	1	645	1	700
4	80	2	240	5	465	2	655		
4	100	4	260	5	490	1	660	2	
3	115	4	280	7	525	1	665	1	
3	130	4	300	7	560	1	670	1	
4	150	4	320	8	600	1	675	1	
4	170	4	340	3	615	1	680	1	
2	180	5	365	1	620	1	685		
4	200	5	390	2	630	1	690		



no.	Depth (mm)			In situ		Blows/mm	
	From	-	To	DN	CBR	150mm	300mm
1	1	-	150	4,3	68	35	40,0
2	151	-	300	3,3	94	45	
3	301	-	450	4,7	61	32	27,5
4	451	-	600	6,5	40	23	
5	601	-	750				
6	751	-	900				
8	901	-	1050				
9	1051	-	1200				
10	1201	-	1350				
11	1351	-	1500				
12	1501	-	1650				
13	1651	-	1800				
14	1801	-	1950				
15	1951	-	2100				



REMARKS:

Max penetration depth **730 mm**

Where values are presented as continued "cont", refer to the adjacent graphs where DN values vs depth and penetration vs depths can be read.

Signature 

TEST REPORT FOR DYNAMIC CONE PENETROMETER BY TEST METHOD TMH6-ST6

CLIENT: Morula Consulting Engineers

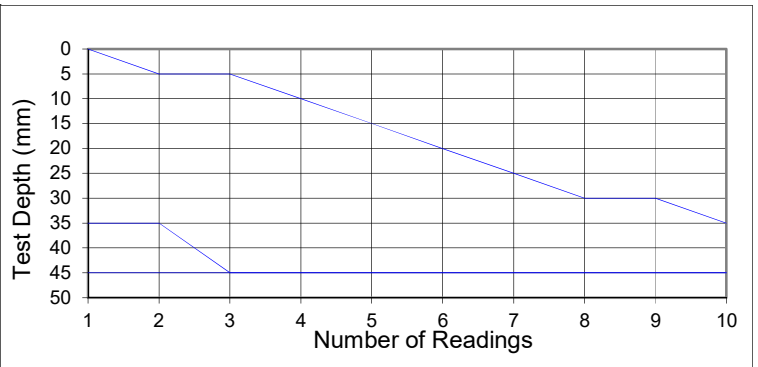
DATE REPORTED: 03-Feb-2022
 OUR REF: MAK0830203

PROJECT: Geotechnical Investigation: D192 ROAD
 ATTENTION: Hulisani Tsanawani
 Tel/Email: shoegra@morulaconsulting.co.za

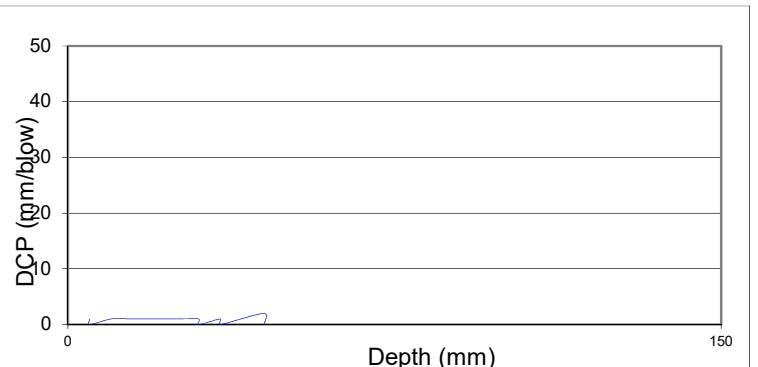
DESCRIPTION: DCP test was done from existing ground level
 DCP No: 1 at TP7 - D192 ROAD

DATE TESTED: 2-Feb-22

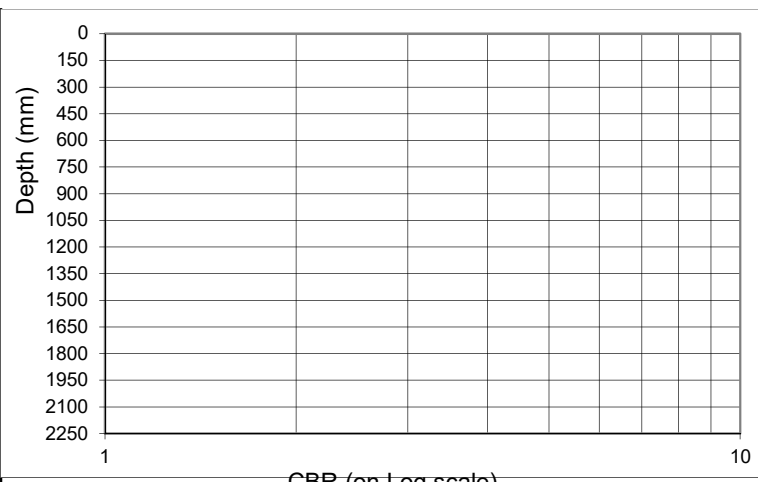
DCP Readings		Blows per reading: 5							
no.	mm	no.	mm	no.	mm	no.	mm	no.	mm
1	5	11		21		31		41	
2		12		22		32		42	
3		13		23		33		43	
4		14		24		34		44	
5		15		25		35		45	
6		16		26		36		46	
7		17		27		37		47	
8		18		28		38		48	
9		19		29		39		49	
10		20		30		40		50	



DCP number (mm / Blow) DN									
DN	mm	DN	mm	DN	mm	DN	mm	DN	mm
1	5	2							
1									
1									
1									
1									
1									
1									



no.	Depth (mm)			In situ		Blows/mm	
	From	-	To	DN	CBR	150mm	300mm
1	1	-	150	####			
2	151	-	300				
3	301	-	450				
4	451	-	600				
5	601	-	750				
6	751	-	900				
8	901	-	1050				
9	1051	-	1200				
10	1201	-	1350				
11	1351	-	1500				
12	1501	-	1650				
13	1651	-	1800				
14	1801	-	1950				
15	1951	-	2100				



REMARKS:

Max penetration depth **45 mm**

Where values are presented as continued "cont", refer to the adjacent graphs where DN values vs depth and penetration vs depths can be read.

Signature 

TEST REPORT FOR DYNAMIC CONE PENETROMETER BY TEST METHOD TMH6-ST6

CLIENT: Morula Consulting Engineers

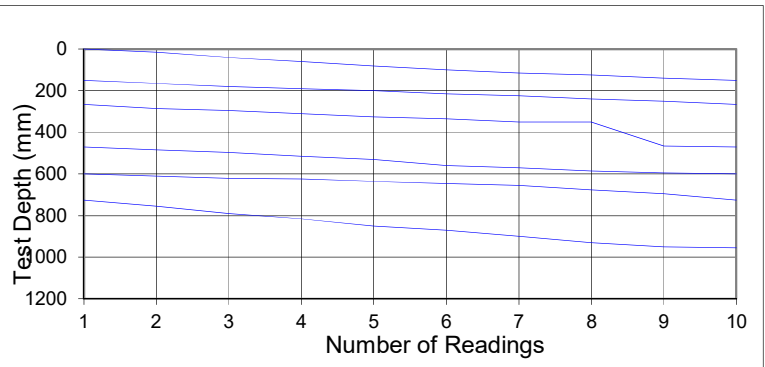
DATE REPORTED: 03-Feb-2022
 OUR REF: MAK0830203

PROJECT: Geotechnical Investigation: D192 ROAD
 ATTENTION: Hulisani Tsanawani
 Tel/Email: shoegra@morulaconsulting.co.za

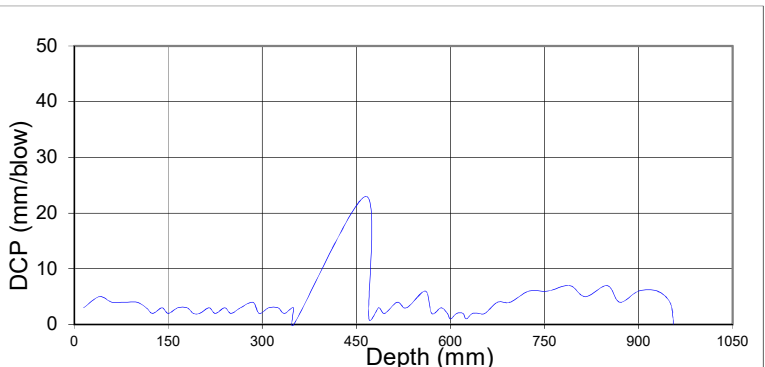
DESCRIPTION: DCP test was done from existing ground level
 DCP No: 1 at TP8 - D192 ROAD

DATE TESTED: 2-Feb-22

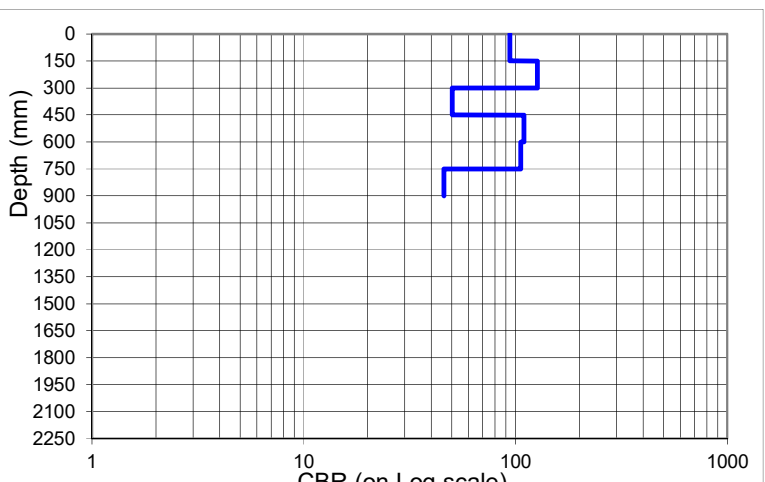
DCP Readings		Blows per reading: 5							
no.	mm	no.	mm	no.	mm	no.	mm	no.	mm
1	15	11	180	21	310	31		41	
2	40	12	190	22	325	32		42	
3	60	13	200	23	335	33		43	
4	80	14	215	24	350	34		44	
5	100	15	225	25		35		45	
6	115	16	240	26		36		46	
7	125	17	250	27		37		47	
8	140	18	265	28		38		48	
9	150	19	285	29		39		49	
10	165	20	295	30		40		50	



DCP number (mm / Blow) DN									
DN	mm	DN	mm	DN	mm	DN	mm	DN	mm
3	15	3	180	3	310	3		2	
5	40	2	190	3	325	6		2	
4	60	2	200	2	335	2		4	
4	80	3	215	3	350	3		4	
4	100	2	225			2		6	
3	115	3	240	23		1		6	
2	125	2	250	1		2		7	
3	140	3	265	3		2		5	
2	150	4	285	2		1		7	
3	165	2	295	4		2		4	



no.	Depth (mm)			In situ		Blows/mm	
	From	-	To	DN	CBR	150mm	300mm
1	1	-	150	3,3	94	45	50,8
2	151	-	300	2,6	127	57	
3	301	-	450	5,4	50	28	39,2
4	451	-	600	3,0	110	51	
5	601	-	750	3,1	106	49	37,5
6	751	-	900	5,8	46	26	
8	901	-	1050				
9	1051	-	1200				
10	1201	-	1350				
11	1351	-	1500				
12	1501	-	1650				
13	1651	-	1800				
14	1801	-	1950				
15	1951	-	2100				



REMARKS:

Max penetration depth **955 mm**

Where values are presented as continued "cont", refer to the adjacent graphs where DN values vs depth and penetration vs depths can be read.

Signature 

TEST REPORT FOR DYNAMIC CONE PENETROMETER BY TEST METHOD TMH6-ST6

CLIENT: Morula Consulting Engineers

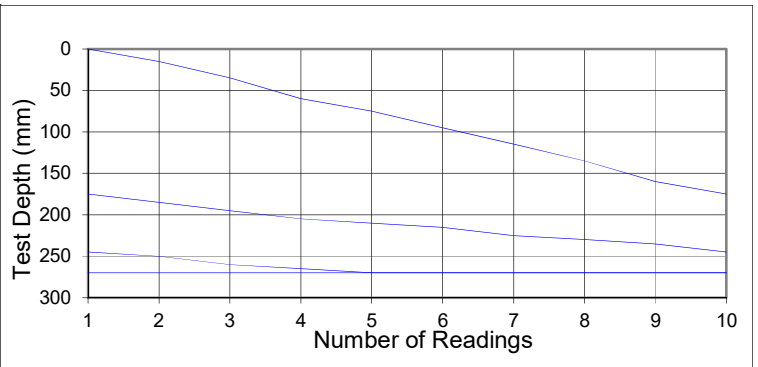
DATE REPORTED: 03-Feb-2022
 OUR REF: MAK0830203

PROJECT: Geotechnical Investigation: D192 ROAD
 ATTENTION: Hulisani Tsanawani
 Tel/Email: shoegra@morulaconsulting.co.za

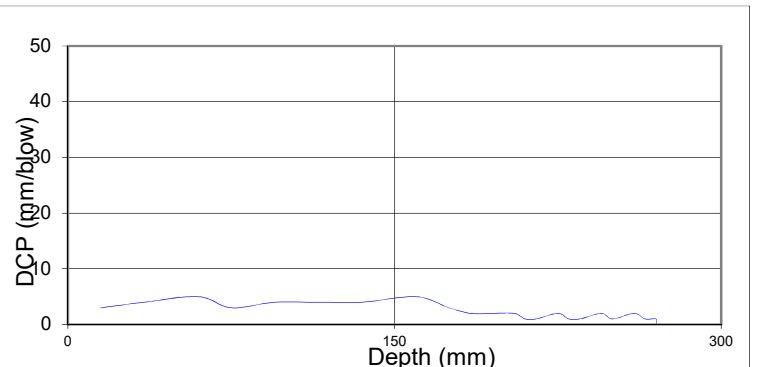
DESCRIPTION: DCP test was done from existing ground level
 DCP No: 1 at TP9 - D192 ROAD

DATE TESTED: 2-Feb-22

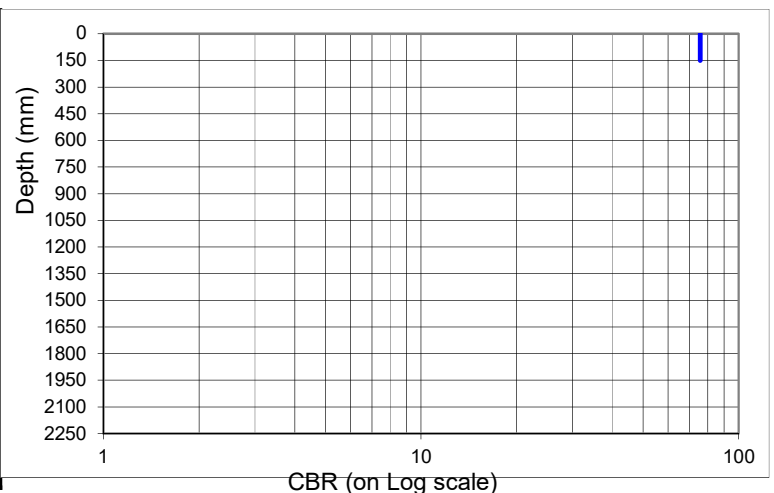
DCP Readings		Blows per reading: 5							
no.	mm	no.	mm	no.	mm	no.	mm	no.	mm
1	15	11	195	21	265	31		41	
2	35	12	205	22	270	32		42	
3	60	13	210	23		33		43	
4	75	14	215	24		34		44	
5	95	15	225	25		35		45	
6	115	16	230	26		36		46	
7	135	17	235	27		37		47	
8	160	18	245	28		38		48	
9	175	19	250	29		39		49	
10	185	20	260	30		40		50	



DCP number (mm / Blow) DN									
DN	mm	DN	mm	DN	mm	DN	mm	DN	mm
3	15	2	195	1	265				
4	35	2	205	1	270				
5	60	1	210						
3	75	1	215						
4	95	2	225						
4	115	1	230						
4	135	1	235						
5	160	2	245						
3	175	1	250						
2	185	2	260						



no.	Depth (mm)			In situ		Blows/mm	
	From	-	To	DN	CBR	150mm	300mm
1	1	-	150	3,9	76	38	
2	151	-	300				
3	301	-	450				
4	451	-	600				
5	601	-	750				
6	751	-	900				
8	901	-	1050				
9	1051	-	1200				
10	1201	-	1350				
11	1351	-	1500				
12	1501	-	1650				
13	1651	-	1800				
14	1801	-	1950				
15	1951	-	2100				



REMARKS:

Max penetration depth **270 mm**

Where values are presented as continued "cont", refer to the adjacent graphs where DN values vs depth and penetration vs depths can be read.

Signature 

TEST REPORT FOR DYNAMIC CONE PENETROMETER BY TEST METHOD TMH6-ST6

CLIENT: Morula Consulting Engineers

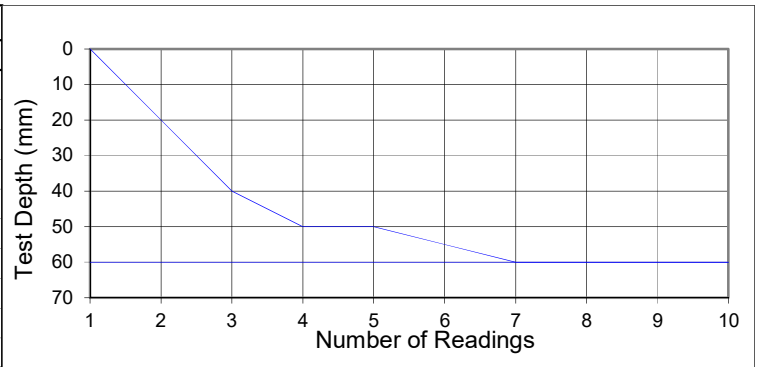
DATE REPORTED: 03-Feb-2022
 OUR REF: MAK0830203

PROJECT: Geotechnical Investigation: D192 ROAD
 ATTENTION: Hulisani Tsanawani
 Tel/Email: shoegra@morulaconsulting.co.za

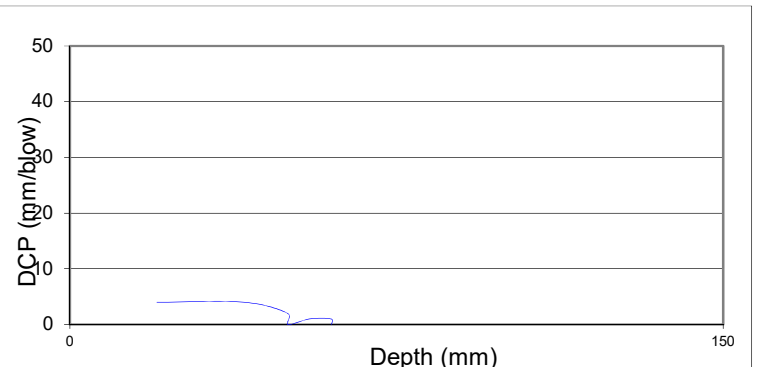
DESCRIPTION: DCP test was done from existing ground level
 DCP No: 1 at TP10 - D192 ROAD

DATE TESTED: 2-Feb-22

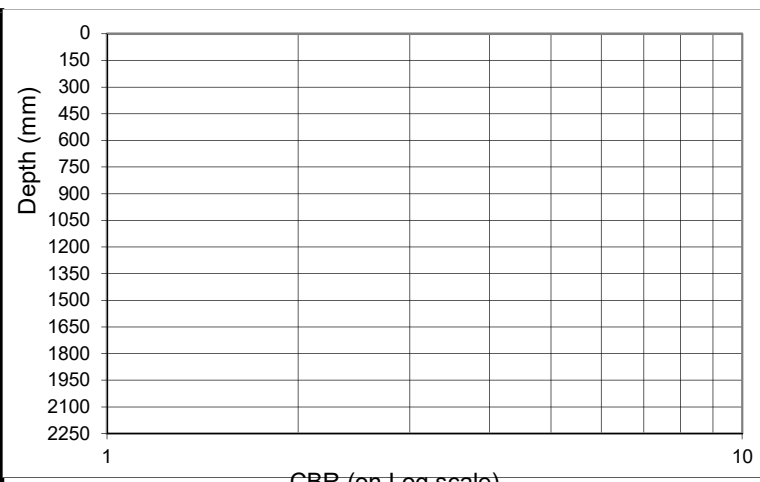
DCP Readings		Blows per reading: 5							
no.	mm	no.	mm	no.	mm	no.	mm	no.	mm
1	20	11		21		31		41	
2	40	12		22		32		42	
3	50	13		23		33		43	
4		14		24		34		44	
5		15		25		35		45	
6		16		26		36		46	
7		17		27		37		47	
8		18		28		38		48	
9		19		29		39		49	
10		20		30		40		50	



DCP number (mm / Blow) DN									
DN	mm	DN	mm	DN	mm	DN	mm	DN	mm
4	20								
4	40								
2	50								
1									
1									



no.	Depth (mm)			In situ		Blows/mm	
	From	-	To	DN	CBR	150mm	300mm
1	1	-	150	####			
2	151	-	300				
3	301	-	450				
4	451	-	600				
5	601	-	750				
6	751	-	900				
8	901	-	1050				
9	1051	-	1200				
10	1201	-	1350				
11	1351	-	1500				
12	1501	-	1650				
13	1651	-	1800				
14	1801	-	1950				
15	1951	-	2100				



REMARKS:

Max penetration depth **60 mm**

Where values are presented as continued "cont", refer to the adjacent graphs where DN values vs depth and penetration vs depths can be read.

Signature 

TEST REPORT FOR DYNAMIC CONE PENETROMETER BY TEST METHOD TMH6-ST6

CLIENT: Morula Consulting Engineers

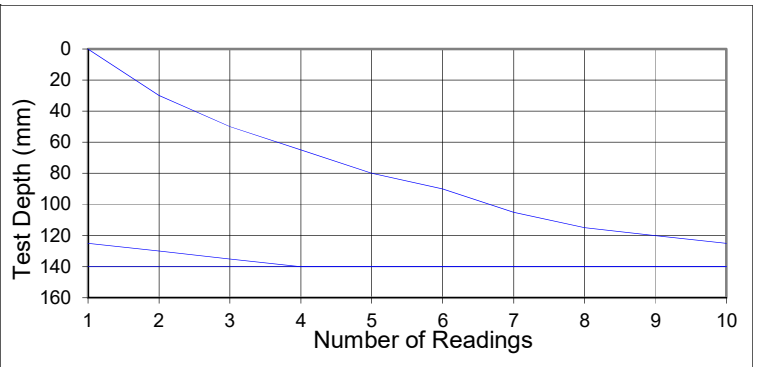
DATE REPORTED: 03-Feb-2022
 OUR REF: MAK0830203

PROJECT: Geotechnical Investigation: D192 ROAD
 ATTENTION: Hulisani Tsanawani
 Tel/Email: shoegra@morulaconsulting.co.za

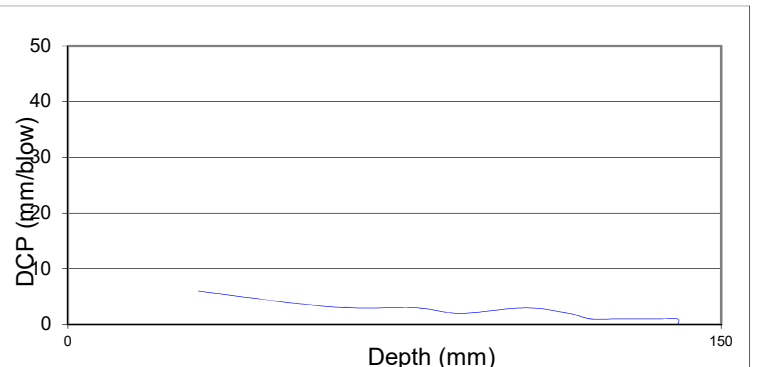
DESCRIPTION: DCP test was done from existing ground level
 DCP No: 1 at TP11 - D192 ROAD

DATE TESTED: 2-Feb-22

DCP Readings		Blows per reading: 5							
no.	mm	no.	mm	no.	mm	no.	mm	no.	mm
1	30	11	135	21		31		41	
2	50	12	140	22		32		42	
3	65	13		23		33		43	
4	80	14		24		34		44	
5	90	15		25		35		45	
6	105	16		26		36		46	
7	115	17		27		37		47	
8	120	18		28		38		48	
9	125	19		29		39		49	
10	130	20		30		40		50	



DCP number (mm / Blow) DN									
DN	mm	DN	mm	DN	mm	DN	mm	DN	mm
6	30	1	135						
4	50	1	140						
3	65								
3	80								
2	90								
3	105								
2	115								
1	120								
1	125								
1	130								



no.	Depth (mm)			In situ		Blows/mm	
	From	-	To	DN	CBR	150mm	300mm
1	1	-	150	####			
2	151	-	300				
3	301	-	450				
4	451	-	600				
5	601	-	750				
6	751	-	900				
8	901	-	1050				
9	1051	-	1200				
10	1201	-	1350				
11	1351	-	1500				
12	1501	-	1650				
13	1651	-	1800				
14	1801	-	1950				
15	1951	-	2100				



REMARKS:

Max penetration depth **140 mm**

Where values are presented as continued "cont", refer to the adjacent graphs where DN values vs depth and penetration vs depths can be read.

