SGS MATROLAB (PTY) LTD
- CIVIL ENGINEERING SERVICES -
Reg.No.: 2003/029180/07 - VAT. Reg.No.: 4040210587
a SANAS Accredited Testing Laboratory, No. T 0239

60 Columbine Place, Glen Anil, Durban North, 4051

Tel. : (031) 579 1220/1
Fax : (031) 579 1344
Email : rasalis.bhikam@sgs.com

T 0239

TEST RESULTS

SNA
SNAVIA Building
285 Albertus Street
La Montagne, 0184
Attention: Leendert Theunissen

Project : Hluhluwe Interchange to Bushveld (N2)

Your Ref : TP18/5
Our Ref : 55430/A
Date Reported : 15.02.2024

SIEVE ANALYSIS, CONSTANTS, CBR(SANS 3001:GR1,GR10,GR12,GR20,GR30,GR40)

SAMPLE NO.	0545				Preparation Method:
HOLE NO.	Sample 5				
ROAD NO.	-				
DEPTH	730 - 940				
CHAINAGE	Km 49.7 SB				
LAYER TYPE	-				
STABILISED WITH	Natural				
SUPPLIER	-				
CURING METHOD	-				
DATE TESTED	-				
DESCRIPTION	Dk Yl Br Fn Silt Snd + Weath Basalt+Grvl				- Specification COTO:2020
SIEVE ANALYSIS (% PASSING)					
100.0 mm					
75.00 mm					
63.00 mm	100				
50.00 mm	85				
37.50 mm	85				
28.00 mm	81				
20.00 mm	81				
14.00 mm	78				
5.000 mm	69				
2.000 mm	62				
0.425 mm	55				
0.075 mm	15				
SOIL MORTAR					
COARSE SAND <2.0mm >0.425mm	11				
FINE SAND <0.425mm >0.075mm	64				
MATERIAL <0.075mm	25				
CONSTANTS					
GRADING MODULUS	1,68				
PRA CLASSIFICATION	A-2-4(0)				
COLTO CLASSIFICATION	---				
TRH Class.(INSITU |93%|90%|)	- | -				
LIQUID LIMIT (%)	-				
PLASTICITY INDEX (0.425mm)	NP				
LINEAR SHRINKAGE (%)	0,0				
MDD					
MAXIMUM DRY DENSITY (kg/m^3)	2051				
OPTIMUM MOISTURE CONTENT(%)	10,0				
MOULDING MOISTURE (%)	10,3				
TYPE OF TEST	CBR				
CBR-UCS @ 100% MDD	0,0				
CBR-UCS @ 98% MDD	0,0				
CBR-UCS @ 97% MDD	0,0				
CBR-UCS @ 95% MDD	0,0				
CBR-UCS @ 93% MDD	0,0				
CBR-UCS @ 90% MDD	0,0				

CBR-UCS @ % MDD derived from calculation.

% SWELL MOULD [A][B][C]	0,10	0,10	0,10										

Remarks :

FORM: GR40

4.5.0(SGS)(2021.05.05)

Technical Signatory : Ronald Ramdeen

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Fax : (031) 579 1344
Email : rasalis.bhikam@sgs.com

TEST RESULTS

SNA SNAVIA Building 285 Albertus Street La Montagne, 0184 Attention: Leendert Theunissen	Project : Hluhluwe Interchange to Bushveld (N2) Your Ref : TP18/5 Our Ref : 55430 Date Reported : 15.02.2024