Signature 

TEST REPORT FOR DYNAMIC CONE PENETROMETER BY TEST METHOD TMH6-ST6

CLIENT: Morula Consulting Engineers

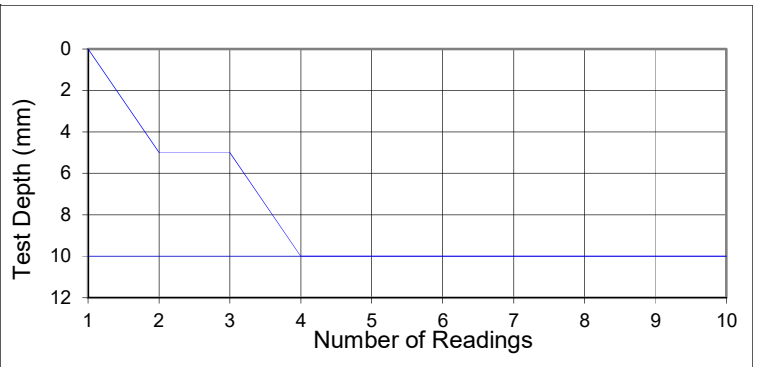
DATE REPORTED: 03-Feb-2022
 OUR REF: MAK0830203

PROJECT: Geotechnical Investigation: D192 ROAD
 ATTENTION: Hulisani Tsanawani
 Tel/Email: shoegra@morulaconsulting.co.za

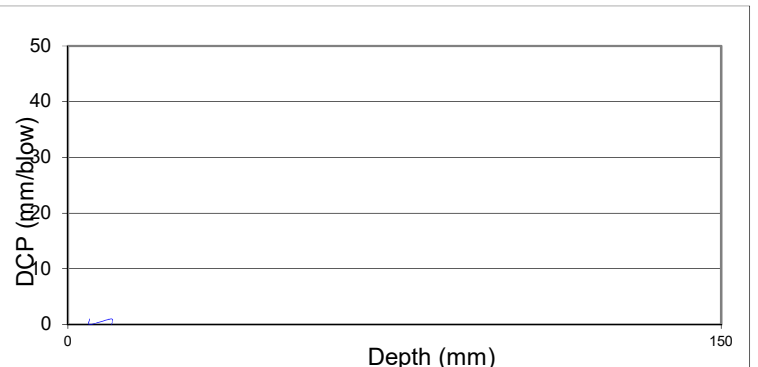
DESCRIPTION: DCP test was done from existing ground level
 DCP No: 1 at TP12 - D192 ROAD

DATE TESTED: 2-Feb-22

DCP Readings		Blows per reading: 5							
no.	mm	no.	mm	no.	mm	no.	mm	no.	mm
1	5	11		21		31		41	
2		12		22		32		42	
3		13		23		33		43	
4		14		24		34		44	
5		15		25		35		45	
6		16		26		36		46	
7		17		27		37		47	
8		18		28		38		48	
9		19		29		39		49	
10		20		30		40		50	



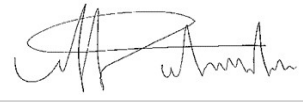
DCP number (mm / Blow) DN									
DN	mm	DN	mm	DN	mm	DN	mm	DN	mm
1	5								
1									



no.	Depth (mm)			In situ		Blows/mm	
	From	-	To	DN	CBR	150mm	300mm
1	1	-	150	####			
2	151	-	300				
3	301	-	450				
4	451	-	600				
5	601	-	750				
6	751	-	900				
8	901	-	1050				
9	1051	-	1200				
10	1201	-	1350				
11	1351	-	1500				
12	1501	-	1650				
13	1651	-	1800				
14	1801	-	1950				
15	1951	-	2100				



REMARKS: Max penetration depth **10 mm**
 Where values are presented as continued "cont", refer to the adjacent graphs where DN values vs depth and penetration vs depths can be read.

Signature 

TEST REPORT FOR DYNAMIC CONE PENETROMETER BY TEST METHOD TMH6-ST6

CLIENT: Morula Consulting Engineers

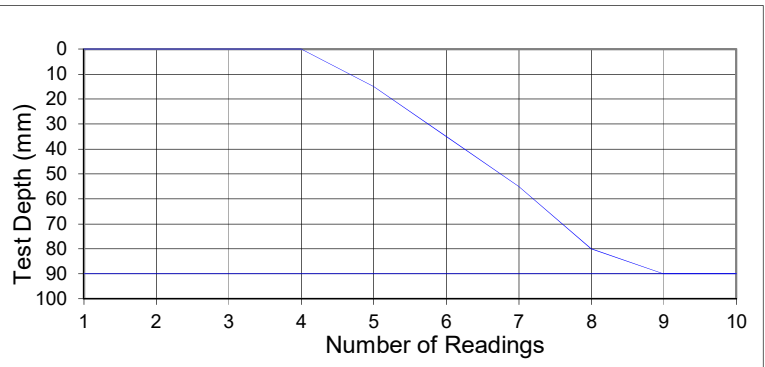
DATE REPORTED: 03-Feb-2022
 OUR REF: MAK0830203

PROJECT: Geotechnical Investigation: D192 ROAD
 ATTENTION: Hulisani Tsanawani
 Tel/Email: shoegra@morulaconsulting.co.za

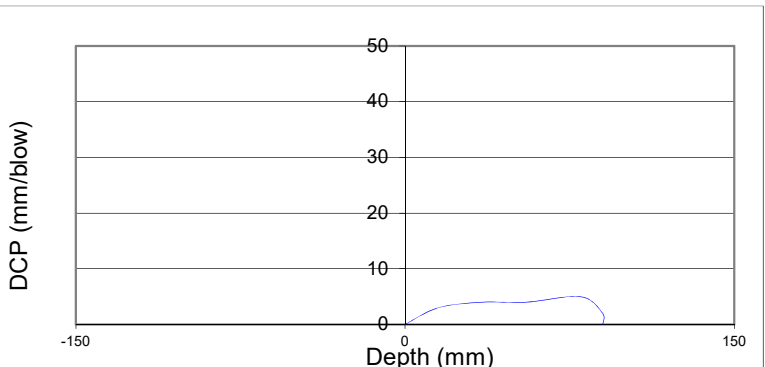
DESCRIPTION: DCP test was done from existing ground level
 DCP No: 1 at TP13 - D192 ROAD

DATE TESTED: 2-Feb-22

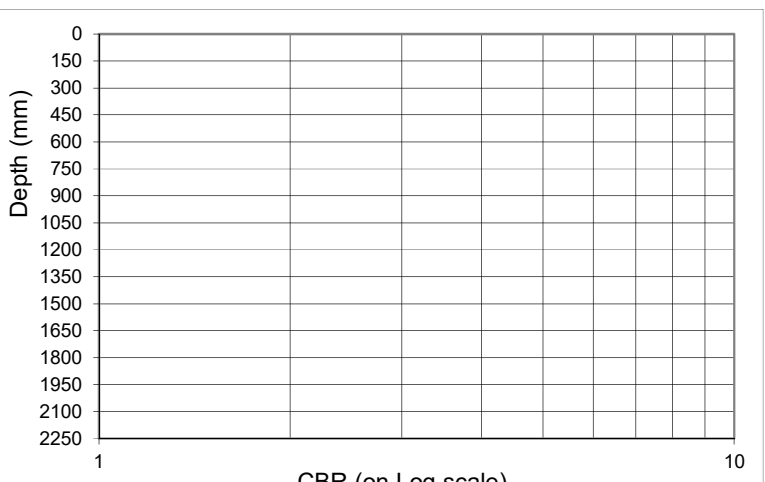
DCP Readings		Blows per reading: 5							
no.	mm	no.	mm	no.	mm	no.	mm	no.	mm
1	0	11		21		31		41	
2		12		22		32		42	
3		13		23		33		43	
4		14		24		34		44	
5		15		25		35		45	
6		16		26		36		46	
7		17		27		37		47	
8		18		28		38		48	
9		19		29		39		49	
10		20		30		40		50	



DCP number (mm / Blow) DN									
DN	mm	DN	mm	DN	mm	DN	mm	DN	mm
0	0								
3									
4									
4									
5									
2									



no.	Depth (mm)			In situ	Blows/mm	
	From	-	To		DN	CBR
1	1	-	150	####		
2	151	-	300			
3	301	-	450			
4	451	-	600			
5	601	-	750			
6	751	-	900			
8	901	-	1050			
9	1051	-	1200			
10	1201	-	1350			
11	1351	-	1500			
12	1501	-	1650			
13	1651	-	1800			
14	1801	-	1950			
15	1951	-	2100			



REMARKS:

Max penetration depth **90 mm**

Where values are presented as continued "cont", refer to the adjacent graphs where DN values vs depth and penetration vs depths can be read.

Signature 

TEST REPORT FOR DYNAMIC CONE PENETROMETER BY TEST METHOD TMH6-ST6

CLIENT: Morula Consulting Engineers

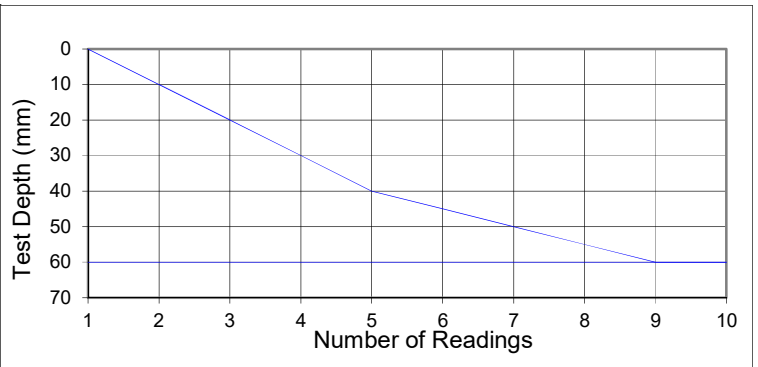
DATE REPORTED: 03-Feb-2022
 OUR REF: MAK0830203

PROJECT: Geotechnical Investigation: D192 ROAD
 ATTENTION: Hulisani Tsanawani
 Tel/Email: shoegra@morulaconsulting.co.za

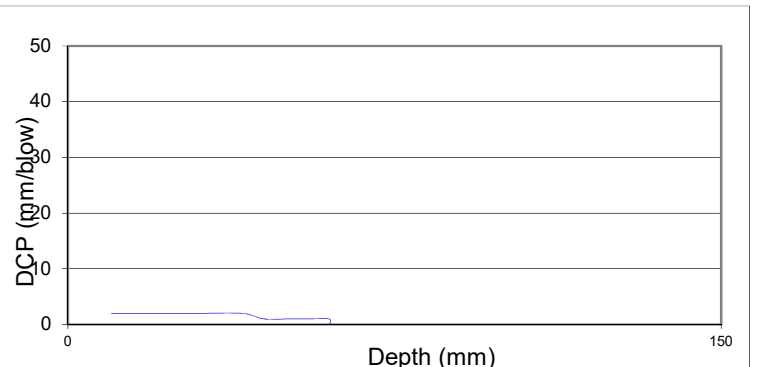
DESCRIPTION: DCP test was done from existing ground level
 DCP No: 1 at TP14 - D192 ROAD

DATE TESTED: 2-Feb-22

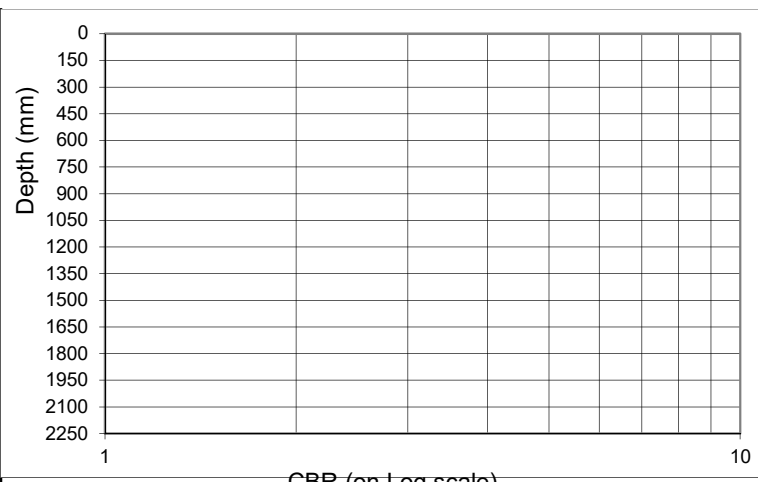
DCP Readings		Blows per reading: 5							
no.	mm	no.	mm	no.	mm	no.	mm	no.	mm
1	10	11		21		31		41	
2	20	12		22		32		42	
3	30	13		23		33		43	
4	40	14		24		34		44	
5	45	15		25		35		45	
6	50	16		26		36		46	
7	55	17		27		37		47	
8	60	18		28		38		48	
9		19		29		39		49	
10		20		30		40		50	



DCP number (mm / Blow) DN									
DN	mm	DN	mm	DN	mm	DN	mm	DN	mm
2	10								
2	20								
2	30								
2	40								
1	45								
1	50								
1	55								
1	60								



no.	Depth (mm)			In situ		Blows/mm	
	From	-	To	DN	CBR	150mm	300mm
1	1	-	150	####			
2	151	-	300				
3	301	-	450				
4	451	-	600				
5	601	-	750				
6	751	-	900				
8	901	-	1050				
9	1051	-	1200				
10	1201	-	1350				
11	1351	-	1500				
12	1501	-	1650				
13	1651	-	1800				
14	1801	-	1950				
15	1951	-	2100				



REMARKS:

Max penetration depth **60 mm**

Where values are presented as continued "cont", refer to the adjacent graphs where DN values vs depth and penetration vs depths can be read.

Signature 

TEST REPORT FOR DYNAMIC CONE PENETROMETER BY TEST METHOD TMH6-ST6

CLIENT: Morula Consulting Engineers

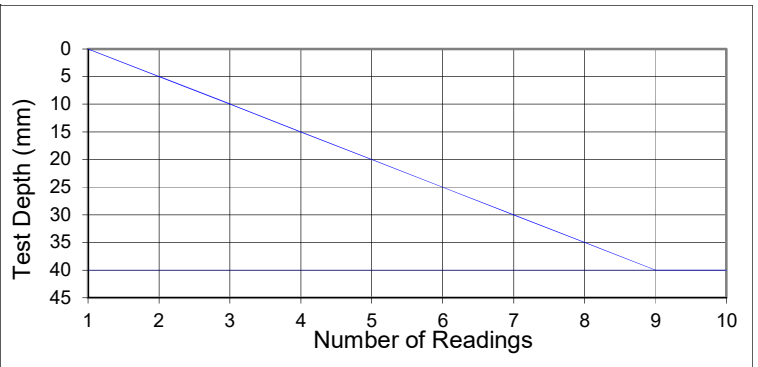
DATE REPORTED: 03-Feb-2022
 OUR REF: MAK0830203

PROJECT: Geotechnical Investigation: D192 ROAD
 ATTENTION: Hulisani Tsanawani
 Tel/Email: shoegra@morulaconsulting.co.za

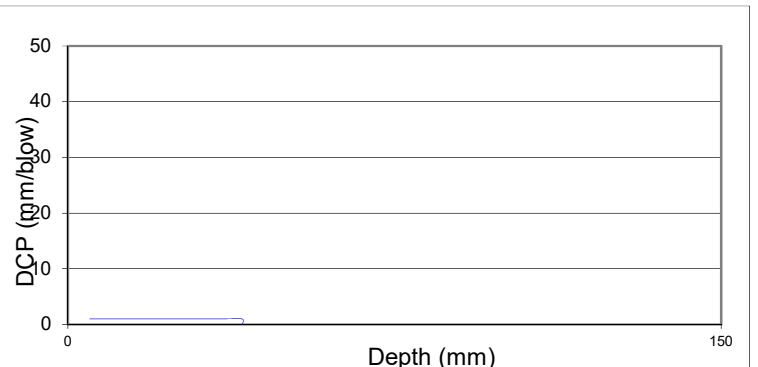
DESCRIPTION: DCP test was done from existing ground level
 DCP No: 1 at TP15 - D192 ROAD

DATE TESTED: 2-Feb-22

DCP Readings		Blows per reading: 5							
no.	mm	no.	mm	no.	mm	no.	mm	no.	mm
1	5	11		21		31		41	
2	10	12		22		32		42	
3	15	13		23		33		43	
4	20	14		24		34		44	
5	25	15		25		35		45	
6	30	16		26		36		46	
7	35	17		27		37		47	
8	40	18		28		38		48	
9		19		29		39		49	
10		20		30		40		50	



DCP number (mm / Blow) DN									
DN	mm	DN	mm	DN	mm	DN	mm	DN	mm
1	5								
1	10								
1	15								
1	20								
1	25								
1	30								
1	35								
1	40								



no.	Depth (mm)			In situ		Blows/mm	
	From	-	To	DN	CBR	150mm	300mm
1	1	-	150	####			
2	151	-	300				
3	301	-	450				
4	451	-	600				
5	601	-	750				
6	751	-	900				
8	901	-	1050				
9	1051	-	1200				
10	1201	-	1350				
11	1351	-	1500				
12	1501	-	1650				
13	1651	-	1800				
14	1801	-	1950				
15	1951	-	2100				



REMARKS:

Max penetration depth **40 mm**

Where values are presented as continued "cont", refer to the adjacent graphs where DN values vs depth and penetration vs depths can be read.

Signature 

TEST REPORT FOR DYNAMIC CONE PENETROMETER BY TEST METHOD TMH6-ST6

CLIENT: Morula Consulting Engineers

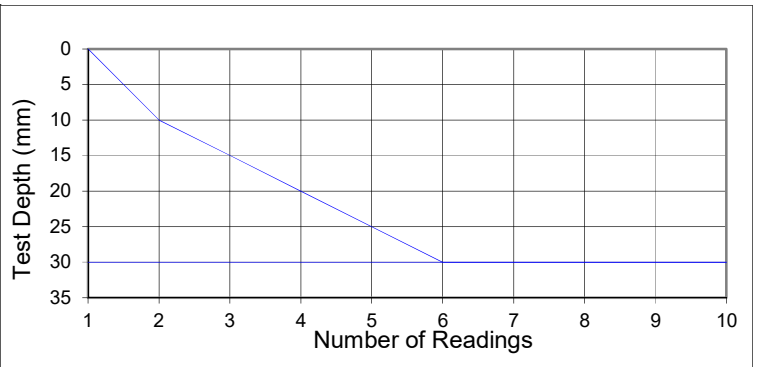
DATE REPORTED: 03-Feb-2022
 OUR REF: MAK0830203

PROJECT: Geotechnical Investigation: D192 ROAD
 ATTENTION: Hulisani Tsanawani
 Tel/Email: shoegra@morulaconsulting.co.za

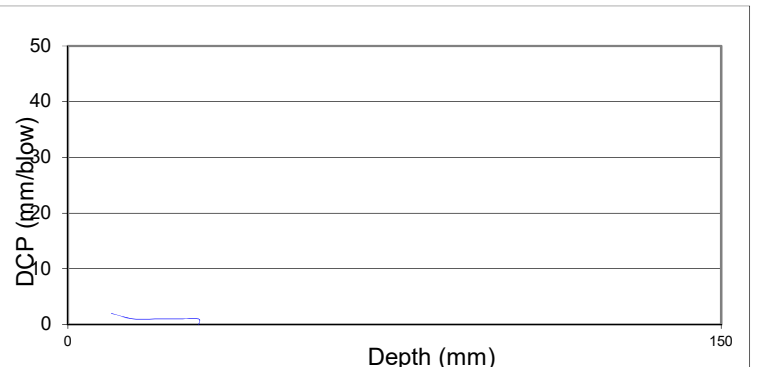
DESCRIPTION: DCP test was done from existing ground level
 DCP No: 1 at TP16 - D192 ROAD

DATE TESTED: 2-Feb-22

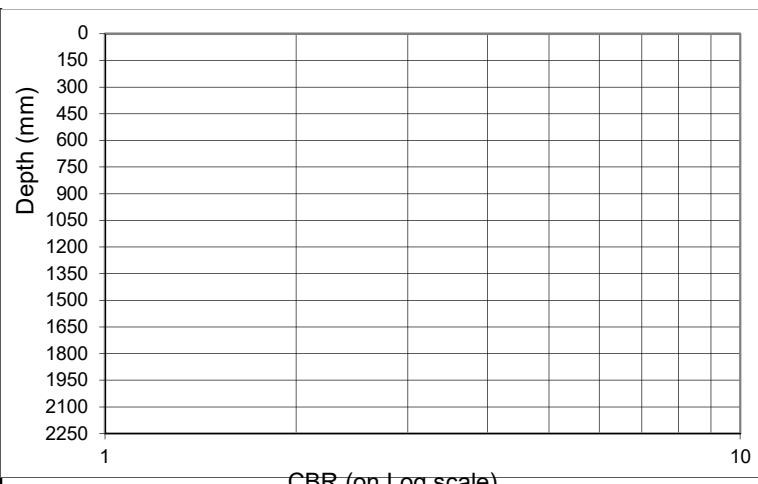
DCP Readings		Blows per reading: 5							
no.	mm	no.	mm	no.	mm	no.	mm	no.	mm
1	10	11		21		31		41	
2	15	12		22		32		42	
3	20	13		23		33		43	
4	25	14		24		34		44	
5	30	15		25		35		45	
6		16		26		36		46	
7		17		27		37		47	
8		18		28		38		48	
9		19		29		39		49	
10		20		30		40		50	



DCP number (mm / Blow) DN									
DN	mm	DN	mm	DN	mm	DN	mm	DN	mm
2	10								
1	15								
1	20								
1	25								
1	30								



no.	Depth (mm)			In situ		Blows/mm	
	From	-	To	DN	CBR	150mm	300mm
1	1	-	150	####			
2	151	-	300				
3	301	-	450				
4	451	-	600				
5	601	-	750				
6	751	-	900				
8	901	-	1050				
9	1051	-	1200				
10	1201	-	1350				
11	1351	-	1500				
12	1501	-	1650				
13	1651	-	1800				
14	1801	-	1950				
15	1951	-	2100				



REMARKS: Max penetration depth **30 mm**
 Where values are presented as continued "cont", refer to the adjacent graphs where DN values vs depth and penetration vs depths can be read.

Signature 

No 1469 Lowveld Close, Rayton 1001
 2814 Thantlagane Street, Mahube Ext 1, 0122
 Cell: 072 342 3563
 Email: info@makhuma.co.za
 Reg: 2017/181097/07



TEST REPORT FOR DYNAMIC CONE PENETROMETER BY TEST METHOD TMH6-ST6

CLIENT: Morula Consulting Engineers

DATE REPORTED: 03-Feb-2022

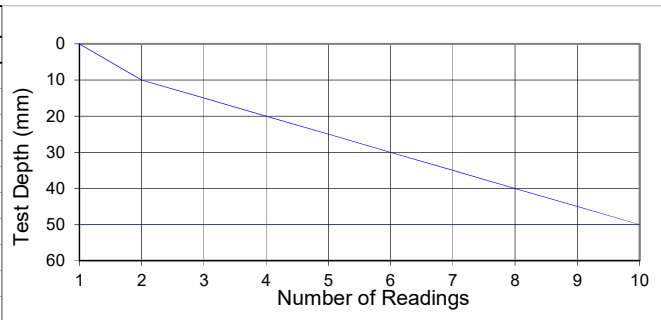
OUR REF: MAK0830203

PROJECT: Geotechnical Investigation: D192 ROAD
 ATTENTION: Hulisani Tsanawani
 Tel/Email: shoegra@morulaconsulting.co.za

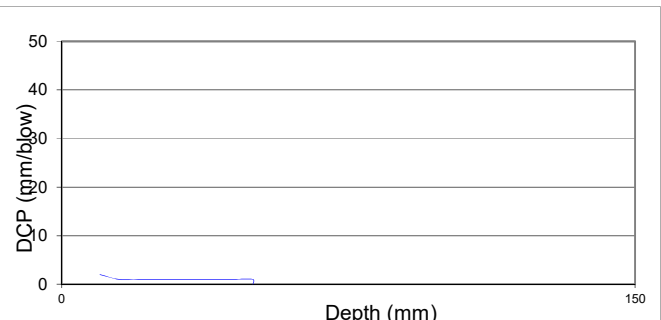
DESCRIPTION: DCP test was done from existing ground level
 DCP No: 1 at TP17 - D192 ROAD

DATE TESTED: 2-Feb-22

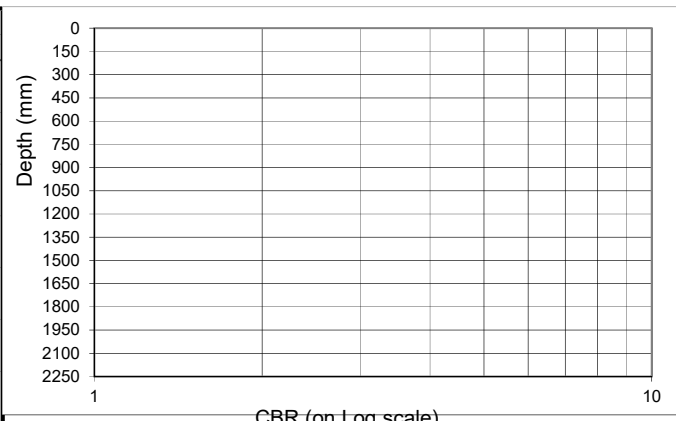
DCP Readings		Blows per reading: 5							
no.	mm	no.	mm	no.	mm	no.	mm	no.	mm
1	10	11		21		31		41	
2	15	12		22		32		42	
3	20	13		23		33		43	
4	25	14		24		34		44	
5	30	15		25		35		45	
6	35	16		26		36		46	
7	40	17		27		37		47	
8	45	18		28		38		48	
9	50	19		29		39		49	
10		20		30		40		50	



DCP number (mm / Blow) DN									
DN	mm	DN	mm	DN	mm	DN	mm	DN	mm
2	10								
1	15								
1	20								
1	25								
1	30								
1	35								
1	40								
1	45								
1	50								



no.	Depth (mm)		In situ		Blows/mm	
	From	To	DN	CBR	150mm	300mm
1	1	150	####			
2	151	300				
3	301	450				
4	451	600				
5	601	750				
6	751	900				
8	901	1050				
9	1051	1200				
10	1201	1350				
11	1351	1500				
12	1501	1650				
13	1651	1800				
14	1801	1950				
15	1951	2100				



REMARKS: Max penetration depth **50 mm**

Where values are presented as continued "cont", refer to the adjacent graphs where DN values vs depth and penetration vs depths can be read.

Signature 

TEST REPORT FOR DYNAMIC CONE PENETROMETER BY TEST METHOD TMH6-ST6

CLIENT: Morula Consulting Engineers

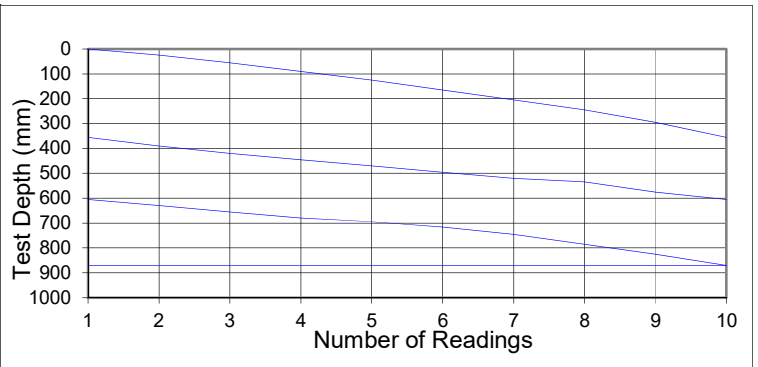
DATE REPORTED: 03-Feb-2022
 OUR REF: MAK0830203

PROJECT: Geotechnical Investigation: D192 ROAD
 ATTENTION: Hulisani Tsanawani
 Tel/Email: shoegra@morulaconsulting.co.za

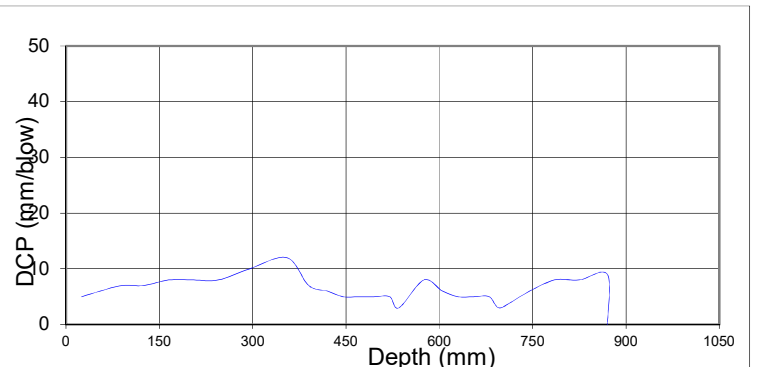
DESCRIPTION: DCP test was done from existing ground level
 DCP No: 1 at TP18 - D192 ROAD

DATE TESTED: 2-Feb-22

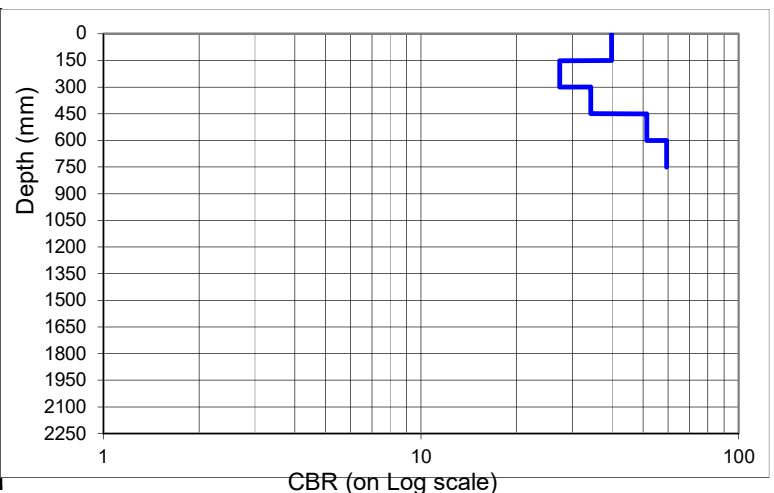
DCP Readings		Blows per reading: 5							
no.	mm	no.	mm	no.	mm	no.	mm	no.	mm
1	25	11	420	21	680	31		41	
2	55	12	445	22	695	32		42	
3	90	13	470	23	715	33		43	
4	125	14	495	24	745	34		44	
5	165	15	520	25	785	35		45	
6	205	16	535	26	825	36		46	
7	245	17	575	27	870	37		47	
8	295	18	605	28		38		48	
9	355	19	630	29		39		49	
10	390	20	655	30		40		50	



DCP number (mm / Blow) DN									
DN	mm	DN	mm	DN	mm	DN	mm	DN	mm
5	25	6	420	5	680				
6	55	5	445	3	695				
7	90	5	470	4	715				
7	125	5	495	6	745				
8	165	5	520	8	785				
8	205	3	535	8	825				
8	245	8	575	9	870				
10	295	6	605						
12	355	5	630						
7	390	5	655						



no.	Depth (mm)			In situ		Blows/mm	
	From	-	To	DN	CBR	150mm	300mm
1	1	-	150	6,5	40	23	20,2
2	151	-	300	8,7	27	17	
3	301	-	450	7,3	34	21	24,4
4	451	-	600	5,3	51	28	
5	601	-	750	4,8	59	31	
6	751	-	900				
8	901	-	1050				
9	1051	-	1200				
10	1201	-	1350				
11	1351	-	1500				
12	1501	-	1650				
13	1651	-	1800				
14	1801	-	1950				
15	1951	-	2100				



REMARKS:

Max penetration depth **870 mm**

Where values are presented as continued "cont", refer to the adjacent graphs where DN values vs depth and penetration vs depths can be read.

Signature 

TEST REPORT FOR DYNAMIC CONE PENETROMETER BY TEST METHOD TMH6-ST6

CLIENT: Morula Consulting Engineers

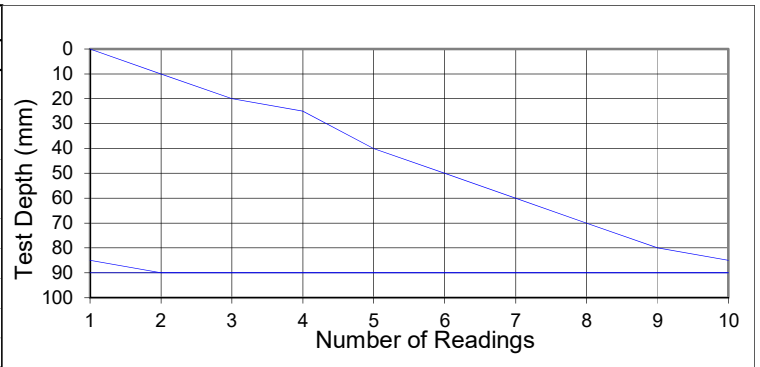
DATE REPORTED: 03-Feb-2022
 OUR REF: MAK0830203

PROJECT: Geotechnical Investigation: D192 ROAD
 ATTENTION: Hulisani Tsanawani
 Tel/Email: shoegra@morulaconsulting.co.za

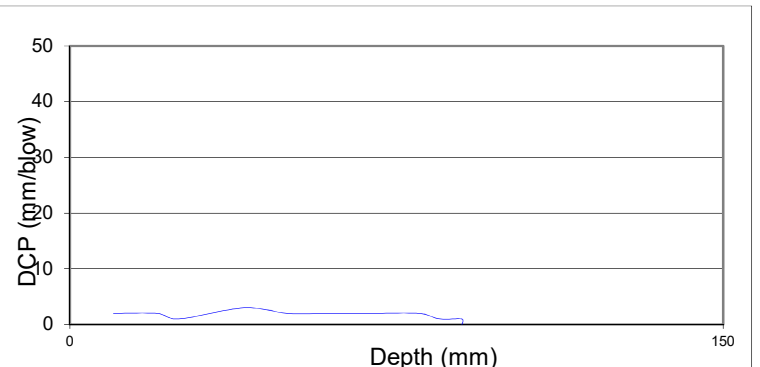
DESCRIPTION: DCP test was done from existing ground level
 DCP No: 1 at TP19 - D192 ROAD

DATE TESTED: 2-Feb-22

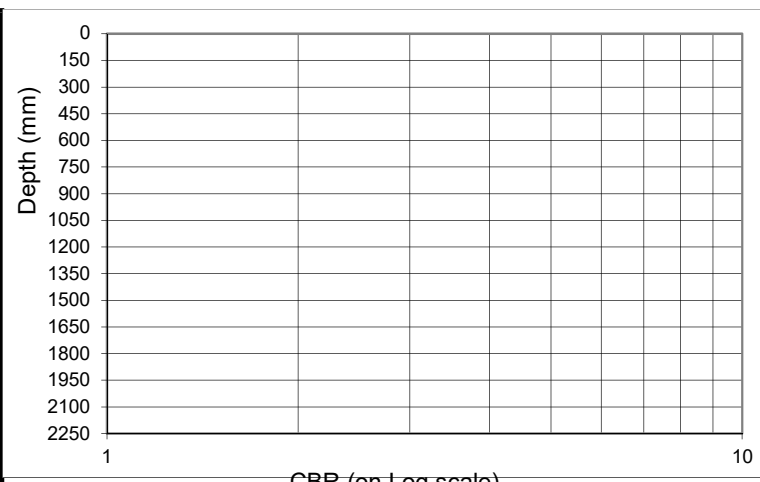
DCP Readings		Blows per reading: 5							
no.	mm	no.	mm	no.	mm	no.	mm	no.	mm
1	10	11		21		31		41	
2	20	12		22		32		42	
3	25	13		23		33		43	
4	40	14		24		34		44	
5	50	15		25		35		45	
6	60	16		26		36		46	
7	70	17		27		37		47	
8	80	18		28		38		48	
9	85	19		29		39		49	
10	90	20		30		40		50	



DCP number (mm / Blow) DN									
DN	mm	DN	mm	DN	mm	DN	mm	DN	mm
2	10								
2	20								
1	25								
3	40								
2	50								
2	60								
2	70								
2	80								
1	85								
1	90								



no.	Depth (mm)			In situ		Blows/mm	
	From	-	To	DN	CBR	150mm	300mm
1	1	-	150	####			
2	151	-	300				
3	301	-	450				
4	451	-	600				
5	601	-	750				
6	751	-	900				
8	901	-	1050				
9	1051	-	1200				
10	1201	-	1350				
11	1351	-	1500				
12	1501	-	1650				
13	1651	-	1800				
14	1801	-	1950				
15	1951	-	2100				



REMARKS:

Max penetration depth **90 mm**

Where values are presented as continued "cont", refer to the adjacent graphs where DN values vs depth and penetration vs depths can be read.

Signature 

TEST REPORT FOR DYNAMIC CONE PENETROMETER BY TEST METHOD TMH6-ST6

CLIENT: Morula Consulting Engineers

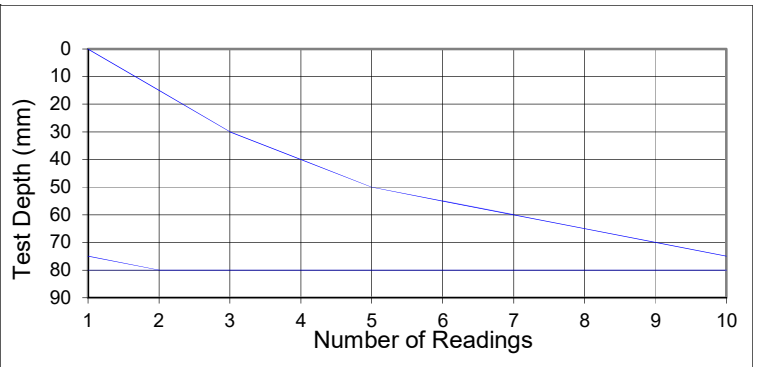
DATE REPORTED: 03-Feb-2022
 OUR REF: MAK0830203

PROJECT: Geotechnical Investigation: D192 ROAD
 ATTENTION: Hulisani Tsanawani
 Tel/Email: shoegra@morulaconsulting.co.za

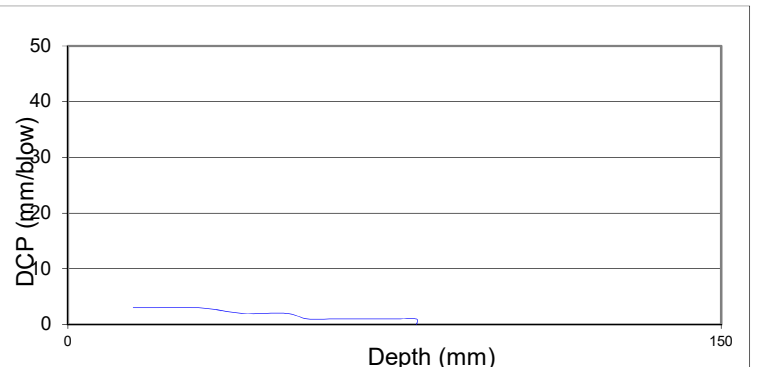
DESCRIPTION: DCP test was done from existing ground level
 DCP No: 1 at TP20 - D192 ROAD

DATE TESTED: 2-Feb-22

DCP Readings		Blows per reading: 5							
no.	mm	no.	mm	no.	mm	no.	mm	no.	mm
1	15	11		21		31		41	
2	30	12		22		32		42	
3	40	13		23		33		43	
4	50	14		24		34		44	
5	55	15		25		35		45	
6	60	16		26		36		46	
7	65	17		27		37		47	
8	70	18		28		38		48	
9	75	19		29		39		49	
10	80	20		30		40		50	



DCP number (mm / Blow) DN									
DN	mm	DN	mm	DN	mm	DN	mm	DN	mm
3	15								
3	30								
2	40								
2	50								
1	55								
1	60								
1	65								
1	70								
1	75								
1	80								



no.	Depth (mm)			In situ		Blows/mm	
	From	-	To	DN	CBR	150mm	300mm
1	1	-	150	####			
2	151	-	300				
3	301	-	450				
4	451	-	600				
5	601	-	750				
6	751	-	900				
8	901	-	1050				
9	1051	-	1200				
10	1201	-	1350				
11	1351	-	1500				
12	1501	-	1650				
13	1651	-	1800				
14	1801	-	1950				
15	1951	-	2100				



REMARKS:

Max penetration depth **80 mm**

Where values are presented as continued "cont", refer to the adjacent graphs where DN values vs depth and penetration vs depths can be read.

Signature 

TEST REPORT FOR DYNAMIC CONE PENETROMETER BY TEST METHOD TMH6-ST6

CLIENT: Morula Consulting Engineers

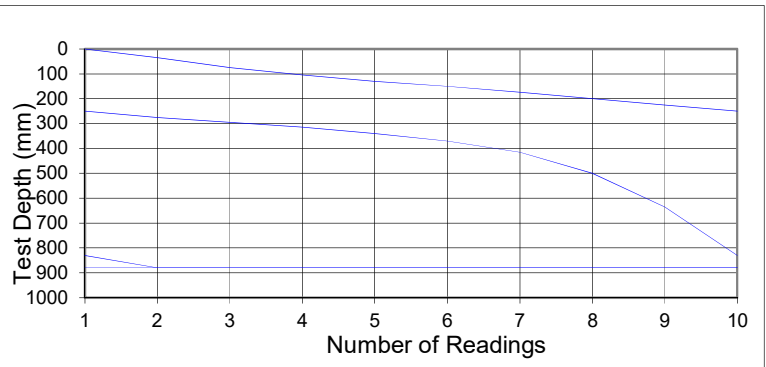
DATE REPORTED: 03-Feb-2022
 OUR REF: MAK0830203

PROJECT: Geotechnical Investigation: D192 ROAD
 ATTENTION: Hulisani Tsanawani
 Tel/Email: shoegra@morulaconsulting.co.za

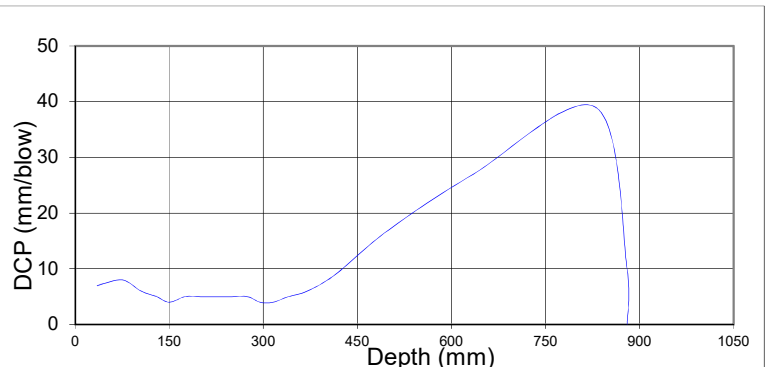
DESCRIPTION: DCP test was done from existing ground level
 DCP No: 1 at TP21 - D192 ROAD

DATE TESTED: 2-Feb-22

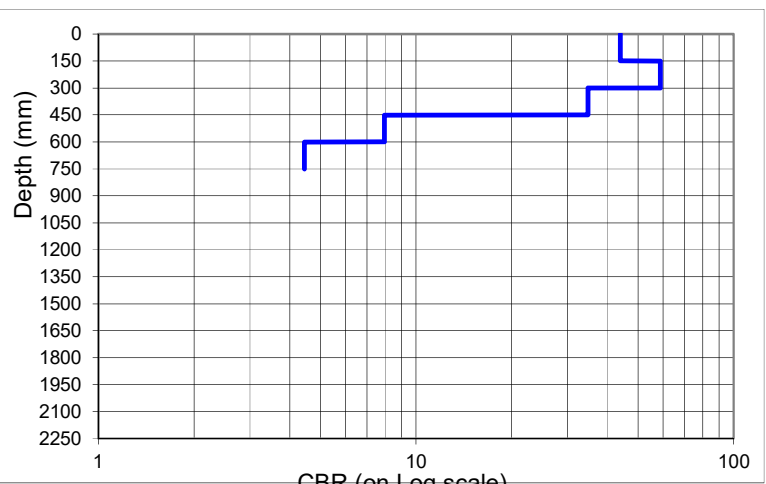
DCP Readings		Blows per reading: 5							
no.	mm	no.	mm	no.	mm	no.	mm	no.	mm
1	35	11	295	21		31		41	
2	75	12	315	22		32		42	
3	105	13	340	23		33		43	
4	130	14	370	24		34		44	
5	150	15	415	25		35		45	
6	175	16	500	26		36		46	
7	200	17	635	27		37		47	
8	225	18	830	28		38		48	
9	250	19	880	29		39		49	
10	275	20		30		40		50	



DCP number (mm / Blow) DN									
DN	mm	DN	mm	DN	mm	DN	mm	DN	mm
7	35	4	295						
8	75	4	315						
6	105	5	340						
5	130	6	370						
4	150	9	415						
5	175	17	500						
5	200	27	635						
5	225	39	830						
5	250	10	880						
5	275								



no.	Depth (mm)			In situ		Blows/mm	
	From	-	To	DN	CBR	150mm	300mm
1	1	-	150	6,0	44	25	28,1
2	151	-	300	4,8	59	31	
3	301	-	450	7,2	35	21	13,7
4	451	-	600	22,6	8	7	
5	601	-	750	35,3	4	4	
6	751	-	900				
8	901	-	1050				
9	1051	-	1200				
10	1201	-	1350				
11	1351	-	1500				
12	1501	-	1650				
13	1651	-	1800				
14	1801	-	1950				
15	1951	-	2100				



REMARKS:

Max penetration depth **880 mm**
 Where values are presented as continued "cont", refer to the adjacent graphs where DN values vs depth and penetration vs depths can be read.

Signature 

TEST REPORT FOR DYNAMIC CONE PENETROMETER BY TEST METHOD *TMH6-ST6*

CLIENT: Morula Consulting Engineers

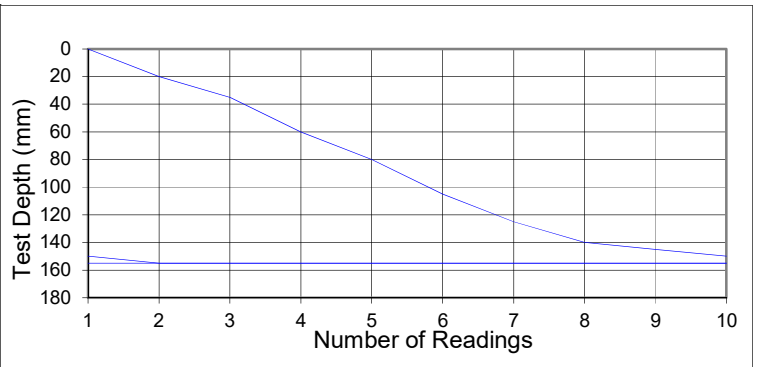
DATE REPORTED: 03-Feb-2022
 OUR REF: MAK0830203

PROJECT: Geotechnical Investigation: D192 ROAD
 ATTENTION: Hulisani Tsanawani
 Tel/Email: shoegra@morulaconsulting.co.za

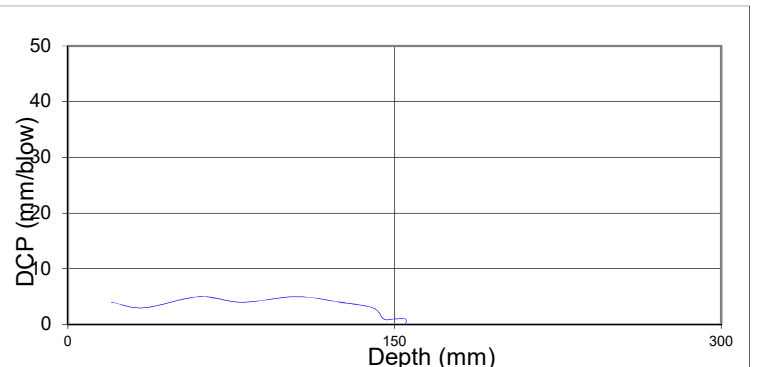
DESCRIPTION: DCP test was done from existing ground level
 DCP No: 1 at TP22 - D192 ROAD

DATE TESTED: 2-Feb-22

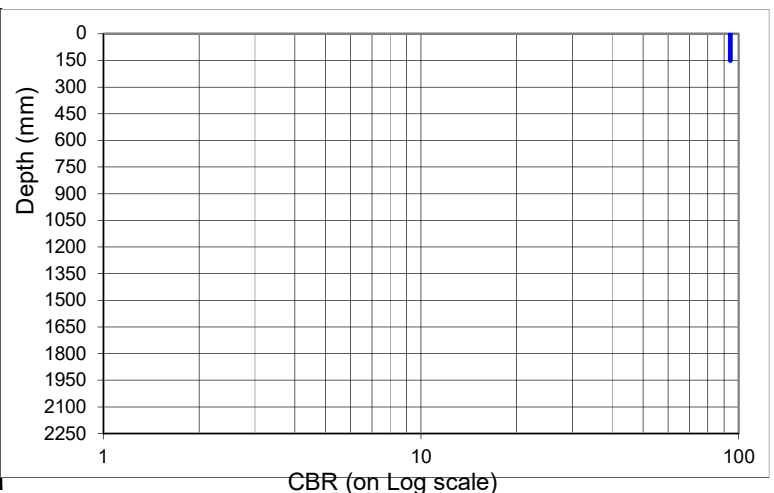
DCP Readings		Blows per reading: 5							
no.	mm	no.	mm	no.	mm	no.	mm	no.	mm
1	20	11		21		31		41	
2	35	12		22		32		42	
3	60	13		23		33		43	
4	80	14		24		34		44	
5	105	15		25		35		45	
6	125	16		26		36		46	
7	140	17		27		37		47	
8	145	18		28		38		48	
9	150	19		29		39		49	
10	155	20		30		40		50	



DCP number (mm / Blow) DN									
DN	mm	DN	mm	DN	mm	DN	mm	DN	mm
4	20								
3	35								
5	60								
4	80								
5	105								
4	125								
3	140								
1	145								
1	150								
1	155								



no.	Depth (mm)			In situ		Blows/mm	
	From	-	To	DN	CBR	150mm	300mm
1	1	-	150	3,3	94	45	
2	151	-	300				
3	301	-	450				
4	451	-	600				
5	601	-	750				
6	751	-	900				
8	901	-	1050				
9	1051	-	1200				
10	1201	-	1350				
11	1351	-	1500				
12	1501	-	1650				
13	1651	-	1800				
14	1801	-	1950				
15	1951	-	2100				



REMARKS:

Max penetration depth **155 mm**

Where values are presented as continued "cont", refer to the adjacent graphs where DN values vs depth and penetration vs depths can be read.