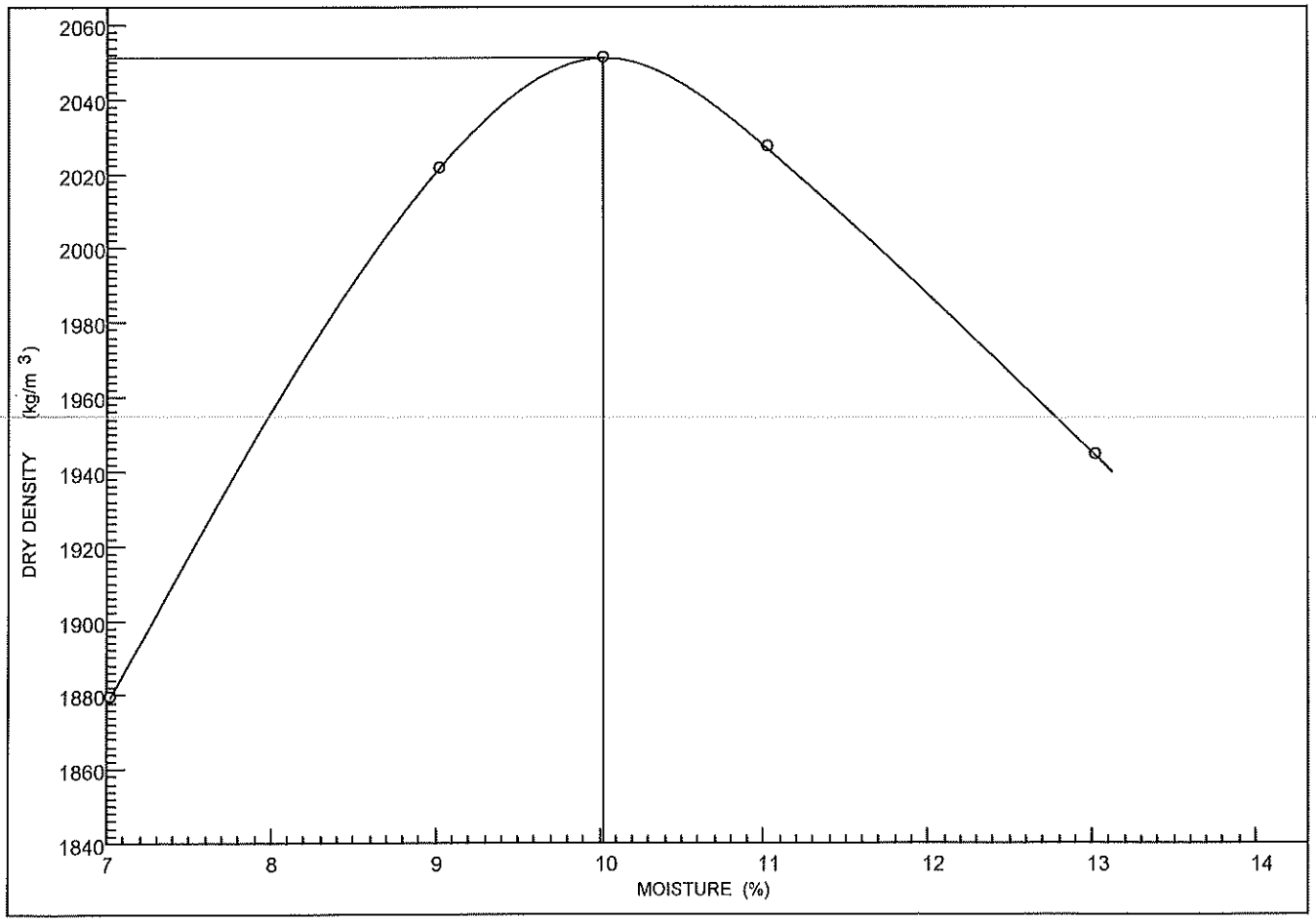
MOISTURE / DENSITY RELATIONSHIP(SANS 3001: GR30)

Sample No.: 0545	Hole No. : Km 49.7 NB	Depth (mm) : 730 - 940
Origin : -	Stabilized With : Natural	Compaction Energy : MDD
Material Description : Dark Yellow Brown Fine Silty Sand + Weath Basalt Gravel		

Maximum Dry Density (kg/m^3): 2051

Optimum Moisture Content (%) : 10,0

Point No.	1	2	3	4	5			
Moisture (%)	7,0	9,0	10,0	11,0	13,0			
Density (kg/m^3)	1879	2021	2051	2027	1944			



Remarks :

FORM: GR30

4.4.1(SGS)(2019.12.04)

Technical Signatory : Ronald Ramdeen

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Email : rasalls.bhikam@sgs.com

TEST RESULTS

SNA
SNAVIA Building
285 Albertus Street
La Montagne, 0184
Attention: Leendert Theunissen

Project : Hluhluwe Interchange to Bushveld (N2)

Your Ref : TP3/2
Our Ref : 55430/B
Date Reported : 14.02.2024

SIEVE ANALYSIS, CONSTANTS, CBR(SANS 3001:GR1,GR10,GR12,GR20,GR30,GR40)