Signature 

TEST REPORT FOR DYNAMIC CONE PENETROMETER BY TEST METHOD TMH6-ST6

CLIENT: Morula Consulting Engineers

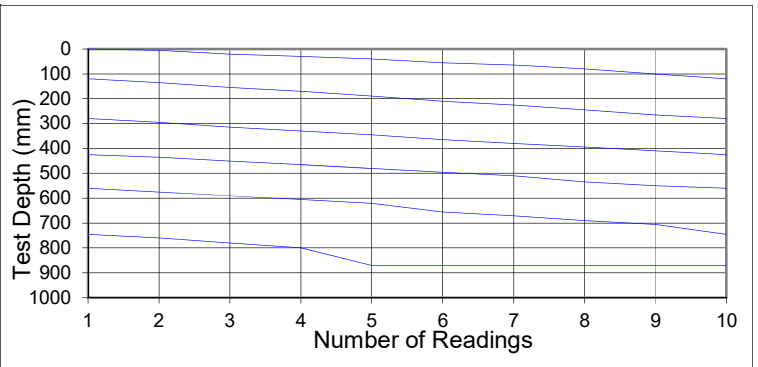
DATE REPORTED: 04-Feb-2022
 OUR REF: MAK0830203

PROJECT: Geotechnical Investigation: D192 ROAD
 ATTENTION: Hulisani Tsanawani
 Tel/Email: shoegra@morulaconsulting.co.za

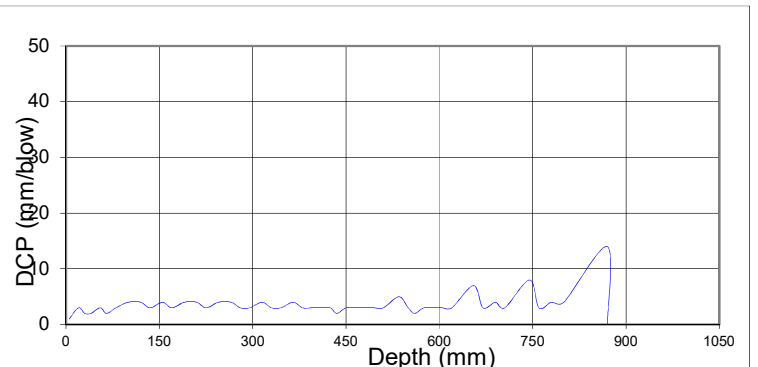
DESCRIPTION: DCP test was done from existing ground level
 DCP No: 1 at TP23 - D192 ROAD

DATE TESTED: 3-Feb-22

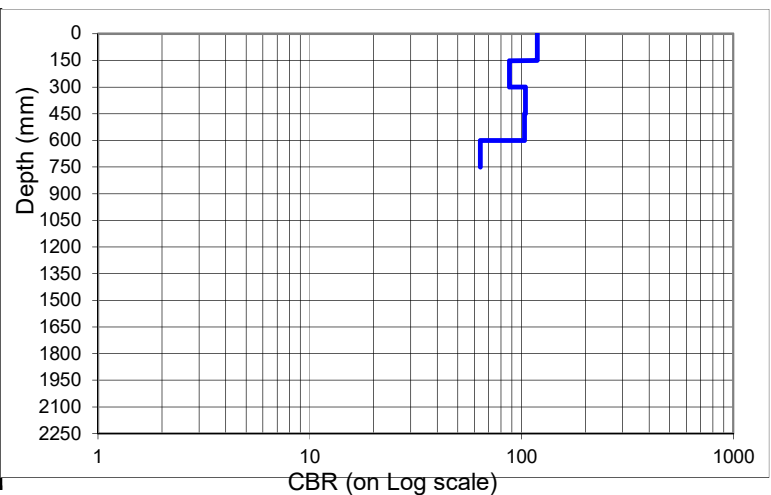
DCP Readings		Blows per reading: 5							
no.	mm	no.	mm	no.	mm	no.	mm	no.	mm
1	5	11	155	21	330	31	480	41	655
2	20	12	170	22	345	32	495	42	670
3	30	13	190	23	365	33	510	43	690
4	40	14	210	24	380	34	535	44	705
5	55	15	225	25	395	35	550	45	745
6	65	16	245	26	410	36	560	46	760
7	80	17	265	27	425	37	575	47	780
8	100	18	280	28	435	38	590	48	800
9	120	19	295	29	450	39	605	49	870
10	135	20	315	30	465	40	620	50	



DCP number (mm / Blow) DN									
DN	mm	DN	mm	DN	mm	DN	mm	DN	mm
1	5	4	155	3	330	3	480	7	655
3	20	3	170	3	345	3	495	3	670
2	30	4	190	4	365	3	510	4	690
2	40	4	210	3	380	5	535	3	705
3	55	3	225	3	395	3	550	8	745
2	65	4	245	3	410	2	560	3	760
3	80	4	265	3	425	3	575	4	780
4	100	3	280	2	435	3	590	4	800
4	120	3	295	3	450	3	605	14	870
3	135	4	315	3	465	3	620		



no.	Depth (mm)			In situ		Blows/mm	
	From	-	To	DN	CBR	150mm	300mm
1	1	-	150	2,8	118	54	48,1
2	151	-	300	3,5	87	43	
3	301	-	450	3,1	104	49	48,5
4	451	-	600	3,1	103	48	
5	601	-	750	4,5	64	33	
6	751	-	900				
8	901	-	1050				
9	1051	-	1200				
10	1201	-	1350				
11	1351	-	1500				
12	1501	-	1650				
13	1651	-	1800				
14	1801	-	1950				
15	1951	-	2100				



REMARKS:

Max penetration depth **870 mm**

Where values are presented as continued "cont", refer to the adjacent graphs where DN values vs depth and penetration vs depths can be read.

Signature 

TEST REPORT FOR DYNAMIC CONE PENETROMETER BY TEST METHOD TMH6-ST6

CLIENT: Morula Consulting Engineers

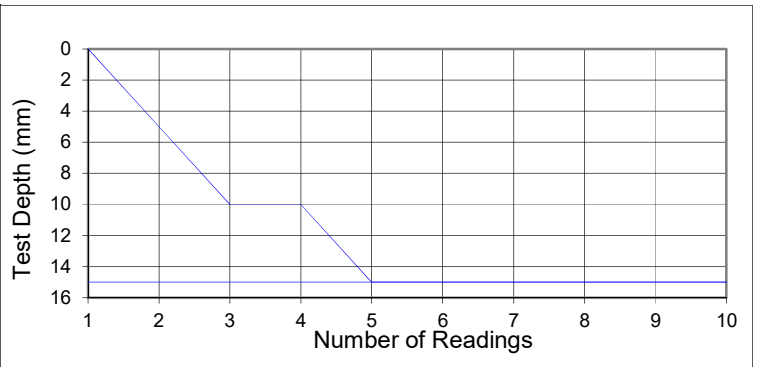
DATE REPORTED: 04-Feb-2022
 OUR REF: MAK0830203

PROJECT: Geotechnical Investigation: D192 ROAD
 ATTENTION: Hulisani Tsanawani
 Tel/Email: shoegra@morulaconsulting.co.za

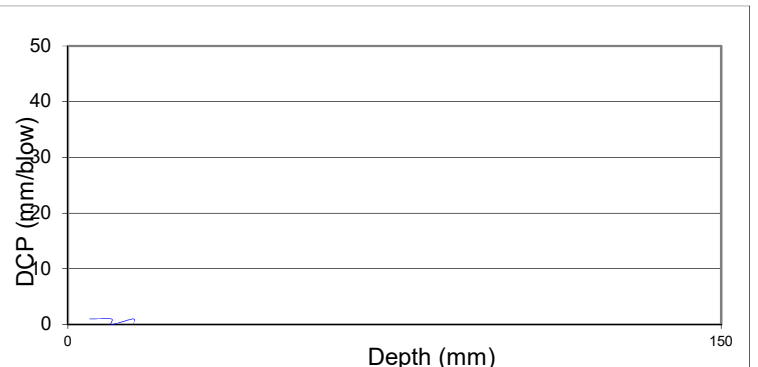
DESCRIPTION: DCP test was done from existing ground level
 DCP No: 1 at TP24 - D192 ROAD

DATE TESTED: 3-Feb-22

DCP Readings		Blows per reading: 5							
no.	mm	no.	mm	no.	mm	no.	mm	no.	mm
1	5	11		21		31		41	
2	10	12		22		32		42	
3		13		23		33		43	
4		14		24		34		44	
5		15		25		35		45	
6		16		26		36		46	
7		17		27		37		47	
8		18		28		38		48	
9		19		29		39		49	
10		20		30		40		50	



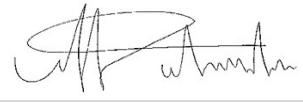
DCP number (mm / Blow) DN									
DN	mm	DN	mm	DN	mm	DN	mm	DN	mm
1	5								
1	10								
1									



no.	Depth (mm)			In situ		Blows/mm	
	From	-	To	DN	CBR	150mm	300mm
1	1	-	150	####			
2	151	-	300				
3	301	-	450				
4	451	-	600				
5	601	-	750				
6	751	-	900				
8	901	-	1050				
9	1051	-	1200				
10	1201	-	1350				
11	1351	-	1500				
12	1501	-	1650				
13	1651	-	1800				
14	1801	-	1950				
15	1951	-	2100				



REMARKS: Max penetration depth **15 mm**
 Where values are presented as continued "cont", refer to the adjacent graphs where DN values vs depth and penetration vs depths can be read.

Signature 

TEST REPORT FOR DYNAMIC CONE PENETROMETER BY TEST METHOD TMH6-ST6

CLIENT: Morula Consulting Engineers

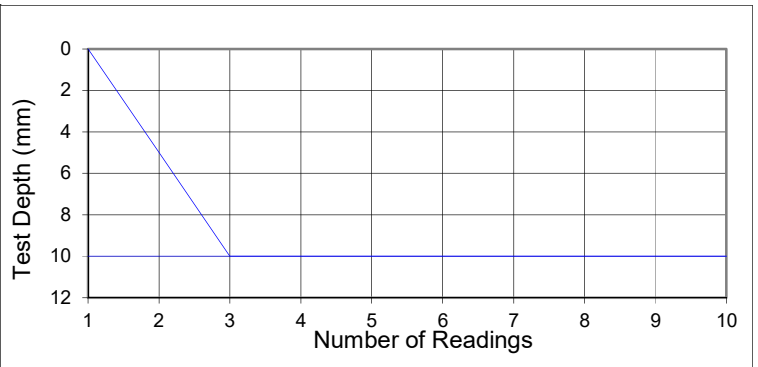
DATE REPORTED: 04-Feb-2022
 OUR REF: MAK0830203

PROJECT: Geotechnical Investigation: D192 ROAD
 ATTENTION: Hulisani Tsanawani
 Tel/Email: shoegra@morulaconsulting.co.za

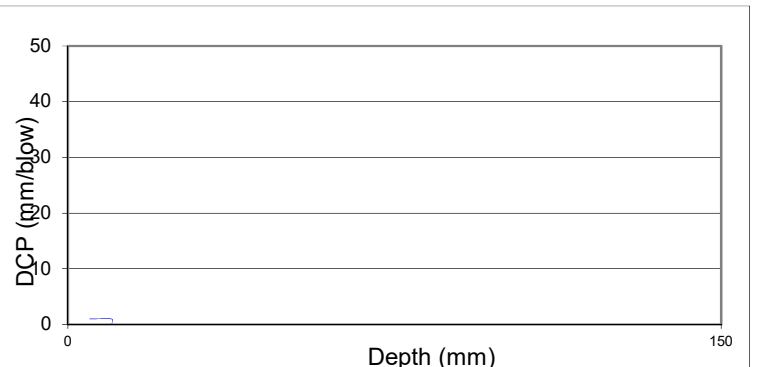
DESCRIPTION: DCP test was done from existing ground level
 DCP No: 1 at TP25 - D192 ROAD

DATE TESTED: 3-Feb-22

DCP Readings		Blows per reading: 5							
no.	mm	no.	mm	no.	mm	no.	mm	no.	mm
1	5	11		21		31		41	
2	10	12		22		32		42	
3		13		23		33		43	
4		14		24		34		44	
5		15		25		35		45	
6		16		26		36		46	
7		17		27		37		47	
8		18		28		38		48	
9		19		29		39		49	
10		20		30		40		50	



DCP number (mm / Blow) DN									
DN	mm	DN	mm	DN	mm	DN	mm	DN	mm
1	5								
1	10								



no.	Depth (mm)			In situ		Blows/mm	
	From	-	To	DN	CBR	150mm	300mm
1	1	-	150	####			
2	151	-	300				
3	301	-	450				
4	451	-	600				
5	601	-	750				
6	751	-	900				
8	901	-	1050				
9	1051	-	1200				
10	1201	-	1350				
11	1351	-	1500				
12	1501	-	1650				
13	1651	-	1800				
14	1801	-	1950				
15	1951	-	2100				



REMARKS: Max penetration depth **10 mm**
 Where values are presented as continued "cont", refer to the adjacent graphs where DN values vs depth and penetration vs depths can be read.

Signature 

TEST REPORT FOR DYNAMIC CONE PENETROMETER BY TEST METHOD TMH6-ST6

CLIENT: Morula Consulting Engineers

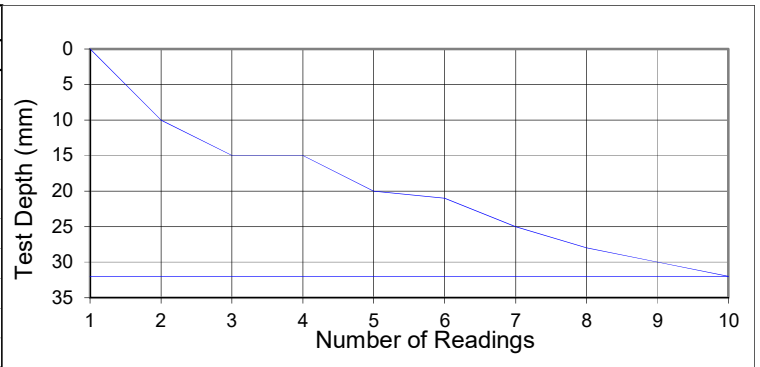
DATE REPORTED: 04-Feb-2022
 OUR REF: MAK0830203

PROJECT: Geotechnical Investigation: D192 ROAD
 ATTENTION: Hulisani Tsanawani
 Tel/Email: shoegra@morulaconsulting.co.za

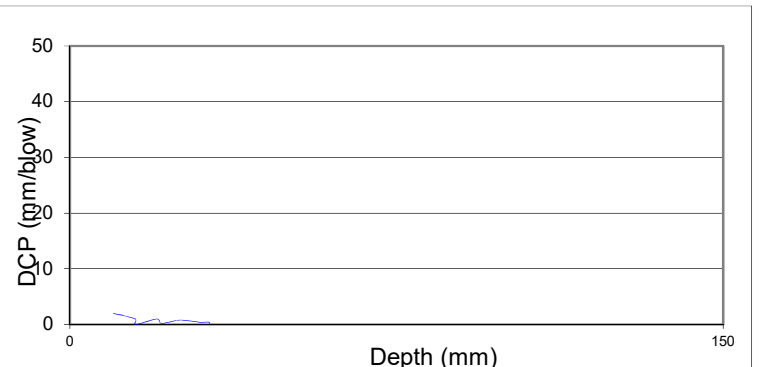
DESCRIPTION: DCP test was done from existing ground level
 DCP No: 1 at TP26 - D192 ROAD

DATE TESTED: 3-Feb-22

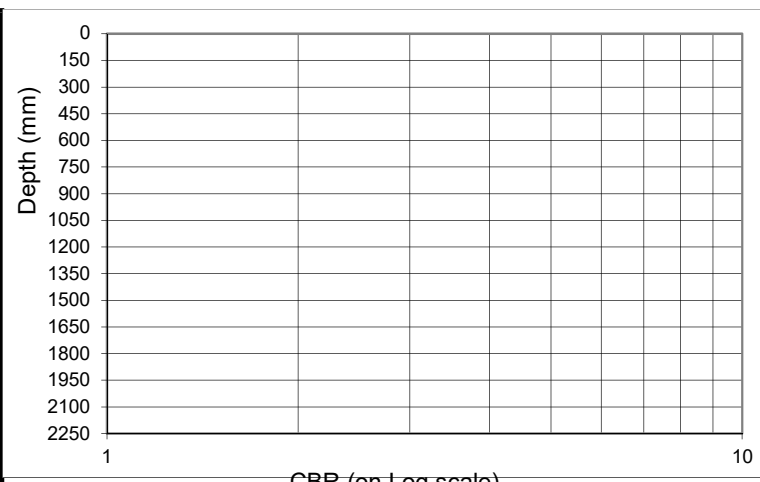
DCP Readings		Blows per reading: 5							
no.	mm	no.	mm	no.	mm	no.	mm	no.	mm
1	10	11		21		31		41	
2	15	12		22		32		42	
3		13		23		33		43	
4		14		24		34		44	
5		15		25		35		45	
6		16		26		36		46	
7		17		27		37		47	
8		18		28		38		48	
9		19		29		39		49	
10		20		30		40		50	



DCP number (mm / Blow) DN									
DN	mm	DN	mm	DN	mm	DN	mm	DN	mm
2	10								
1	15								
1									
0,2									
0,8									
0,6									
0,4									
0,4									



no.	Depth (mm)			In situ		Blows/mm	
	From	-	To	DN	CBR	150mm	300mm
1	1	-	150	####			
2	151	-	300				
3	301	-	450				
4	451	-	600				
5	601	-	750				
6	751	-	900				
8	901	-	1050				
9	1051	-	1200				
10	1201	-	1350				
11	1351	-	1500				
12	1501	-	1650				
13	1651	-	1800				
14	1801	-	1950				
15	1951	-	2100				



REMARKS:

Max penetration depth **32 mm**

Where values are presented as continued "cont", refer to the adjacent graphs where DN values vs depth and penetration vs depths can be read.

Signature 

TEST REPORT FOR DYNAMIC CONE PENETROMETER BY TEST METHOD TMH6-ST6

CLIENT: Morula Consulting Engineers

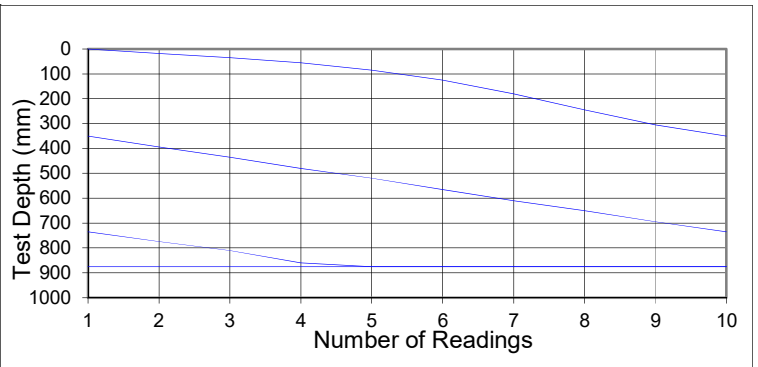
DATE REPORTED: 04-Feb-2022
 OUR REF: MAK0830203

PROJECT: Geotechnical Investigation: D192 ROAD
 ATTENTION: Hulisani Tsanawani
 Tel/Email: shoegra@morulaconsulting.co.za

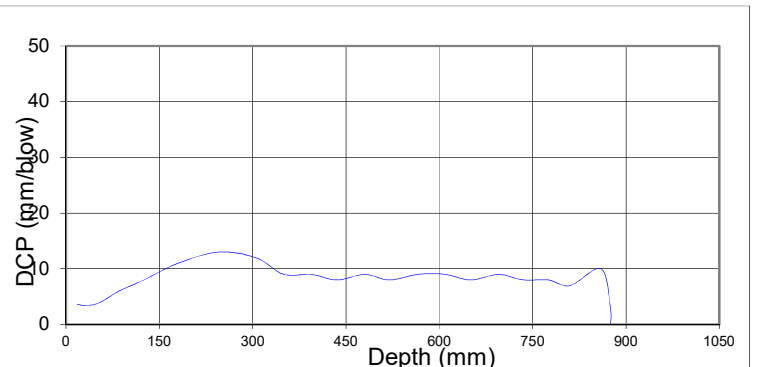
DESCRIPTION: DCP test was done from existing ground level
 DCP No: 1 at TP27 - D192 ROAD

DATE TESTED: 3-Feb-22

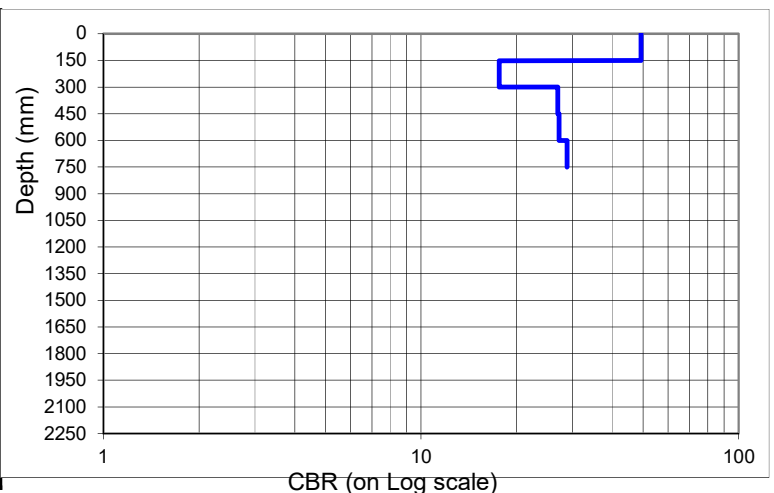
DCP Readings		Blows per reading: 5							
no.	mm	no.	mm	no.	mm	no.	mm	no.	mm
1	18	11	435	21	860	31		41	
2	35	12	480	22	875	32		42	
3	55	13	520	23		33		43	
4	85	14	565	24		34		44	
5	125	15	610	25		35		45	
6	180	16	650	26		36		46	
7	245	17	695	27		37		47	
8	305	18	735	28		38		48	
9	350	19	775	29		39		49	
10	395	20	810	30		40		50	



DCP number (mm / Blow) DN									
DN	mm	DN	mm	DN	mm	DN	mm	DN	mm
3,6	18	8	435	10	860				
3,4	35	9	480	3	875				
4	55	8	520						
6	85	9	565						
8	125	9	610						
11	180	8	650						
13	245	9	695						
12	305	8	735						
9	350	8	775						
9	395	7	810						



no.	Depth (mm)			In situ		Blows/mm	
	From	-	To	DN	CBR	150mm	300mm
1	1	-	150	5,5	49	27	19,8
2	151	-	300	12,2	18	12	
3	301	-	450	8,8	27	17	17,2
4	451	-	600	8,7	27	17	
5	601	-	750	8,3	29	18	
6	751	-	900				
8	901	-	1050				
9	1051	-	1200				
10	1201	-	1350				
11	1351	-	1500				
12	1501	-	1650				
13	1651	-	1800				
14	1801	-	1950				
15	1951	-	2100				



REMARKS:

Max penetration depth **875 mm**

Where values are presented as continued "cont", refer to the adjacent graphs where DN values vs depth and penetration vs depths can be read.