SAMPLE NO.	0475				Preparation Method:
HOLE NO.	Sub Base				
ROAD NO.	-				
DEPTH	200 - 470				
CHAINAGE	Km 47.88 SB				
LAYER TYPE	Ex Sub Base				
STABILISED WITH	Natural				
SUPPLIER	-				
CURING METHOD	-				
DATE TESTED	-				
DESCRIPTION	Lt Br Cr Basalt Gravel with Asphalt				- Specification COTO:2020
SIEVE ANALYSIS (% PASSING)					
100.0 mm					
75.00 mm					
63.00 mm					
50.00 mm	100				
37.50 mm	93				
28.00 mm	83				
20.00 mm	68				
14.00 mm	60				
5.000 mm	38				
2.000 mm	28				
0.425 mm	17				
0.075 mm	6				
SOIL MORTAR					
COARSE SAND <2.0mm >0.425mm	39				
FINE SAND <0.425mm >0.075mm	38				
MATERIAL <0.075mm	23				
CONSTANTS					
GRADING MODULUS	2,49				
PRA CLASSIFICATION	A-1-a(0)				
~~COLTO CLASSIFICATION~~	---				
TRH Class.(INSITU |93%|90%|)	- | -				
LIQUID LIMIT (%)	-				
PLASTICITY INDEX (0.425mm)	NP				
LINEAR SHRINKAGE (%)	0,0				
MDD					
MAXIMUM DRY DENSITY (kg/m^3)	2117				
OPTIMUM MOISTURE CONTENT(%)	9,1				
MOULDING MOISTURE (%)	8,8				
TYPE OF TEST	CBR				
CBR-UCS @ 100% MDD	0,0				
CBR-UCS @ 98% MDD	0,0				
CBR-UCS @ 97% MDD	0,0				
CBR-UCS @ 95% MDD	0,0				
CBR-UCS @ 93% MDD	0,0				
CBR-UCS @ 90% MDD	0,0				

CBR-UCS @ % MDD derived from calculation.

% SWELL MOULD [A][B][C]	0,00	0,00	0,00										

Remarks :

FORM: GR40

4.5.0(SGS)(2021.05.05)

Technical Signatory : Ronald Ramdeen

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Fax : (031) 579 1344
Email : rasalis.bhikam@sgs.com

sanas Testing Laboratory T 0239

TEST RESULTS

SNA SNAVIA Building 285 Albertus Street La Montagne, 0184 Attention: Leendert Theunissen	Project : Hluhluwe Interchange Your Ref : TP3/1 Our Ref : 55430 Date Reported : 13.02.2024

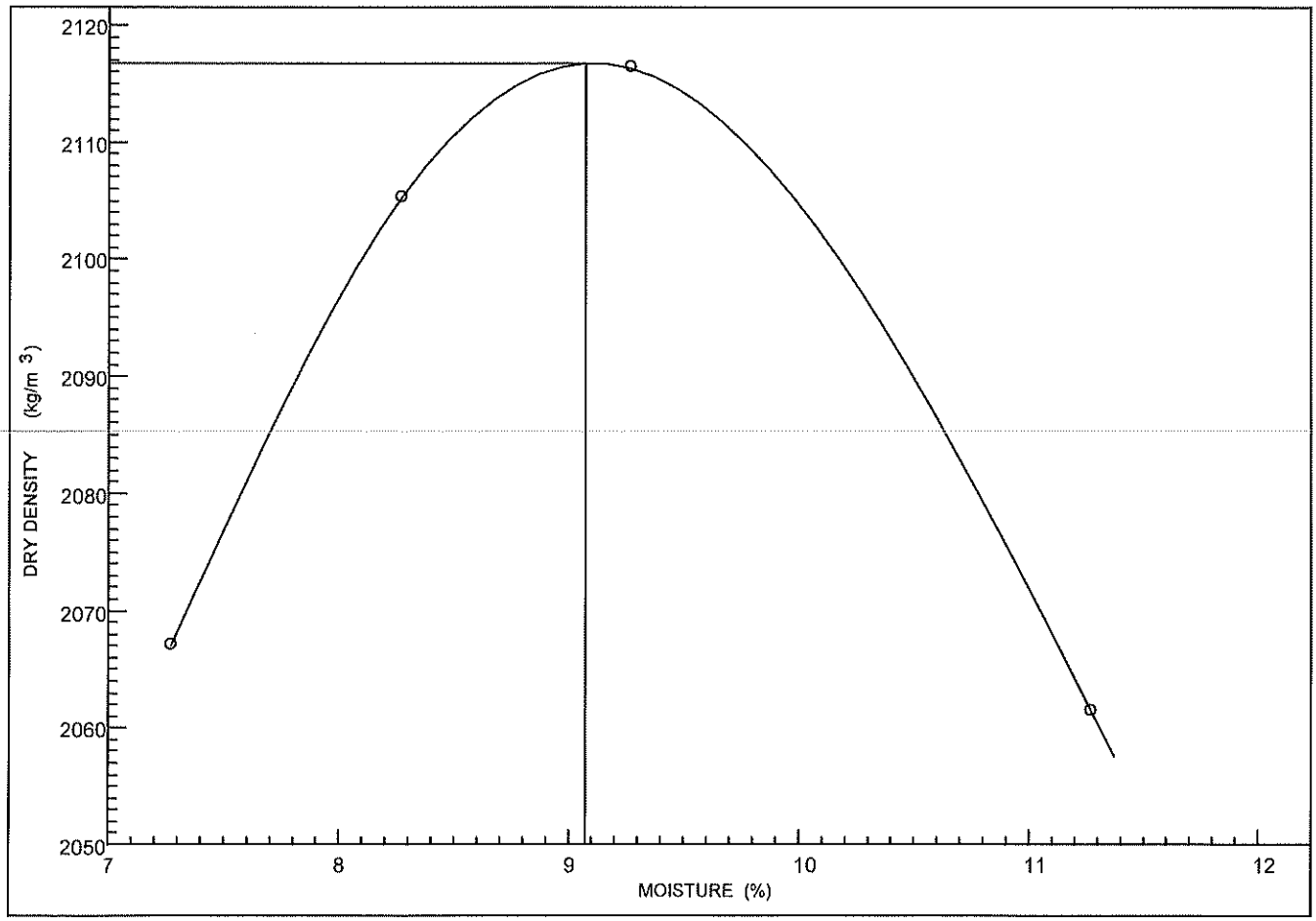
MOISTURE / DENSITY RELATIONSHIP(SANS 3001: GR30)