Signature 

TEST REPORT FOR DYNAMIC CONE PENETROMETER BY TEST METHOD TMH6-ST6

CLIENT: Morula Consulting Engineers

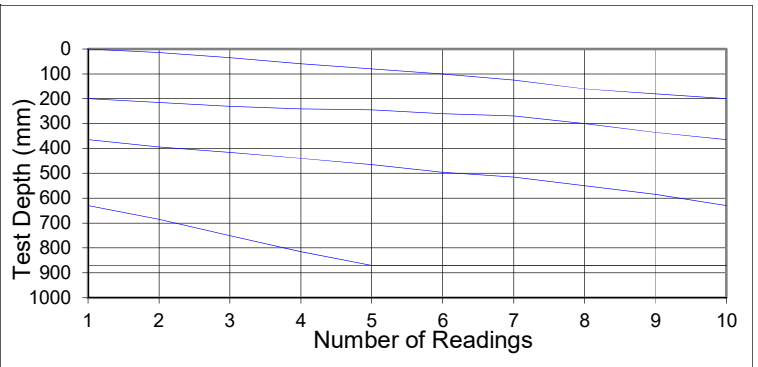
DATE REPORTED: 04-Feb-2022
 OUR REF: MAK0830203

PROJECT: Geotechnical Investigation: D192 ROAD
 ATTENTION: Hulisani Tsanawani
 Tel/Email: shoegra@morulaconsulting.co.za

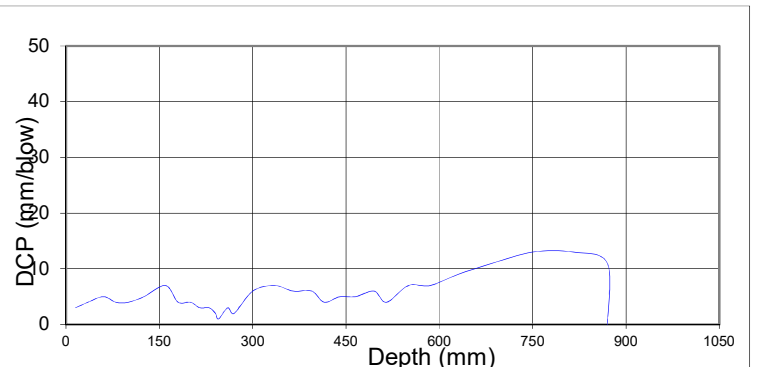
DESCRIPTION: DCP test was done from existing ground level
 DCP No: 1 at TP28 - D192 ROAD

DATE TESTED: 3-Feb-22

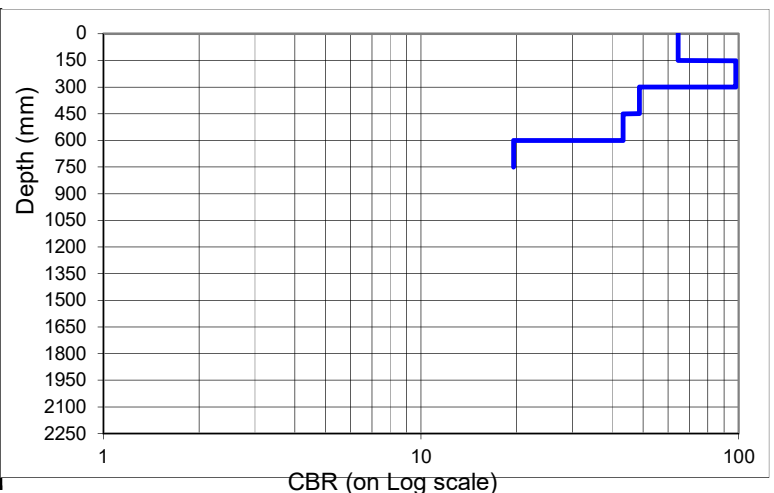
DCP Readings		Blows per reading: 5							
no.	mm	no.	mm	no.	mm	no.	mm	no.	mm
1	15	11	230	21	440	31	870	41	
2	35	12	240	22	465	32		42	
3	60	13	245	23	495	33		43	
4	80	14	260	24	515	34		44	
5	100	15	270	25	550	35		45	
6	125	16	300	26	585	36		46	
7	160	17	335	27	630	37		47	
8	180	18	365	28	685	38		48	
9	200	19	395	29	750	39		49	
10	215	20	415	30	815	40		50	



DCP number (mm / Blow) DN									
DN	mm	DN	mm	DN	mm	DN	mm	DN	mm
3	15	3	230	5	440	11	870		
4	35	2	240	5	465				
5	60	1	245	6	495				
4	80	3	260	4	515				
4	100	2	270	7	550				
5	125	6	300	7	585				
7	160	7	335	9	630				
4	180	6	365	11	685				
4	200	6	395	13	750				
3	215	4	415	13	815				



no.	Depth (mm)			In situ		Blows/mm	
	From	-	To	DN	CBR	150mm	300mm
1	1	-	150	4,5	64	34	40,0
2	151	-	300	3,2	98	46	
3	301	-	450	5,6	49	27	25,8
4	451	-	600	6,1	43	25	
5	601	-	750	11,3	20	13	
6	751	-	900				
8	901	-	1050				
9	1051	-	1200				
10	1201	-	1350				
11	1351	-	1500				
12	1501	-	1650				
13	1651	-	1800				
14	1801	-	1950				
15	1951	-	2100				



REMARKS:

Max penetration depth **870 mm**

Where values are presented as continued "cont", refer to the adjacent graphs where DN values vs depth and penetration vs depths can be read.

Signature 

TEST REPORT FOR DYNAMIC CONE PENETROMETER BY TEST METHOD TMH6-ST6

CLIENT: Morula Consulting Engineers

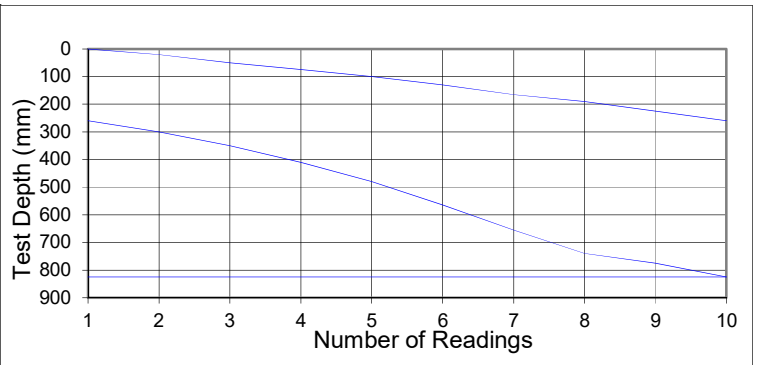
DATE REPORTED: 04-Feb-2022
 OUR REF: MAK0830203

PROJECT: Geotechnical Investigation: D192 ROAD
 ATTENTION: Hulisani Tsanawani
 Tel/Email: shoegra@morulaconsulting.co.za

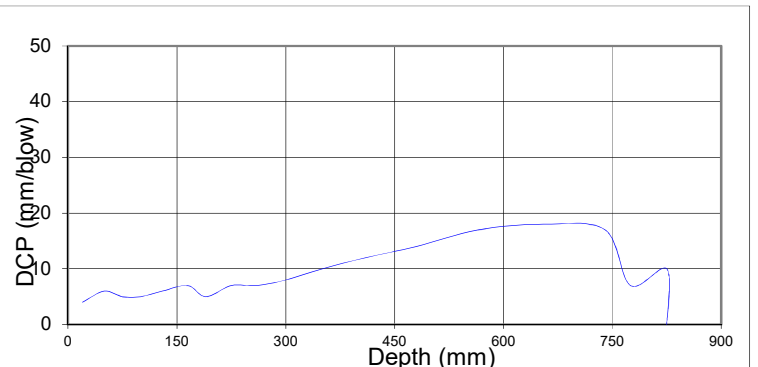
DESCRIPTION: DCP test was done from existing ground level
 DCP No: 1 at TP29 - D192 ROAD

DATE TESTED: 3-Feb-22

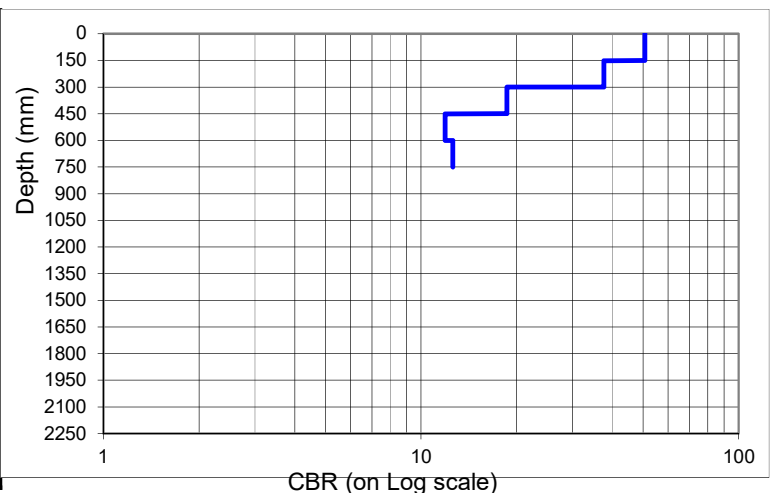
DCP Readings		Blows per reading: 5							
no.	mm	no.	mm	no.	mm	no.	mm	no.	mm
1	20	11	350	21		31		41	
2	50	12	410	22		32		42	
3	75	13	480	23		33		43	
4	100	14	565	24		34		44	
5	130	15	655	25		35		45	
6	165	16	740	26		36		46	
7	190	17	775	27		37		47	
8	225	18	825	28		38		48	
9	260	19		29		39		49	
10	300	20		30		40		50	



DCP number (mm / Blow) DN									
DN	mm	DN	mm	DN	mm	DN	mm	DN	mm
4	20	10	350						
6	50	12	410						
5	75	14	480						
5	100	17	565						
6	130	18	655						
7	165	17	740						
5	190	7	775						
7	225	10	825						
7	260								
8	300								



no.	Depth (mm)			In situ		Blows/mm	
	From	-	To	DN	CBR	150mm	300mm
1	1	-	150	5,4	51	28	25,0
2	151	-	300	6,8	38	22	
3	301	-	450	11,7	19	13	11,0
4	451	-	600	16,5	12	9	
5	601	-	750	15,8	13	9	
6	751	-	900				
8	901	-	1050				
9	1051	-	1200				
10	1201	-	1350				
11	1351	-	1500				
12	1501	-	1650				
13	1651	-	1800				
14	1801	-	1950				
15	1951	-	2100				



REMARKS:

Max penetration depth **825 mm**

Where values are presented as continued "cont", refer to the adjacent graphs where DN values vs depth and penetration vs depths can be read.

Signature 

TEST REPORT FOR DYNAMIC CONE PENETROMETER BY TEST METHOD TMH6-ST6

CLIENT: Morula Consulting Engineers

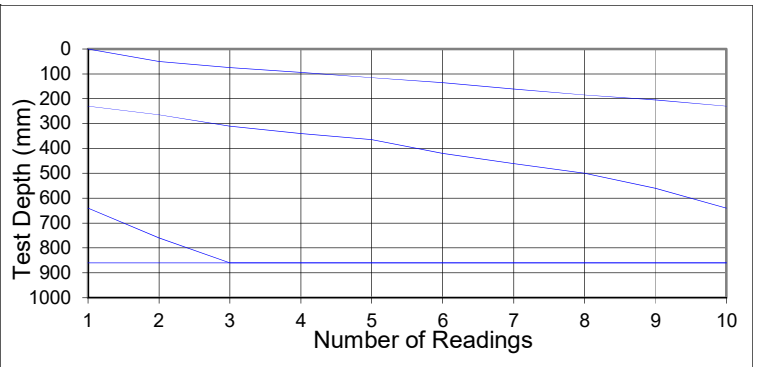
DATE REPORTED: 04-Feb-2022
 OUR REF: MAK0830203

PROJECT: Geotechnical Investigation: D192 ROAD
 ATTENTION: Hulisani Tsanawani
 Tel/Email: shoegra@morulaconsulting.co.za

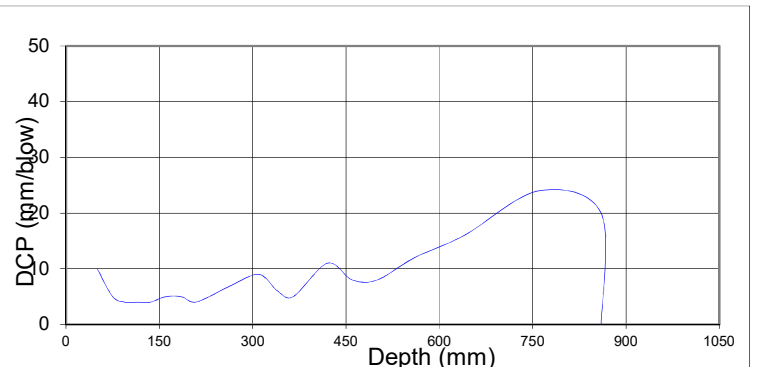
DESCRIPTION: DCP test was done from existing ground level
 DCP No: 1 at TP30 - D192 ROAD

DATE TESTED: 3-Feb-22

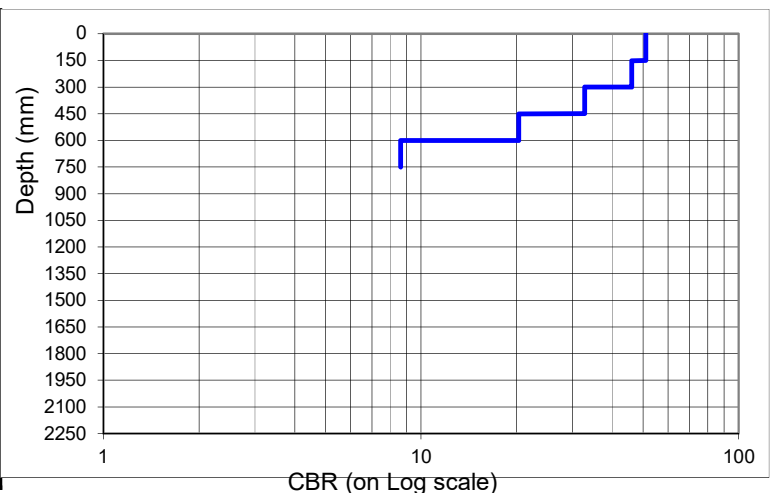
DCP Readings		Blows per reading: 5							
no.	mm	no.	mm	no.	mm	no.	mm	no.	mm
1	50	11	310	21		31		41	
2	75	12	340	22		32		42	
3	95	13	365	23		33		43	
4	115	14	420	24		34		44	
5	135	15	460	25		35		45	
6	160	16	500	26		36		46	
7	185	17	560	27		37		47	
8	205	18	640	28		38		48	
9	230	19	760	29		39		49	
10	265	20	860	30		40		50	



DCP number (mm / Blow) DN									
DN	mm	DN	mm	DN	mm	DN	mm	DN	mm
10	50	9	310						
5	75	6	340						
4	95	5	365						
4	115	11	420						
4	135	8	460						
5	160	8	500						
5	185	12	560						
4	205	16	640						
5	230	24	760						
7	265	20	860						



no.	Depth (mm)			In situ		Blows/mm	
	From	-	To	DN	CBR	150mm	300mm
1	1	-	150	5,4	51	28	26,9
2	151	-	300	5,8	46	26	
3	301	-	450	7,6	33	20	16,8
4	451	-	600	10,9	20	14	
5	601	-	750	21,2	9	7	
6	751	-	900				
8	901	-	1050				
9	1051	-	1200				
10	1201	-	1350				
11	1351	-	1500				
12	1501	-	1650				
13	1651	-	1800				
14	1801	-	1950				
15	1951	-	2100				



REMARKS:

Max penetration depth **860 mm**

Where values are presented as continued "cont", refer to the adjacent graphs where DN values vs depth and penetration vs depths can be read.

Signature 

TEST REPORT FOR DYNAMIC CONE PENETROMETER BY TEST METHOD TMH6-ST6

CLIENT: Morula Consulting Engineers

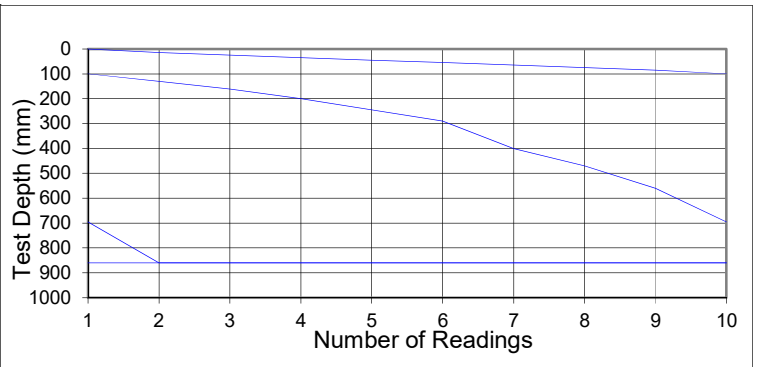
DATE REPORTED: 04-Feb-2022
 OUR REF: MAK0830203

PROJECT: Geotechnical Investigation: D192 ROAD
 ATTENTION: Hulisani Tsanawani
 Tel/Email: shoegra@morulaconsulting.co.za

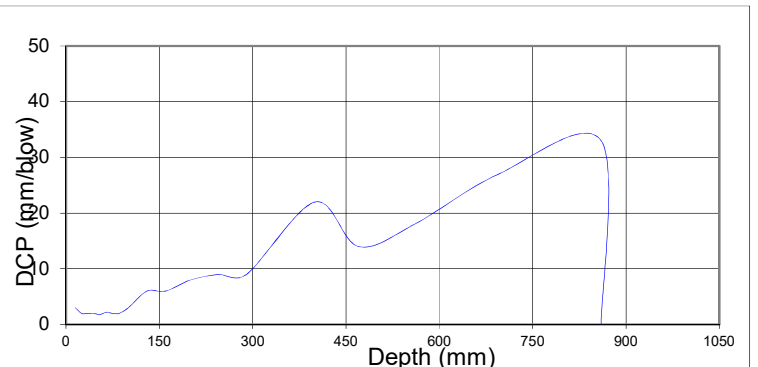
DESCRIPTION: DCP test was done from existing ground level
 DCP No: 1 at TP31 - D192 ROAD

DATE TESTED: 3-Feb-22

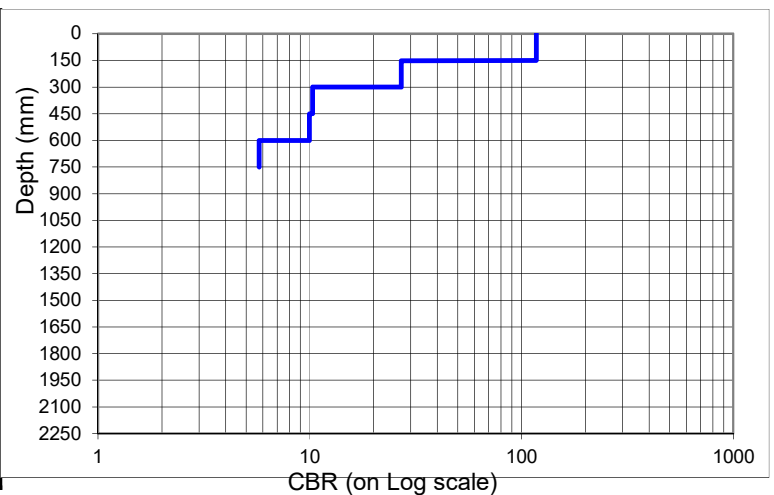
DCP Readings		Blows per reading: 5							
no.	mm	no.	mm	no.	mm	no.	mm	no.	mm
1	15	11	160	21		31		41	
2	25	12	200	22		32		42	
3	35	13	245	23		33		43	
4	45	14	290	24		34		44	
5	54	15	400	25		35		45	
6	65	16	470	26		36		46	
7	75	17	560	27		37		47	
8	85	18	695	28		38		48	
9	100	19	860	29		39		49	
10	130	20		30		40		50	



DCP number (mm / Blow) DN									
DN	mm	DN	mm	DN	mm	DN	mm	DN	mm
3	15	6	160						
2	25	8	200						
2	35	9	245						
2	45	9	290						
1,8	54	22	400						
2,2	65	14	470						
2	75	18	560						
2	85	27	695						
3	100	33	860						
6	130								



no.	Depth (mm)			In situ		Blows/mm		
	From	-	To	DN	CBR	150mm	300mm	
1	1	-	150	2,8	117	53		35,2
2	151	-	300	8,8	27	17		
3	301	-	450	18,5	10	8		8,0
4	451	-	600	19,0	10	8		
5	601	-	750	28,9	6	5		
6	751	-	900					
8	901	-	1050					
9	1051	-	1200					
10	1201	-	1350					
11	1351	-	1500					
12	1501	-	1650					
13	1651	-	1800					
14	1801	-	1950					
15	1951	-	2100					



REMARKS:

Max penetration depth **860 mm**

Where values are presented as continued "cont", refer to the adjacent graphs where DN values vs depth and penetration vs depths can be read.

Signature 

TEST REPORT FOR DYNAMIC CONE PENETROMETER BY TEST METHOD TMH6-ST6

CLIENT: Morula Consulting Engineers

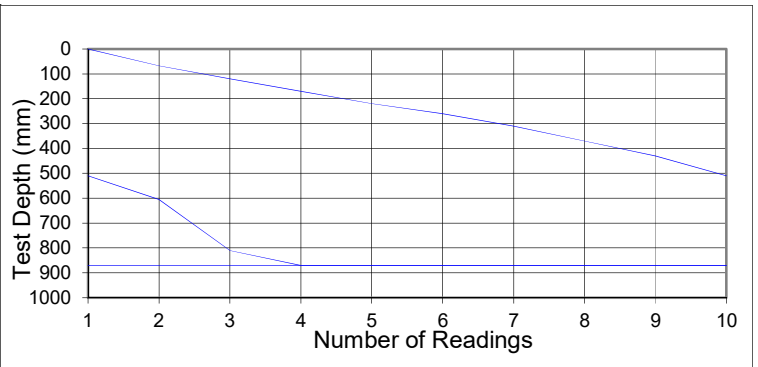
DATE REPORTED: 04-Feb-2022
 OUR REF: MAK0830203

PROJECT: Geotechnical Investigation: D192 ROAD
 ATTENTION: Hulisani Tsanawani
 Tel/Email: shoegra@morulaconsulting.co.za

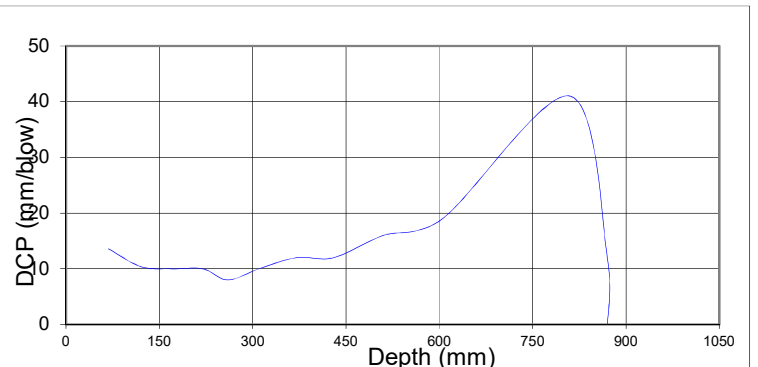
DESCRIPTION: DCP test was done from existing ground level
 DCP No: 1 at TP30 - D192 ROAD

DATE TESTED: 3-Feb-22

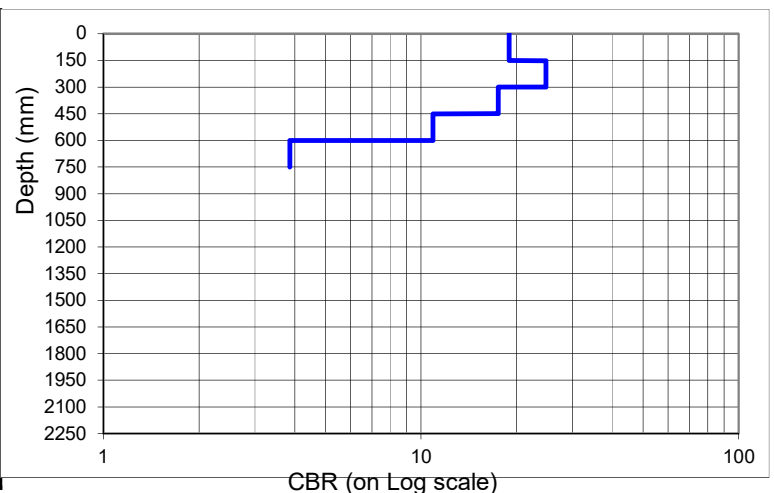
DCP Readings		Blows per reading: 5							
no.	mm	no.	mm	no.	mm	no.	mm	no.	mm
1	68	11	810	21		31		41	
2	120	12	870	22		32		42	
3	170	13		23		33		43	
4	220	14		24		34		44	
5	260	15		25		35		45	
6	310	16		26		36		46	
7	370	17		27		37		47	
8	430	18		28		38		48	
9	510	19		29		39		49	
10	605	20		30		40		50	



DCP number (mm / Blow) DN									
DN	mm	DN	mm	DN	mm	DN	mm	DN	mm
13,6	68	41	810						
10,4	120	12	870						
10	170								
10	220								
8	260								
10	310								
12	370								
12	430								
16	510								
19	605								



no.	Depth (mm)			In situ		Blows/mm	
	From	-	To	DN	CBR	150mm	300mm
1	1	-	150	11,5	19	13	14,5
2	151	-	300	9,4	25	16	
3	301	-	450	12,2	18	12	10,4
4	451	-	600	17,7	11	8	
5	601	-	750	39,5	4	4	
6	751	-	900				
8	901	-	1050				
9	1051	-	1200				
10	1201	-	1350				
11	1351	-	1500				
12	1501	-	1650				
13	1651	-	1800				
14	1801	-	1950				
15	1951	-	2100				



REMARKS:

Max penetration depth **870 mm**

Where values are presented as continued "cont", refer to the adjacent graphs where DN values vs depth and penetration vs depths can be read.