Sample No.: 0475	Hole No. : Km 47.88 SB	Depth (mm) : 200 - 470
Origin : Ex Sub Base	Stabilized With : Natural	Compaction Energy : MDD
Material Description : Light Brown Crushed Basalt Gravel with Asphalt		

Maximum Dry Density (kg/m^3): 2117

Optimum Moisture Content (%) : 9,1

Point No.	1	2	3	4				
Moisture (%)	7,3	8,3	9,3	11,3				
Density (kg/m^3)	2067	2105	2116	2061				



Remarks :

FORM: GR30

4.4.1(SGS)(2019.12.04)

Technical Signatory : Ronald Ramdeen

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Email : rasalis.bhikam@sgs.com

TEST RESULTS

SNA SNAVIA Building 285 Albertus Street La Montagne, 0184 Attention: Leendert Theunissen	Project : Hluhluwe Interchange to Bushveld (N2) Your Ref : TP5/1 Our Ref : 55430/C Date Reported : 14.02.2024

SIEVE ANALYSIS, CONSTANTS, CBR(SANS 3001:GR1,GR10,GR12,GR20,GR30,GR40)

SAMPLE NO.	0482				Preparation Method:
HOLE NO.	Base				
ROAD NO.	-				
DEPTH	15 - 180				
CHAINAGE	Km 49.10 NB				
LAYER TYPE	-				
STABILISED WITH	Natural				
SUPPLIER	-				
CURING METHOD	-				
DATE TESTED	-				
DESCRIPTION	Dk Gr Crs Cr Bas Grv Fn to Med Grnd Sand				- Specification COTO:2020
SIEVE ANALYSIS (% PASSING)					
100.0 mm					
75.00 mm					
63.00 mm					
50.00 mm	100				
37.50 mm	99				
28.00 mm	94				
20.00 mm	83				
14.00 mm	72				
5.000 mm	43				
2.000 mm	22				
0.425 mm	5				
0.075 mm	4				
SOIL MORTAR					
COARSE SAND <2.0mm >0.425mm	78				
FINE SAND <0.425mm >0.075mm	3				
MATERIAL <0.075mm	19				
CONSTANTS					
GRADING MODULUS	2,69				
PRA CLASSIFICATION	A-1-a(0)				
COLTO CLASSIFICATION	---				
TRH Class.(INSITU |93%|90%|)	- | -				
LIQUID LIMIT (%)	-				
PLASTICITY INDEX (0.425mm)	NP				
LINEAR SHRINKAGE (%)	0,0				
MDD					
MAXIMUM DRY DENSITY (kg/m^3)	2121				
OPTIMUM MOISTURE CONTENT(%)	4,8				
MOULDING MOISTURE (%)	5,1				
TYPE OF TEST	CBR				
CBR-UCS @ 100% MDD	0,0				
CBR-UCS @ 98% MDD	0,0				
CBR-UCS @ 97% MDD	0,0				
CBR-UCS @ 95% MDD	0,0				
CBR-UCS @ 93% MDD	0,0				
CBR-UCS @ 90% MDD	0,0				

CBR-UCS @ % MDD derived from calculation.