Signature 

TEST REPORT FOR DYNAMIC CONE PENETROMETER BY TEST METHOD TMH6-ST6

CLIENT: Morula Consulting Engineers

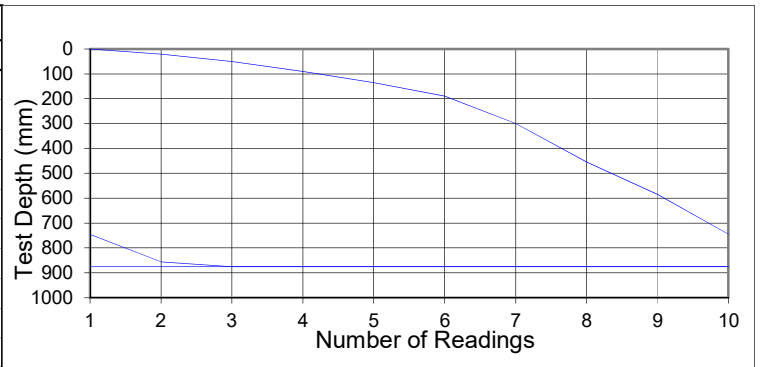
DATE REPORTED: 04-Feb-2022
 OUR REF: MAK0830203

PROJECT: Geotechnical Investigation: D192 ROAD
 ATTENTION: Hulisani Tsanawani
 Tel/Email: shoegra@morulaconsulting.co.za

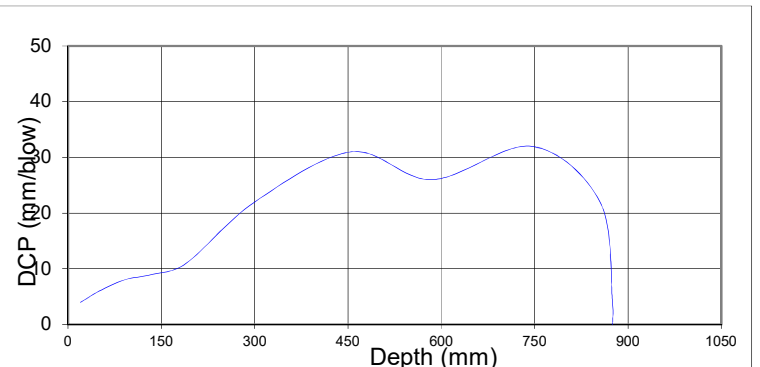
DESCRIPTION: DCP test was done from existing ground level
 DCP No: 1 at TP33 - D192 ROAD

DATE TESTED: 3-Feb-22

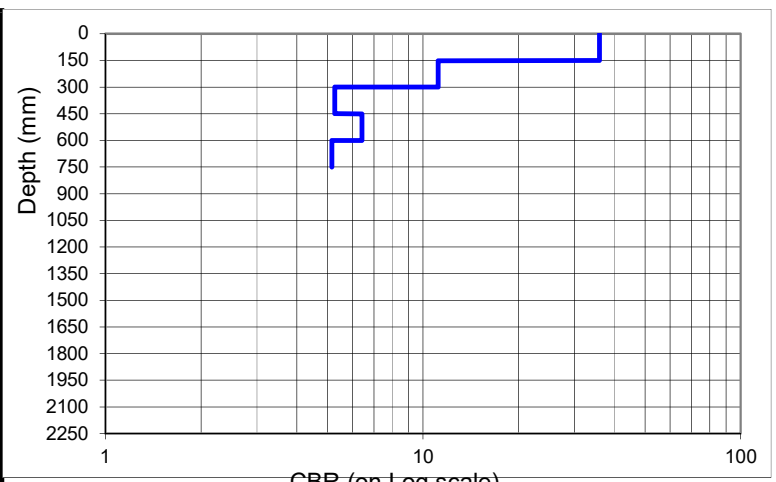
DCP Readings		Blows per reading: 5							
no.	mm	no.	mm	no.	mm	no.	mm	no.	mm
1	20	11	875	21		31		41	
2	50	12		22		32		42	
3	90	13		23		33		43	
4	135	14		24		34		44	
5	190	15		25		35		45	
6	300	16		26		36		46	
7	455	17		27		37		47	
8	585	18		28		38		48	
9	745	19		29		39		49	
10	855	20		30		40		50	



DCP number (mm / Blow) DN									
DN	mm	DN	mm	DN	mm	DN	mm	DN	mm
4	20	4	875						
6	50								
8	90								
9	135								
11	190								
22	300								
31	455								
26	585								
32	745								
22	855								



no.	Depth (mm)			In situ		Blows/mm	
	From	-	To	DN	CBR	150mm	300mm
1	1	-	150	7,0	36	21	15,0
2	151	-	300	17,4	11	9	
3	301	-	450	31,0	5	5	5,2
4	451	-	600	26,6	6	6	
5	601	-	750	31,5	5	5	
6	751	-	900				
8	901	-	1050				
9	1051	-	1200				
10	1201	-	1350				
11	1351	-	1500				
12	1501	-	1650				
13	1651	-	1800				
14	1801	-	1950				
15	1951	-	2100				



REMARKS:

Max penetration depth **875 mm**
 Where values are presented as continued "cont", refer to the adjacent graphs where DN values vs depth and penetration vs depths can be read.

Signature 

TEST REPORT FOR DYNAMIC CONE PENETROMETER BY TEST METHOD TMH6-ST6

CLIENT: Morula Consulting Engineers

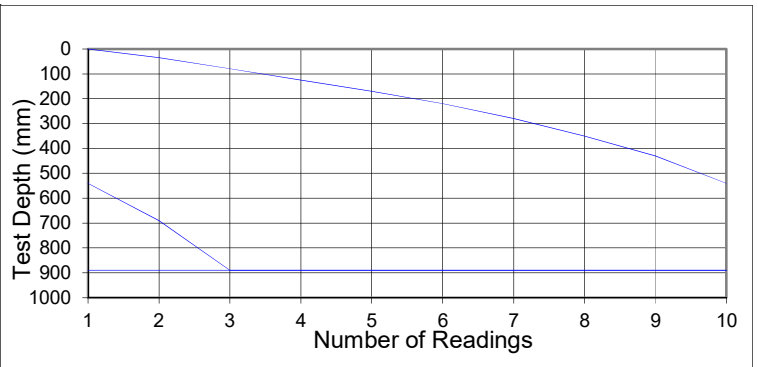
DATE REPORTED: 04-Feb-2022
 OUR REF: MAK0830203

PROJECT: Geotechnical Investigation: D192 ROAD
 ATTENTION: Hulisani Tsanawani
 Tel/Email: shoegra@morulaconsulting.co.za

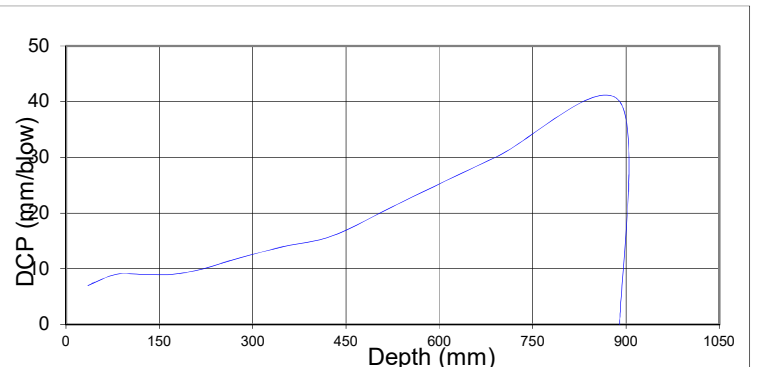
DESCRIPTION: DCP test was done from existing ground level
 DCP No: 1 at TP34 - D192 ROAD

DATE TESTED: 3-Feb-22

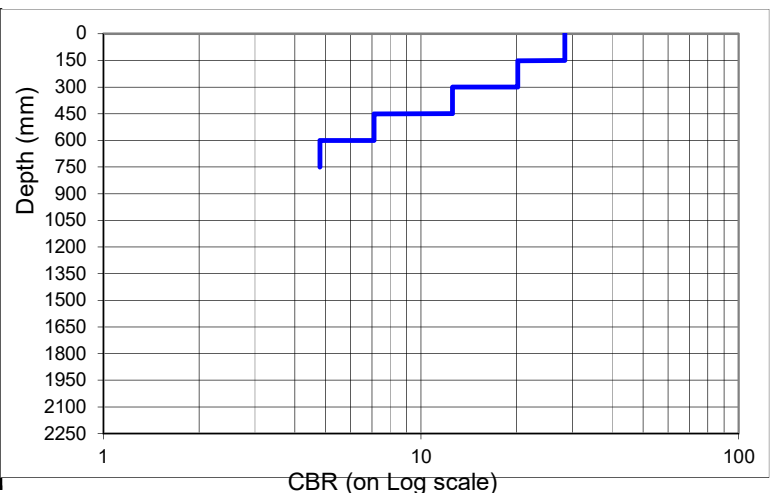
DCP Readings		Blows per reading: 5							
no.	mm	no.	mm	no.	mm	no.	mm	no.	mm
1	35	11	890	21		31		41	
2	80	12		22		32		42	
3	125	13		23		33		43	
4	170	14		24		34		44	
5	220	15		25		35		45	
6	280	16		26		36		46	
7	350	17		27		37		47	
8	430	18		28		38		48	
9	540	19		29		39		49	
10	690	20		30		40		50	



DCP number (mm / Blow) DN									
DN	mm	DN	mm	DN	mm	DN	mm	DN	mm
7	35	40	890						
9	80								
9	125								
9	170								
10	220								
12	280								
14	350								
16	430								
22	540								
30	690								



no.	Depth (mm)			In situ		Blows/mm	
	From	-	To	DN	CBR	150mm	300mm
1	1	-	150	8,4	28	18	15,7
2	151	-	300	11,0	20	14	
3	301	-	450	15,8	13	9	7,8
4	451	-	600	24,6	7	6	
5	601	-	750	33,3	5	5	
6	751	-	900				
8	901	-	1050				
9	1051	-	1200				
10	1201	-	1350				
11	1351	-	1500				
12	1501	-	1650				
13	1651	-	1800				
14	1801	-	1950				
15	1951	-	2100				



REMARKS:

Max penetration depth **890 mm**

Where values are presented as continued "cont", refer to the adjacent graphs where DN values vs depth and penetration vs depths can be read.

Signature 

TEST REPORT FOR DYNAMIC CONE PENETROMETER BY TEST METHOD TMH6-ST6

CLIENT: Morula Consulting Engineers

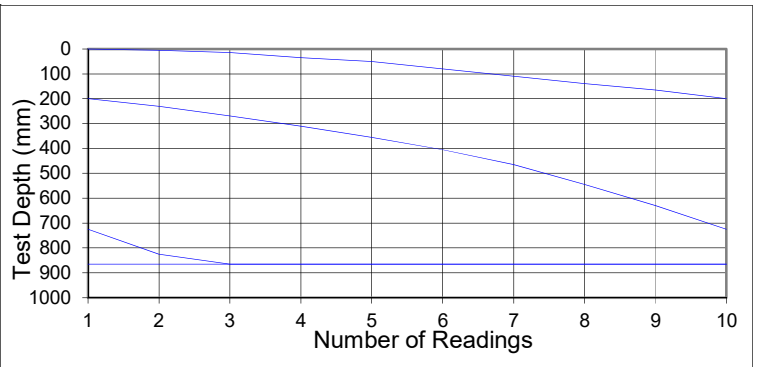
DATE REPORTED: 04-Feb-2022
 OUR REF: MAK0830203

PROJECT: Geotechnical Investigation: D192 ROAD
 ATTENTION: Hulisani Tsanawani
 Tel/Email: shoegra@morulaconsulting.co.za

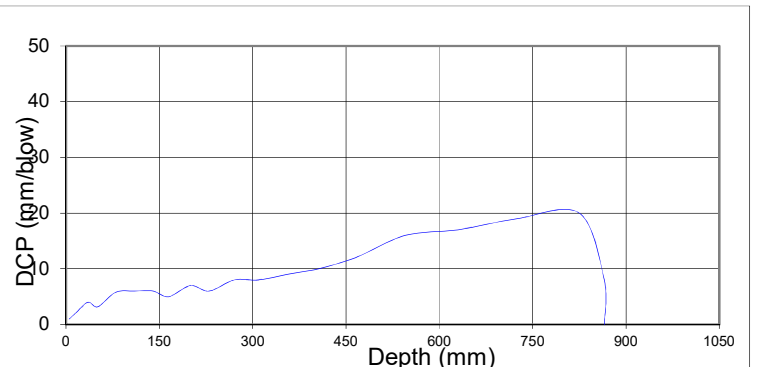
DESCRIPTION: DCP test was done from existing ground level
 DCP No: 1 at TP35 - D192 ROAD

DATE TESTED: 3-Feb-22

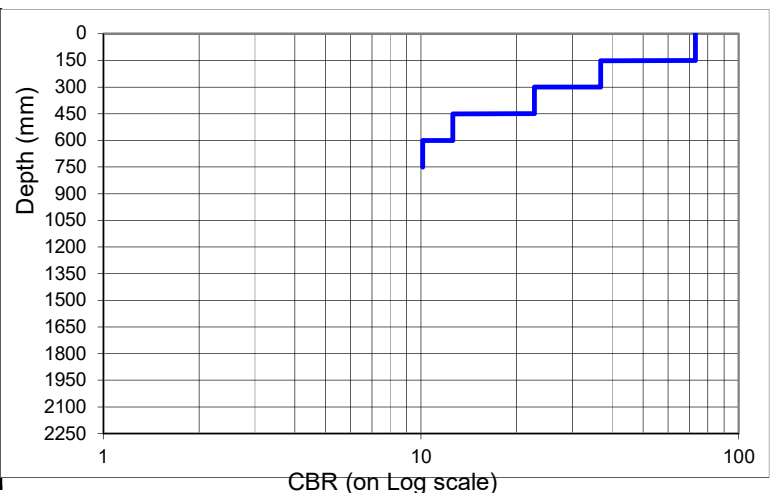
DCP Readings		Blows per reading: 5							
no.	mm	no.	mm	no.	mm	no.	mm	no.	mm
1	5	11	270	21		31		41	
2	15	12	310	22		32		42	
3	35	13	355	23		33		43	
4	51	14	405	24		34		44	
5	80	15	465	25		35		45	
6	110	16	545	26		36		46	
7	140	17	630	27		37		47	
8	165	18	725	28		38		48	
9	200	19	825	29		39		49	
10	230	20	865	30		40		50	



DCP number (mm / Blow) DN									
DN	mm	DN	mm	DN	mm	DN	mm	DN	mm
1	5	8	270						
2	15	8	310						
4	35	9	355						
3,2	51	10	405						
5,8	80	12	465						
6	110	16	545						
6	140	17	630						
5	165	19	725						
7	200	20	825						
6	230	8	865						



no.	Depth (mm)			In situ		Blows/mm	
	From	-	To	DN	CBR	150mm	300mm
1	1	-	150	4,1	73	37	29,4
2	151	-	300	6,9	37	22	
3	301	-	450	10,0	23	15	12,2
4	451	-	600	15,8	13	9	
5	601	-	750	18,7	10	8	
6	751	-	900				
8	901	-	1050				
9	1051	-	1200				
10	1201	-	1350				
11	1351	-	1500				
12	1501	-	1650				
13	1651	-	1800				
14	1801	-	1950				
15	1951	-	2100				



REMARKS:

Max penetration depth **865 mm**

Where values are presented as continued "cont", refer to the adjacent graphs where DN values vs depth and penetration vs depths can be read.

Signature 

TEST REPORT FOR DYNAMIC CONE PENETROMETER BY TEST METHOD TMH6-ST6

CLIENT: Morula Consulting Engineers

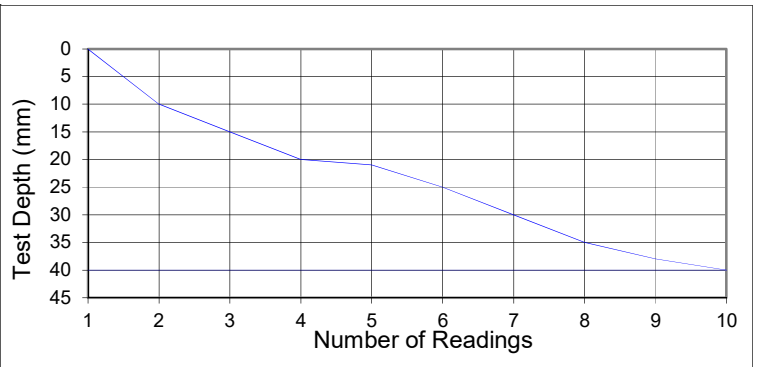
DATE REPORTED: 04-Feb-2022
 OUR REF: MAK0830203

PROJECT: Geotechnical Investigation: D192 ROAD
 ATTENTION: Hulisani Tsanawani
 Tel/Email: shoegra@morulaconsulting.co.za

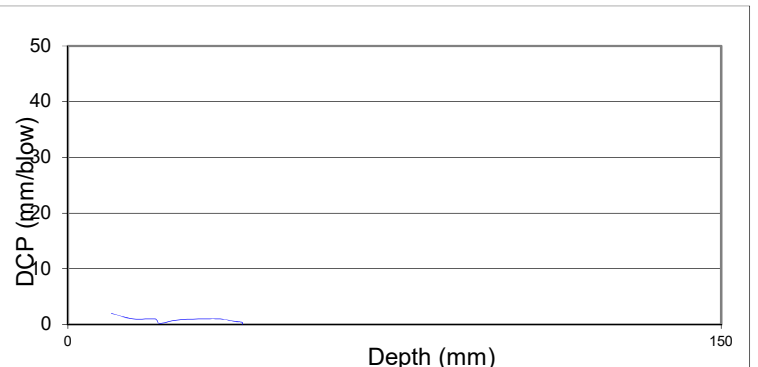
DESCRIPTION: DCP test was done from existing ground level
 DCP No: 1 at TP36 - D192 ROAD

DATE TESTED: 3-Feb-22

DCP Readings		Blows per reading: 5							
no.	mm	no.	mm	no.	mm	no.	mm	no.	mm
1	10	11		21		31		41	
2	15	12		22		32		42	
3	20	13		23		33		43	
4	21	14		24		34		44	
5	25	15		25		35		45	
6	30	16		26		36		46	
7	35	17		27		37		47	
8	38	18		28		38		48	
9	40	19		29		39		49	
10		20		30		40		50	



DCP number (mm / Blow) DN									
DN	mm	DN	mm	DN	mm	DN	mm	DN	mm
2	10								
1	15								
1	20								
0,2	21								
0,8	25								
1	30								
1	35								
0,6	38								
0,4	40								



no.	Depth (mm)			In situ		Blows/mm	
	From	-	To	DN	CBR	150mm	300mm
1	1	-	150	####			
2	151	-	300				
3	301	-	450				
4	451	-	600				
5	601	-	750				
6	751	-	900				
8	901	-	1050				
9	1051	-	1200				
10	1201	-	1350				
11	1351	-	1500				
12	1501	-	1650				
13	1651	-	1800				
14	1801	-	1950				
15	1951	-	2100				



REMARKS:

Max penetration depth **40 mm**

Where values are presented as continued "cont", refer to the adjacent graphs where DN values vs depth and penetration vs depths can be read.

Signature 

TEST REPORT FOR DYNAMIC CONE PENETROMETER BY TEST METHOD TMH6-ST6

CLIENT: Morula Consulting Engineers

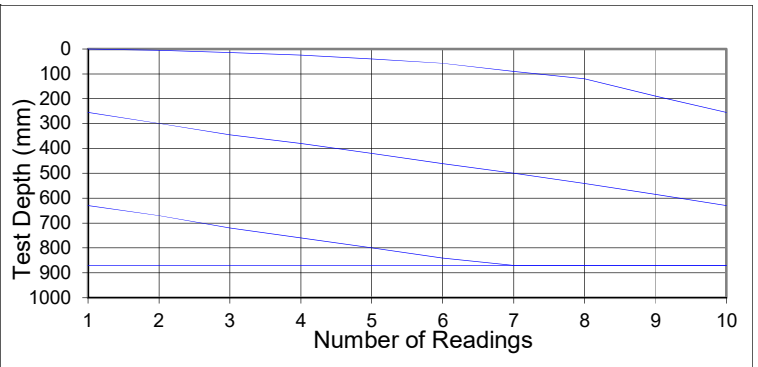
DATE REPORTED: 04-Feb-2022
 OUR REF: MAK0830203

PROJECT: Geotechnical Investigation: D192 ROAD
 ATTENTION: Hulisani Tsanawani
 Tel/Email: shoegra@morulaconsulting.co.za

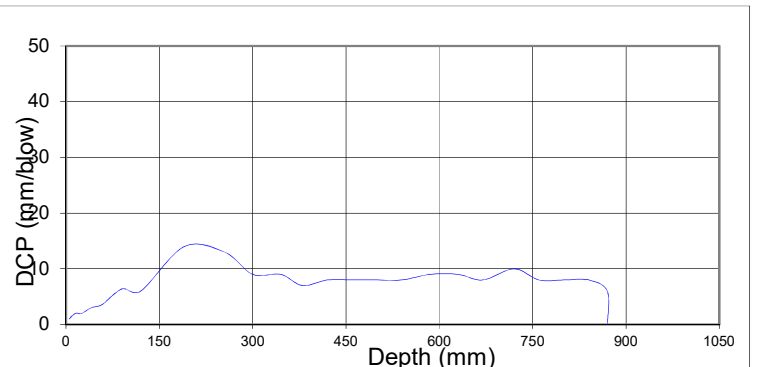
DESCRIPTION: DCP test was done from existing ground level
 DCP No: 1 at TP37 - D192 ROAD

DATE TESTED: 3-Feb-22

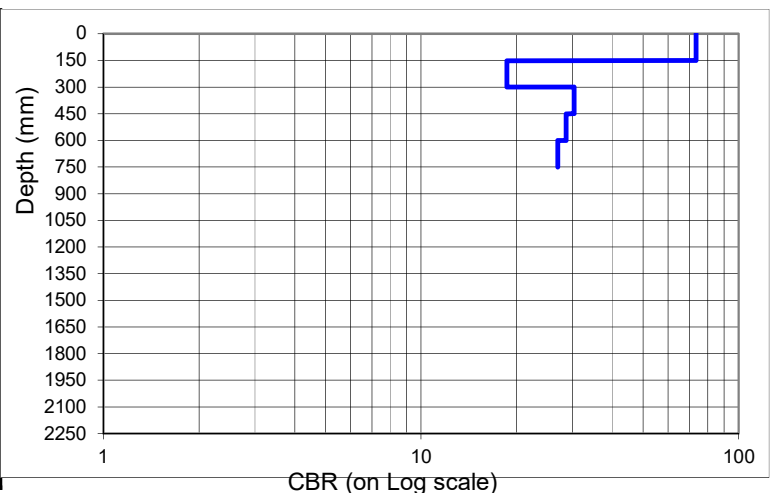
DCP Readings		Blows per reading: 5							
no.	mm	no.	mm	no.	mm	no.	mm	no.	mm
1	5	11	345	21	760	31		41	
2	15	12	380	22	800	32		42	
3	25	13	420	23	840	33		43	
4	40	14	460	24	870	34		44	
5	58	15	500	25		35		45	
6	90	16	540	26		36		46	
7	120	17	585	27		37		47	
8	190	18	630	28		38		48	
9	255	19	670	29		39		49	
10	300	20	720	30		40		50	



DCP number (mm / Blow) DN									
DN	mm	DN	mm	DN	mm	DN	mm	DN	mm
1	5	9	345	8	760				
2	15	7	380	8	800				
2	25	8	420	8	840				
3	40	8	460	6	870				
3,6	58	8	500						
6,4	90	8	540						
6	120	9	585						
14	190	9	630						
13	255	8	670						
9	300	10	720						



no.	Depth (mm)			In situ		Blows/mm	
	From	-	To	DN	CBR	150mm	300mm
1	1	-	150	4,0	73	37	25,0
2	151	-	300	11,7	19	13	
3	301	-	450	8,0	30	19	18,3
4	451	-	600	8,4	29	18	
5	601	-	750	8,8	27	17	
6	751	-	900				
8	901	-	1050				
9	1051	-	1200				
10	1201	-	1350				
11	1351	-	1500				
12	1501	-	1650				
13	1651	-	1800				
14	1801	-	1950				
15	1951	-	2100				



REMARKS:

Max penetration depth **870 mm**

Where values are presented as continued "cont", refer to the adjacent graphs where DN values vs depth and penetration vs depths can be read.