% SWELL MOULD [A][B][C]	0,00	0,00	0,00										

Remarks :

FORM: GR40

4.5.0(SGS)(2021.05.05)

Technical Signatory : Ronald Ramdeen

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Tel. : (031) 579 1220/1
Fax : (031) 579 1344
Email : rasalis.bhikam@sgs.com

sanas Testing Laboratory T 0239

TEST RESULTS

SNA
SNAVIA Building
285 Albertus Street
La Montagne, 0184
Attention: Leendert Theunissen

Project : Hluhluwe Interchange

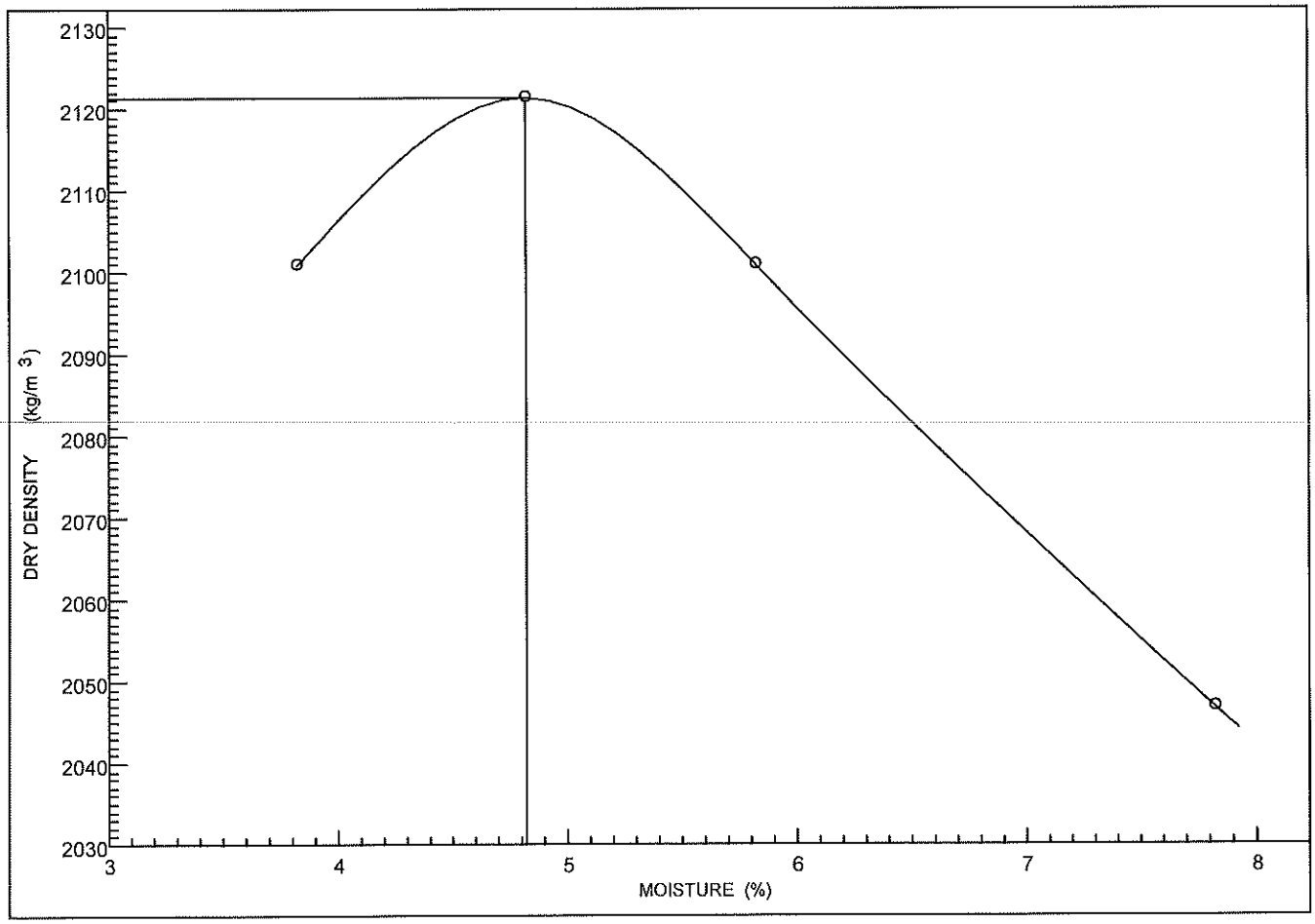
Your Ref : TP5/1
Our Ref : 55430
Date Reported : 13.02.2024