Signature 

TEST REPORT FOR DYNAMIC CONE PENETROMETER BY TEST METHOD TMH6-ST6

CLIENT: Morula Consulting Engineers

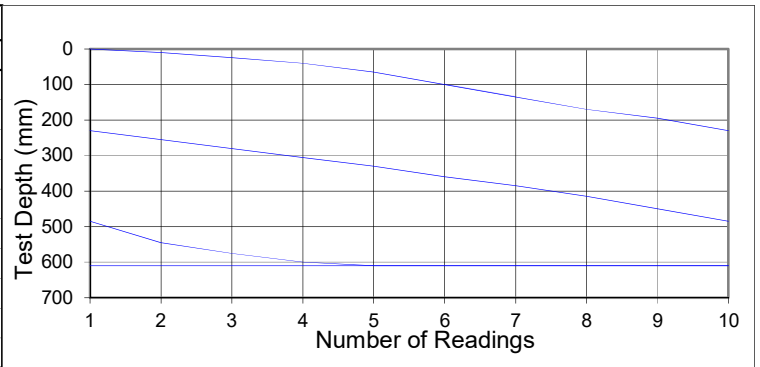
DATE REPORTED: 04-Feb-2022
 OUR REF: MAK0830203

PROJECT: Geotechnical Investigation: D192 ROAD
 ATTENTION: Hulisani Tsanawani
 Tel/Email: shoegra@morulaconsulting.co.za

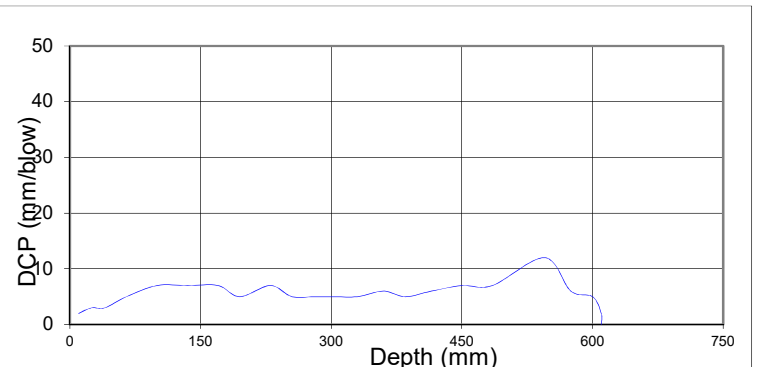
DESCRIPTION: DCP test was done from existing ground level
 DCP No: 1 at TP38 - D192 ROAD

DATE TESTED: 3-Feb-22

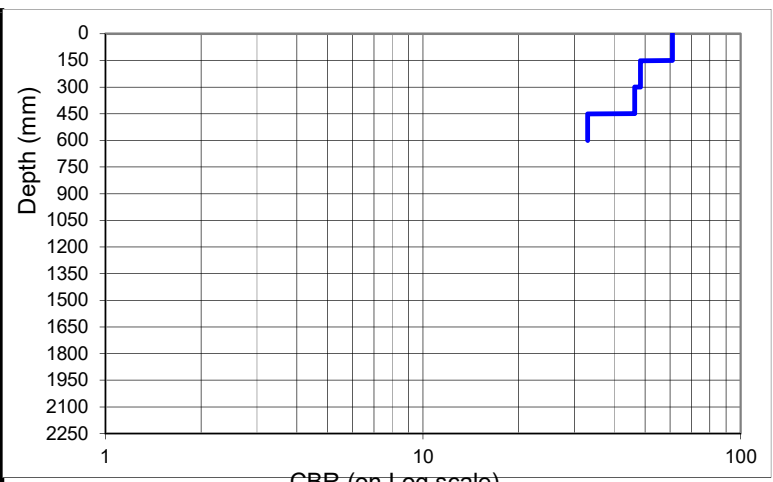
DCP Readings		Blows per reading: 5							
no.	mm	no.	mm	no.	mm	no.	mm	no.	mm
1	10	11	280	21	600	31		41	
2	25	12	305	22	610	32		42	
3	40	13	330	23		33		43	
4	65	14	360	24		34		44	
5	100	15	385	25		35		45	
6	135	16	415	26		36		46	
7	170	17	450	27		37		47	
8	195	18	485	28		38		48	
9	230	19	545	29		39		49	
10	255	20	575	30		40		50	



DCP number (mm / Blow) DN									
DN	mm	DN	mm	DN	mm	DN	mm	DN	mm
2	10	5	280	5	600				
3	25	5	305	2	610				
3	40	5	330						
5	65	6	360						
7	100	5	385						
7	135	6	415						
7	170	7	450						
5	195	7	485						
7	230	12	545						
5	255	6	575						



no.	Depth (mm)			In situ		Blows/mm	
	From	-	To	DN	CBR	150mm	300mm
1	1	-	150	4,7	61	32	29,5
2	151	-	300	5,6	48	27	
3	301	-	450	5,8	46	26	23,0
4	451	-	600	7,5	33	20	
5	601	-	750				
6	751	-	900				
8	901	-	1050				
9	1051	-	1200				
10	1201	-	1350				
11	1351	-	1500				
12	1501	-	1650				
13	1651	-	1800				
14	1801	-	1950				
15	1951	-	2100				



REMARKS:

Max penetration depth **610 mm**

Where values are presented as continued "cont", refer to the adjacent graphs where DN values vs depth and penetration vs depths can be read.

Signature 

TEST REPORT FOR DYNAMIC CONE PENETROMETER BY TEST METHOD TMH6-ST6

CLIENT: Morula Consulting Engineers

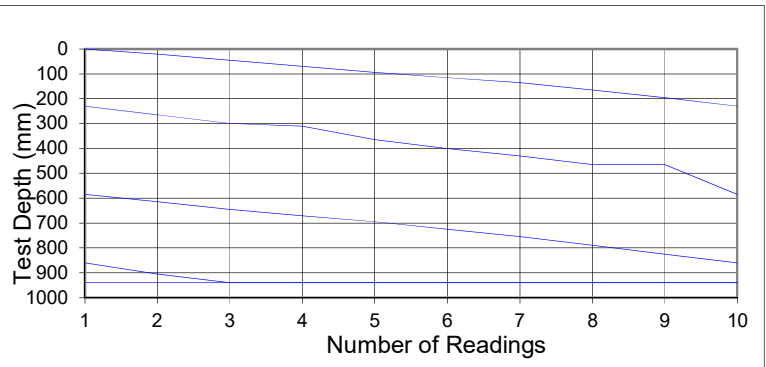
DATE REPORTED: 04-Feb-2022
 OUR REF: MAK0830203

PROJECT: Geotechnical Investigation: D192 ROAD
 ATTENTION: Hulisani Tsanawani
 Tel/Email: shoegra@morulaconsulting.co.za

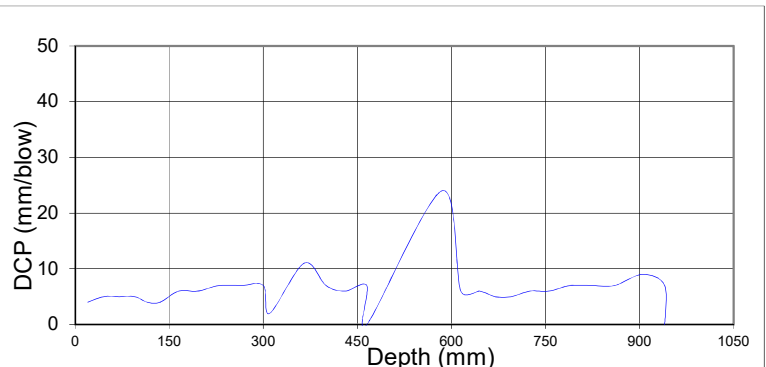
DESCRIPTION: DCP test was done from existing ground level
 DCP No: 1 at TP39 - D192 ROAD

DATE TESTED: 3-Feb-22

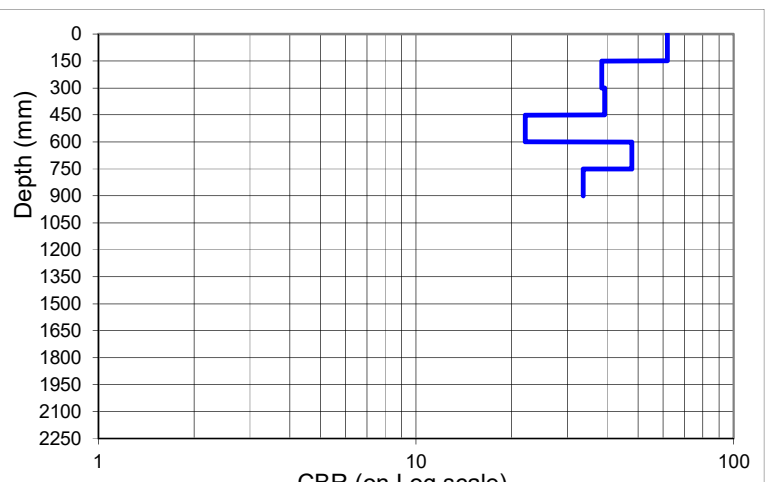
DCP Readings		Blows per reading: 5							
no.	mm	no.	mm	no.	mm	no.	mm	no.	mm
1	20	11	300	21		31		41	
2	45	12	310	22		32		42	
3	70	13	365	23		33		43	
4	95	14	400	24		34		44	
5	115	15	430	25		35		45	
6	135	16	465	26		36		46	
7	165	17		27		37		47	
8	195	18		28		38		48	
9	230	19		29		39		49	
10	265	20		30		40		50	



DCP number (mm / Blow) DN									
DN	mm	DN	mm	DN	mm	DN	mm	DN	mm
4	20	7	300	5					
5	45	2	310	5					
5	70	11	365	6					
5	95	7	400	6					
4	115	6	430	7					
4	135	7	465	7					
6	165			7					
6	195	24		9					
7	230	6		7					
7	265	6							



no.	Depth (mm)			In situ		Blows/mm	
	From	-	To	DN	CBR	150mm	300mm
1	1	-	150	4,6	62	33	27,5
2	151	-	300	6,7	38	23	
3	301	-	450	6,6	39	23	18,8
4	451	-	600	10,2	22	15	
5	601	-	750	5,6	48	27	23,5
6	751	-	900	7,4	34	20	
8	901	-	1050				
9	1051	-	1200				
10	1201	-	1350				
11	1351	-	1500				
12	1501	-	1650				
13	1651	-	1800				
14	1801	-	1950				
15	1951	-	2100				



REMARKS:

Max penetration depth 940 mm
 Where values are presented as continued "cont", refer to the adjacent graphs where DN values vs depth and penetration vs depths can be read.

Signature 

TEST REPORT FOR DYNAMIC CONE PENETROMETER BY TEST METHOD TMH6-ST6

CLIENT: Morula Consulting Engineers

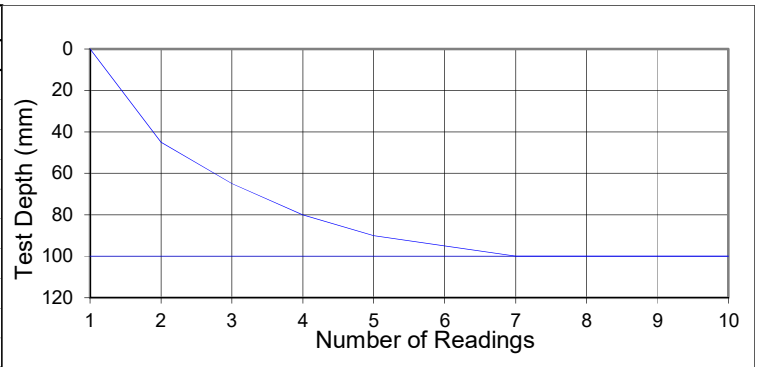
DATE REPORTED: 04-Feb-2022
 OUR REF: MAK0830203

PROJECT: Geotechnical Investigation: D192 ROAD
 ATTENTION: Hulisani Tsanawani
 Tel/Email: shoegra@morulaconsulting.co.za

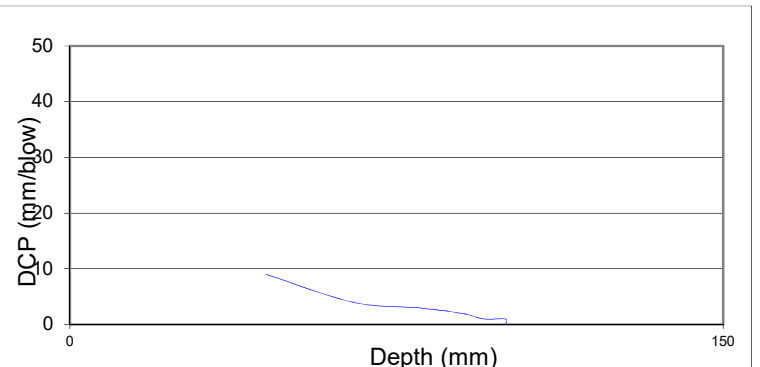
DESCRIPTION: DCP test was done from existing ground level
 DCP No: 1 at TP40 - D192 ROAD

DATE TESTED: 3-Feb-22

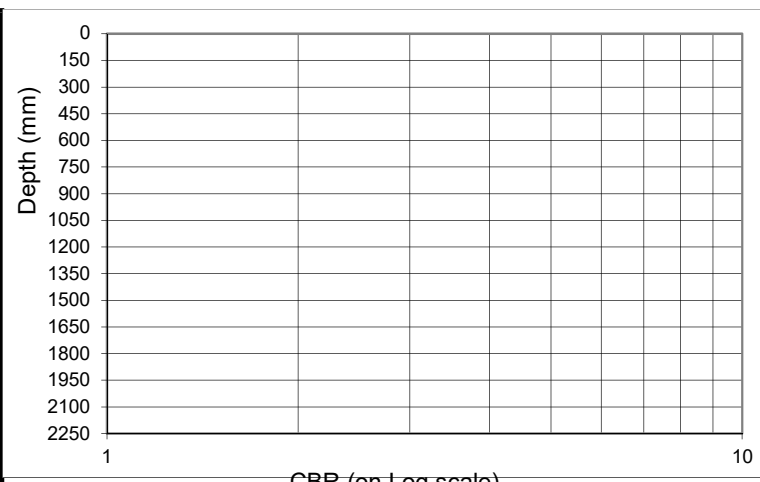
DCP Readings		Blows per reading: 5							
no.	mm	no.	mm	no.	mm	no.	mm	no.	mm
1	45	11		21		31		41	
2	65	12		22		32		42	
3	80	13		23		33		43	
4	90	14		24		34		44	
5	95	15		25		35		45	
6	100	16		26		36		46	
7		17		27		37		47	
8		18		28		38		48	
9		19		29		39		49	
10		20		30		40		50	



DCP number (mm / Blow) DN									
DN	mm	DN	mm	DN	mm	DN	mm	DN	mm
9	45								
4	65								
3	80								
2	90								
1	95								
1	100								



no.	Depth (mm)			In situ		Blows/mm	
	From	-	To	DN	CBR	150mm	300mm
1	1	-	150	####			
2	151	-	300				
3	301	-	450				
4	451	-	600				
5	601	-	750				
6	751	-	900				
8	901	-	1050				
9	1051	-	1200				
10	1201	-	1350				
11	1351	-	1500				
12	1501	-	1650				
13	1651	-	1800				
14	1801	-	1950				
15	1951	-	2100				



REMARKS:

Max penetration depth **100 mm**

Where values are presented as continued "cont", refer to the adjacent graphs where DN values vs depth and penetration vs depths can be read.

Signature 

TEST REPORT FOR DYNAMIC CONE PENETROMETER BY TEST METHOD TMH6-ST6

CLIENT: Morula Consulting Engineers

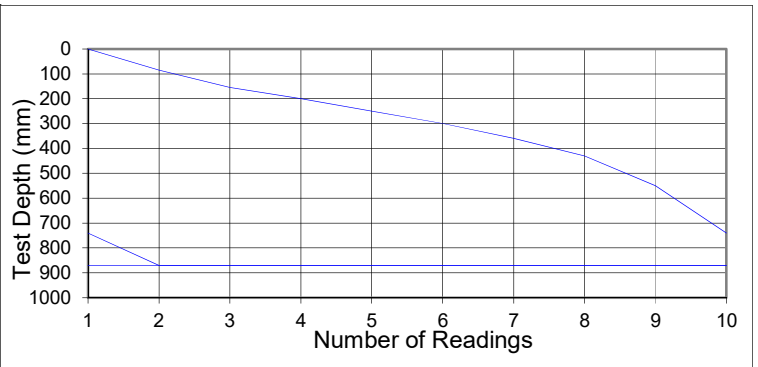
DATE REPORTED: 04-Feb-2022
 OUR REF: MAK0830203

PROJECT: Geotechnical Investigation: D192 ROAD
 ATTENTION: Hulisani Tsanawani
 Tel/Email: shoegra@morulaconsulting.co.za

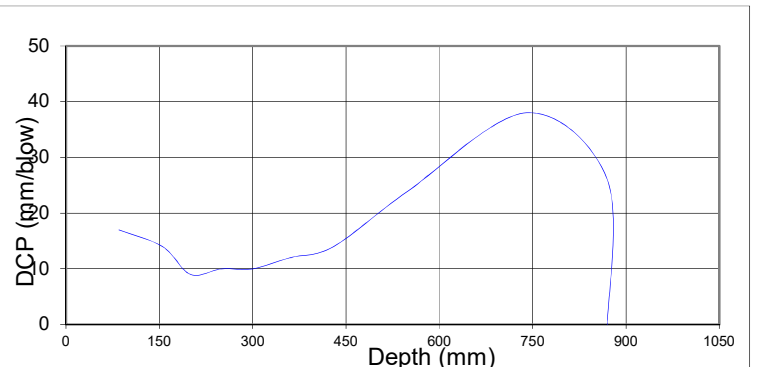
DESCRIPTION: DCP test was done from existing ground level
 DCP No: 1 at TP41 - D192 ROAD

DATE TESTED: 3-Feb-22

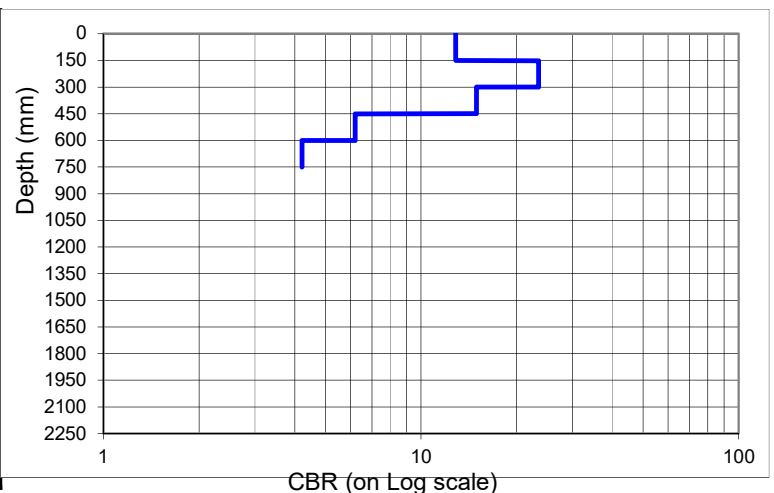
DCP Readings		Blows per reading: 5							
no.	mm	no.	mm	no.	mm	no.	mm	no.	mm
1	85	11		21		31		41	
2	155	12		22		32		42	
3	200	13		23		33		43	
4	250	14		24		34		44	
5	300	15		25		35		45	
6	360	16		26		36		46	
7	430	17		27		37		47	
8	550	18		28		38		48	
9	740	19		29		39		49	
10	870	20		30		40		50	



DCP number (mm / Blow) DN									
DN	mm	DN	mm	DN	mm	DN	mm	DN	mm
17	85								
14	155								
9	200								
10	250								
10	300								
12	360								
14	430								
24	550								
38	740								
26	870								



no.	Depth (mm)			In situ		Blows/mm	
	From	-	To	DN	CBR	150mm	300mm
1	1	-	150	15,6	13	10	12,5
2	151	-	300	9,8	23	15	
3	301	-	450	13,8	15	11	8,2
4	451	-	600	27,4	6	5	
5	601	-	750	36,9	4	4	
6	751	-	900				
8	901	-	1050				
9	1051	-	1200				
10	1201	-	1350				
11	1351	-	1500				
12	1501	-	1650				
13	1651	-	1800				
14	1801	-	1950				
15	1951	-	2100				



REMARKS:

Max penetration depth **870 mm**

Where values are presented as continued "cont", refer to the adjacent graphs where DN values vs depth and penetration vs depths can be read.

Signature 

TEST REPORT FOR DYNAMIC CONE PENETROMETER BY TEST METHOD TMH6-ST6

CLIENT: Morula Consulting Engineers

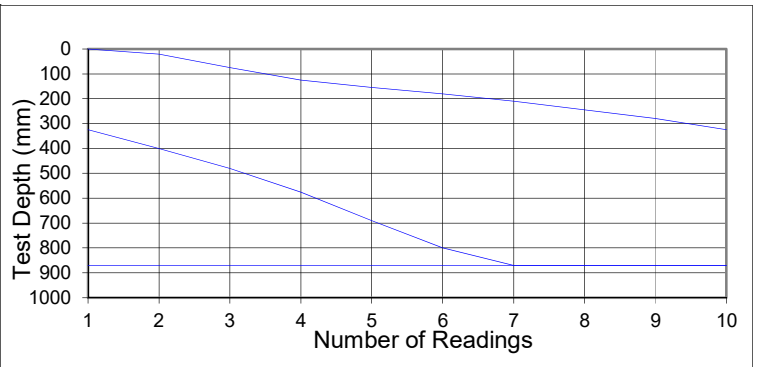
DATE REPORTED: 04-Feb-2022
 OUR REF: MAK0830203

PROJECT: Geotechnical Investigation: D192 ROAD
 ATTENTION: Hulisani Tsanawani
 Tel/Email: shoegra@morulaconsulting.co.za

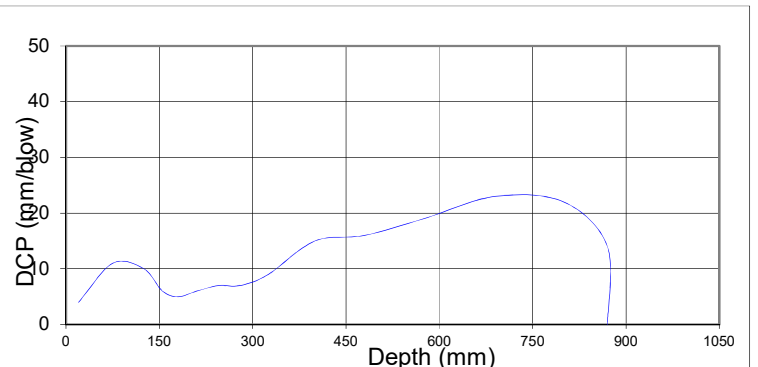
DESCRIPTION: DCP test was done from existing ground level
 DCP No: 1 at TP42 - D192 ROAD

DATE TESTED: 3-Feb-22

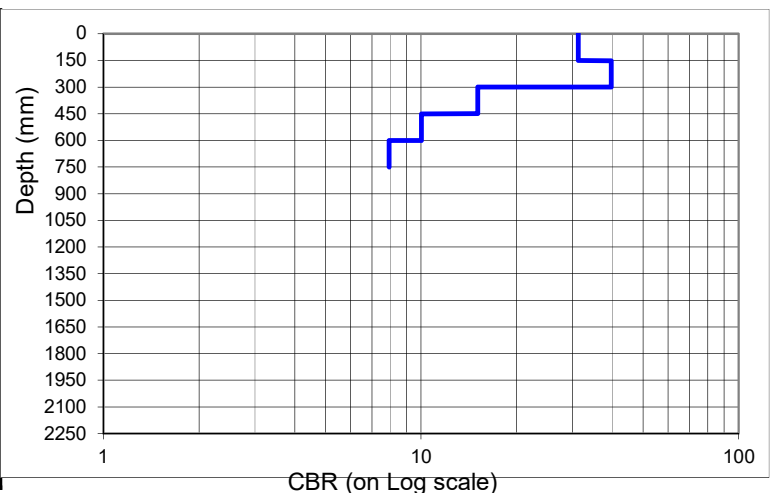
DCP Readings		Blows per reading: 5							
no.	mm	no.	mm	no.	mm	no.	mm	no.	mm
1	20	11	480	21		31		41	
2	75	12	575	22		32		42	
3	125	13	690	23		33		43	
4	155	14	800	24		34		44	
5	180	15	870	25		35		45	
6	210	16		26		36		46	
7	245	17		27		37		47	
8	280	18		28		38		48	
9	325	19		29		39		49	
10	400	20		30		40		50	



DCP number (mm / Blow) DN									
DN	mm	DN	mm	DN	mm	DN	mm	DN	mm
4	20	16	480						
11	75	19	575						
10	125	23	690						
6	155	22	800						
5	180	14	870						
6	210								
7	245								
7	280								
9	325								
15	400								



no.	Depth (mm)			In situ		Blows/mm		
	From	-	To	DN	CBR	150mm	300mm	
1	1	-	150	7,8	31	19		21,1
2	151	-	300	6,5	40	23		
3	301	-	450	13,8	15	11		9,4
4	451	-	600	18,8	10	8		
5	601	-	750	22,6	8	7		
6	751	-	900					
8	901	-	1050					
9	1051	-	1200					
10	1201	-	1350					
11	1351	-	1500					
12	1501	-	1650					
13	1651	-	1800					
14	1801	-	1950					
15	1951	-	2100					



REMARKS:

Max penetration depth **870 mm**

Where values are presented as continued "cont", refer to the adjacent graphs where DN values vs depth and penetration vs depths can be read.

Signature 

TEST REPORT FOR DYNAMIC CONE PENETROMETER BY TEST METHOD TMH6-ST6

CLIENT: Morula Consulting Engineers

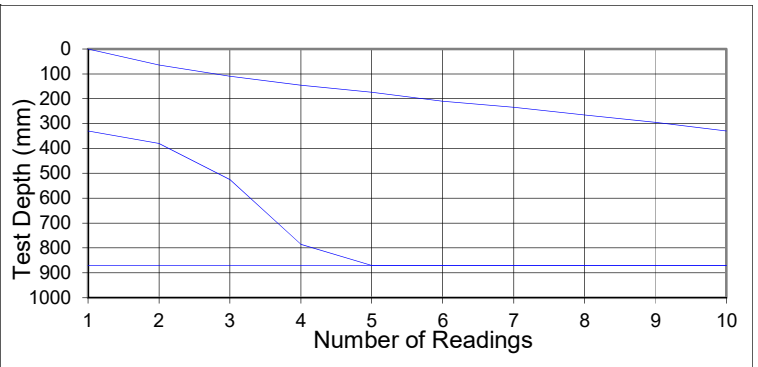
DATE REPORTED: 04-Feb-2022
 OUR REF: MAK0830203

PROJECT: Geotechnical Investigation: D192 ROAD
 ATTENTION: Hulisani Tsanawani
 Tel/Email: shoegra@morulaconsulting.co.za

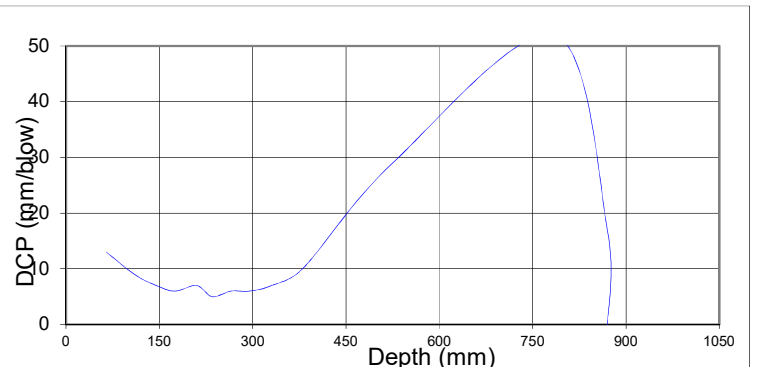
DESCRIPTION: DCP test was done from existing ground level
 DCP No: 1 at TP43 - D192 ROAD

DATE TESTED: 3-Feb-22

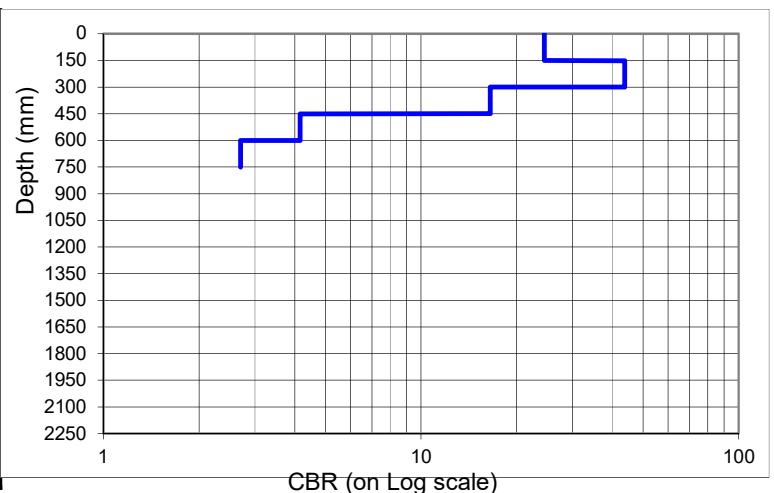
DCP Readings		Blows per reading: 5							
no.	mm	no.	mm	no.	mm	no.	mm	no.	mm
1	65	11	525	21		31		41	
2	110	12	785	22		32		42	
3	145	13	870	23		33		43	
4	175	14		24		34		44	
5	210	15		25		35		45	
6	235	16		26		36		46	
7	265	17		27		37		47	
8	295	18		28		38		48	
9	330	19		29		39		49	
10	380	20		30		40		50	



DCP number (mm / Blow) DN									
DN	mm	DN	mm	DN	mm	DN	mm	DN	mm
13	65	29	525						
9	110	52	785						
7	145	17	870						
6	175								
7	210								
5	235								
6	265								
6	295								
7	330								
10	380								



no.	Depth (mm)			In situ		Blows/mm		
	From	-	To	DN	CBR	150mm	300mm	
1	1	-	150	9,5	24	16		20,4
2	151	-	300	6,0	44	25		
3	301	-	450	12,8	17	12		7,9
4	451	-	600	37,2	4	4		
5	601	-	750	52,0	3	3		
6	751	-	900					
8	901	-	1050					
9	1051	-	1200					
10	1201	-	1350					
11	1351	-	1500					
12	1501	-	1650					
13	1651	-	1800					
14	1801	-	1950					
15	1951	-	2100					



REMARKS:

Max penetration depth **870 mm**

Where values are presented as continued "cont", refer to the adjacent graphs where DN values vs depth and penetration vs depths can be read.

Signature 

TEST REPORT FOR DYNAMIC CONE PENETROMETER BY TEST METHOD TMH6-ST6

CLIENT: Morula Consulting Engineers

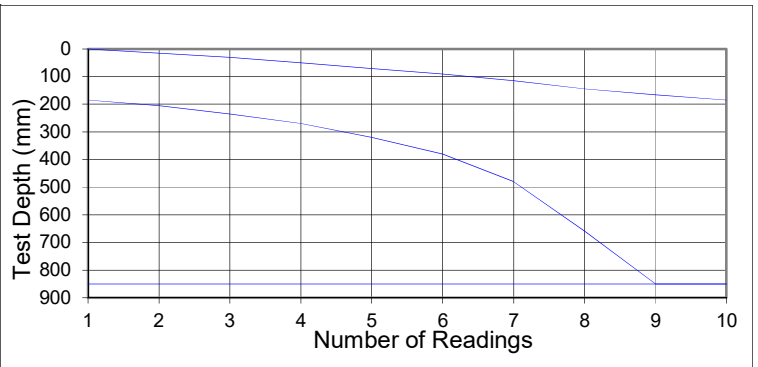
DATE REPORTED: 04-Feb-2022
 OUR REF: MAK0830203

PROJECT: Geotechnical Investigation: D192 ROAD
 ATTENTION: Hulisani Tsanawani
 Tel/Email: shoegra@morulaconsulting.co.za

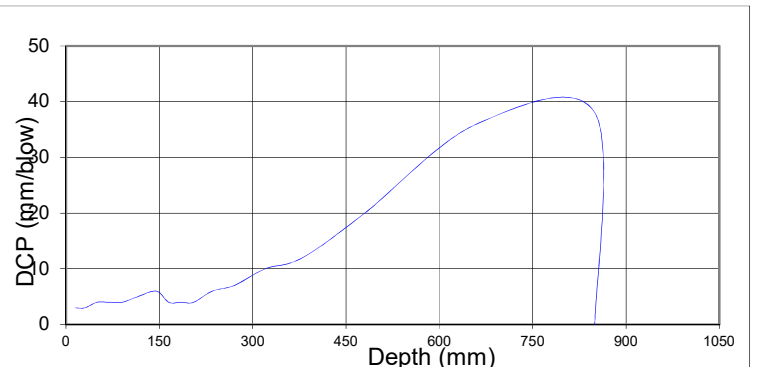
DESCRIPTION: DCP test was done from existing ground level
 DCP No: 1 at TP44 - D192 ROAD

DATE TESTED: 3-Feb-22

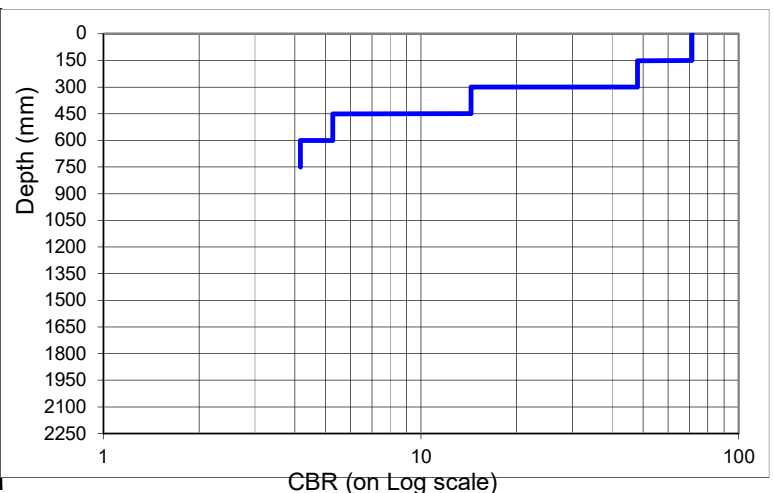
DCP Readings		Blows per reading: 5							
no.	mm	no.	mm	no.	mm	no.	mm	no.	mm
1	15	11	235	21		31		41	
2	30	12	270	22		32		42	
3	50	13	320	23		33		43	
4	70	14	380	24		34		44	
5	90	15	480	25		35		45	
6	115	16	660	26		36		46	
7	145	17	850	27		37		47	
8	165	18		28		38		48	
9	185	19		29		39		49	
10	205	20		30		40		50	



DCP number (mm / Blow) DN									
DN	mm	DN	mm	DN	mm	DN	mm	DN	mm
3	15	6	235						
3	30	7	270						
4	50	10	320						
4	70	12	380						
4	90	20	480						
5	115	36	660						
6	145	38	850						
4	165								
4	185								
4	205								



no.	Depth (mm)			In situ		Blows/mm	
	From	-	To	DN	CBR	150mm	300mm
1	1	-	150	4,1	71	36	31,5
2	151	-	300	5,6	48	27	
3	301	-	450	14,3	14	11	7,7
4	451	-	600	31,0	5	5	
5	601	-	750	37,2	4	4	
6	751	-	900				
8	901	-	1050				
9	1051	-	1200				
10	1201	-	1350				
11	1351	-	1500				
12	1501	-	1650				
13	1651	-	1800				
14	1801	-	1950				
15	1951	-	2100				



REMARKS:

Max penetration depth **850 mm**

Where values are presented as continued "cont", refer to the adjacent graphs where DN values vs depth and penetration vs depths can be read.

Signature 

TEST REPORT FOR DYNAMIC CONE PENETROMETER BY TEST METHOD TMH6-ST6

CLIENT: Morula Consulting Engineers

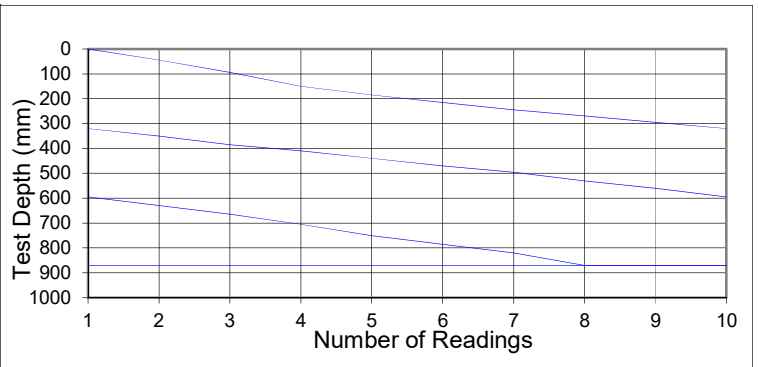
DATE REPORTED: 04-Feb-2022
 OUR REF: MAK0830203

PROJECT: Geotechnical Investigation: D192 ROAD
 ATTENTION: Hulisani Tsanawani
 Tel/Email: shoegra@morulaconsulting.co.za

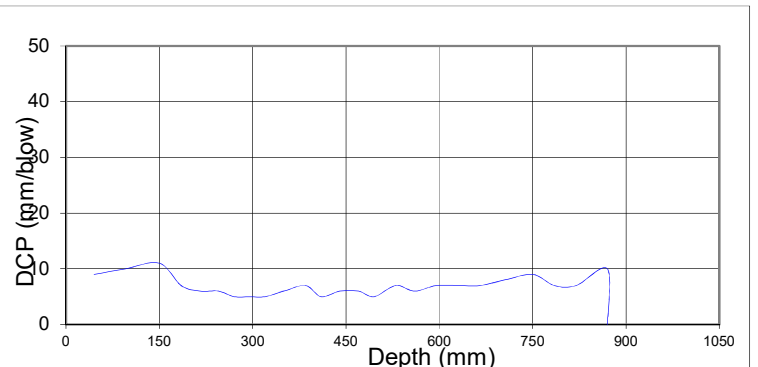
DESCRIPTION: DCP test was done from existing ground level
 DCP No: 1 at TP45 - D192 ROAD

DATE TESTED: 3-Feb-22

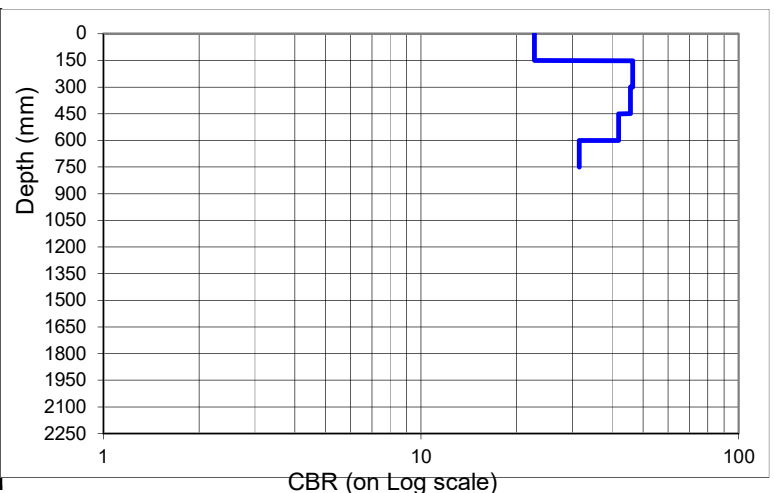
DCP Readings		Blows per reading: 5							
no.	mm	no.	mm	no.	mm	no.	mm	no.	mm
1	45	11	385	21	705	31		41	
2	95	12	410	22	750	32		42	
3	150	13	440	23	785	33		43	
4	185	14	470	24	820	34		44	
5	215	15	495	25	870	35		45	
6	245	16	530	26		36		46	
7	270	17	560	27		37		47	
8	295	18	595	28		38		48	
9	320	19	630	29		39		49	
10	350	20	665	30		40		50	



DCP number (mm / Blow) DN									
DN	mm	DN	mm	DN	mm	DN	mm	DN	mm
9	45	7	385	8	705				
10	95	5	410	9	750				
11	150	6	440	7	785				
7	185	6	470	7	820				
6	215	5	495	10	870				
6	245	7	530						
5	270	6	560						
5	295	7	595						
5	320	7	630						
6	350	7	665						



no.	Depth (mm)			In situ		Blows/mm	
	From	-	To	DN	CBR	150mm	300mm
1	1	-	150	10,0	23	15	20,5
2	151	-	300	5,8	46	26	
3	301	-	450	5,8	46	26	24,9
4	451	-	600	6,2	42	24	
5	601	-	750	7,8	32	19	
6	751	-	900				
8	901	-	1050				
9	1051	-	1200				
10	1201	-	1350				
11	1351	-	1500				
12	1501	-	1650				
13	1651	-	1800				
14	1801	-	1950				
15	1951	-	2100				



REMARKS:

Max penetration depth **870 mm**

Where values are presented as continued "cont", refer to the adjacent graphs where DN values vs depth and penetration vs depths can be read.

Signature 

TEST REPORT FOR DYNAMIC CONE PENETROMETER BY TEST METHOD TMH6-ST6

CLIENT: Morula Consulting Engineers

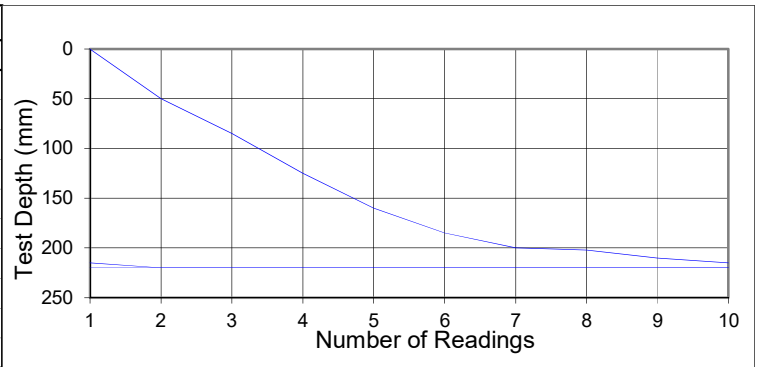
DATE REPORTED: 04-Feb-2022
 OUR REF: MAK0830203

PROJECT: Geotechnical Investigation: D192 ROAD
 ATTENTION: Hulisani Tsanawani
 Tel/Email: shoegra@morulaconsulting.co.za

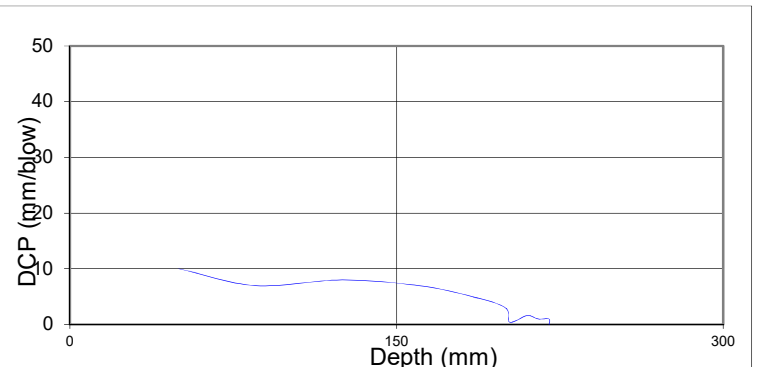
DESCRIPTION: DCP test was done from existing ground level
 DCP No: 1 at TP46 - D192 ROAD

DATE TESTED: 3-Feb-22

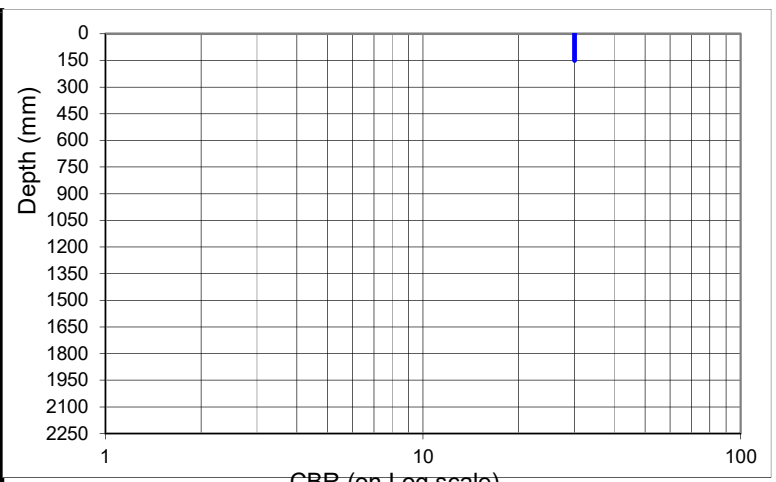
DCP Readings		Blows per reading: 5							
no.	mm	no.	mm	no.	mm	no.	mm	no.	mm
1	50	11		21		31		41	
2	85	12		22		32		42	
3	125	13		23		33		43	
4	160	14		24		34		44	
5	185	15		25		35		45	
6	200	16		26		36		46	
7	202	17		27		37		47	
8	210	18		28		38		48	
9	215	19		29		39		49	
10	220	20		30		40		50	



DCP number (mm / Blow) DN									
DN	mm	DN	mm	DN	mm	DN	mm	DN	mm
10	50								
7	85								
8	125								
7	160								
5	185								
3	200								
0,4	202								
1,6	210								
1	215								
1	220								



no.	Depth (mm)			In situ		Blows/mm	
	From	-	To	DN	CBR	150mm	300mm
1	1	-	150	8,1	30	19	
2	151	-	300				
3	301	-	450				
4	451	-	600				
5	601	-	750				
6	751	-	900				
8	901	-	1050				
9	1051	-	1200				
10	1201	-	1350				
11	1351	-	1500				
12	1501	-	1650				
13	1651	-	1800				
14	1801	-	1950				
15	1951	-	2100				



REMARKS:

Max penetration depth **220 mm**

Where values are presented as continued "cont", refer to the adjacent graphs where DN values vs depth and penetration vs depths can be read.

Signature 

TEST REPORT FOR DYNAMIC CONE PENETROMETER BY TEST METHOD TMH6-ST6

CLIENT: Morula Consulting Engineers

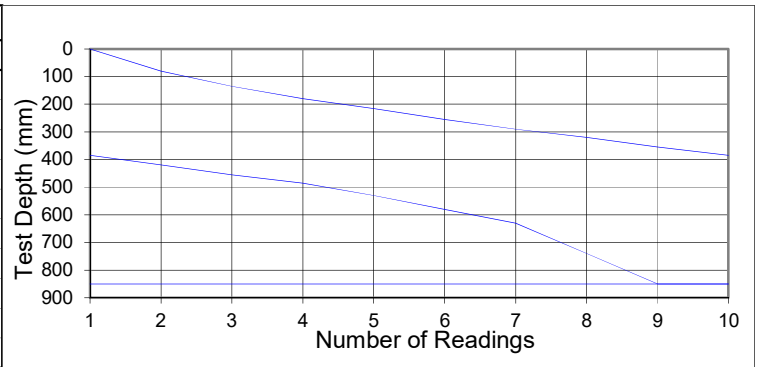
DATE REPORTED: 04-Feb-2022
 OUR REF: MAK0830203

PROJECT: Geotechnical Investigation: D192 ROAD
 ATTENTION: Hulisani Tsanawani
 Tel/Email: shoegra@morulaconsulting.co.za

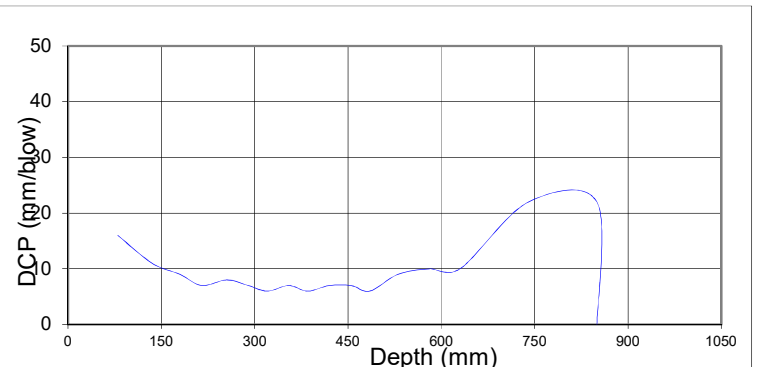
DESCRIPTION: DCP test was done from existing ground level
 DCP No: 1 at TP47 - D192 ROAD

DATE TESTED: 3-Feb-22

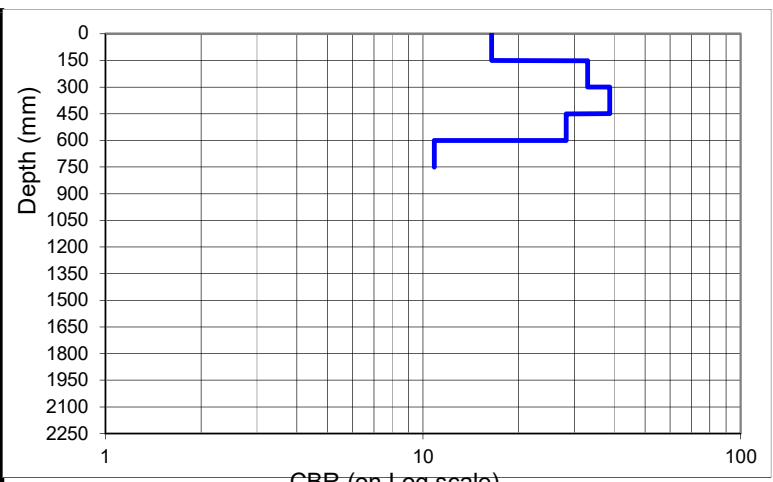
DCP Readings		Blows per reading: 5							
no.	mm	no.	mm	no.	mm	no.	mm	no.	mm
1	80	11	455	21		31		41	
2	135	12	485	22		32		42	
3	180	13	530	23		33		43	
4	215	14	580	24		34		44	
5	255	15	630	25		35		45	
6	290	16	740	26		36		46	
7	320	17	850	27		37		47	
8	355	18		28		38		48	
9	385	19		29		39		49	
10	420	20		30		40		50	



DCP number (mm / Blow) DN									
DN	mm	DN	mm	DN	mm	DN	mm	DN	mm
16	80	7	455						
11	135	6	485						
9	180	9	530						
7	215	10	580						
8	255	10	630						
7	290	22	740						
6	320	22	850						
7	355								
6	385								
7	420								



no.	Depth (mm)			In situ		Blows/mm	
	From	-	To	DN	CBR	150mm	300mm
1	1	-	150	12,9	16	12	15,8
2	151	-	300	7,5	33	20	
3	301	-	450	6,6	39	23	20,2
4	451	-	600	8,5	28	18	
5	601	-	750	17,7	11	8	
6	751	-	900				
8	901	-	1050				
9	1051	-	1200				
10	1201	-	1350				
11	1351	-	1500				
12	1501	-	1650				
13	1651	-	1800				
14	1801	-	1950				
15	1951	-	2100				



REMARKS:

Max penetration depth **850 mm**

Where values are presented as continued "cont", refer to the adjacent graphs where DN values vs depth and penetration vs depths can be read.

Signature 

APPENDIX G: PHOTOGRAPHS

Km 0.00- km 1.85(Edge Break)



Km 1.85 – km 2.95(Pothole and Edge Break)



Km 2.95 – km 3.80(Damaged Base)



Km 3.8 – km 6.25(Potholes)



Km 18.2 – km 20.5(Potholes)



Km 3.8- Km 6.25 (Existing Culvert Structure)



km 6.25 – km 8.45(Existing Bridge Structure)



Km 10.13 – Km 11.45 (Existing Culverts)