MOISTURE / DENSITY RELATIONSHIP(SANS 3001: GR30)

Sample No.: 0482	Hole No. : Km 19.10 NB	Depth (mm) : 15 - 180
Origin : Ex USSG	Stabilized With : Natural	Compaction Energy : MDD
Material Description : Dark Grey Coarse Crushed Basalt Gravel + Fine to Med Grained Sand		

Maximum Dry Density (kg/m^3): 2121
Optimum Moisture Content (%) : 4,8

Point No.	1	2	3	4				
Moisture (%)	3,8	4,8	5,8	7,8				
Density (kg/m^3)	2101	2121	2101	2047				



Remarks :
FORM: GR30

4.4.1(SGS)(2019.12.04)

Technical Signatory : Ronald Ramdeen

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Email : rasalis.bhikam@sgs.com

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TEST RESULTS

SNA
SNAVIA Building
285 Albertus Street
La Montagne, 0184
Attention: Leendert Theunissen

Project : Hluhluwe Interchange to Bushveld (N2)

Your Ref : TP8/1
Our Ref : 55430/D
Date Reported : 14.02.2024

SIEVE ANALYSIS, CONSTANTS, CBR(SANS 3001:GR1,GR10,GR12,GR20,GR30,GR40)

SAMPLE NO.	0496				Preparation Method:
HOLE NO.	Km 50,02 NB				
ROAD NO.	-				
DEPTH	16 - 203				
CHAINAGE	-				
LAYER TYPE	Ex Base				
STABILISED WITH	Natural				
SUPPLIER	-				
CURING METHOD	-				
DATE TESTED	-				
DESCRIPTION	Dk Gr Crs Basit Grv+ Fn to Med Grn Sand				- Specification COTO:2020

SIEVE ANALYSIS (% PASSING)

100.0 mm					
75.00 mm	100				
63.00 mm	96				
50.00 mm	93				
37.50 mm	90				
28.00 mm	85				
20.00 mm	77				
14.00 mm	68				
5.000 mm	41				
2.000 mm	21				
0.425 mm	8				
0.075 mm	7				

SOIL MORTAR

COARSE SAND <2.0mm >0.425mm	64				
FINE SAND <0.425mm >0.075mm	4				
MATERIAL <0.075mm	32				

CONSTANTS

GRADING MODULUS	2,64				
PRA CLASSIFICATION	A-1-a(0)				
COLTO CLASSIFICATION	---				
TRH Class.(INSITU |93%|90%|)	- | -				
LIQUID LIMIT (%)	-				
PLASTICITY INDEX (0.425mm)	NP				
LINEAR SHRINKAGE (%)	0,0				

MDD

MAXIMUM DRY DENSITY (kg/m^3)	2067				
OPTIMUM MOISTURE CONTENT(%)	4,5				
MOULDING MOISTURE (%)	4,2				

TYPE OF TEST	CBR				

CBR-UCS @ 100% MDD	0,0				
CBR-UCS @ 98% MDD	0,0				
CBR-UCS @ 97% MDD	0,0				
CBR-UCS @ 95% MDD	0,0				
CBR-UCS @ 93% MDD	0,0				
CBR-UCS @ 90% MDD	0,0				

CBR-UCS @ % MDD derived from calculation.

% SWELL MOULD [A][B][C]	0,00	0,00	0,00											

Remarks :

FORM: GR40

4.5.0(SGS)(2021.05.05)

Technical Signatory : Ronald Ramdeen

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Tel. : (031) 579 1220/1
Fax : (031) 579 1344
Email : rasalis.bhikam@sgs.com

TEST RESULTS

SNA
SNAVIA Building
285 Albertus Street
La Montagne, 0184
Attention: Leendert Theunissen

Project : Hluhluwe Interchange

Your Ref : TP8/1
Our Ref : 55430
Date Reported : 13.02.2024

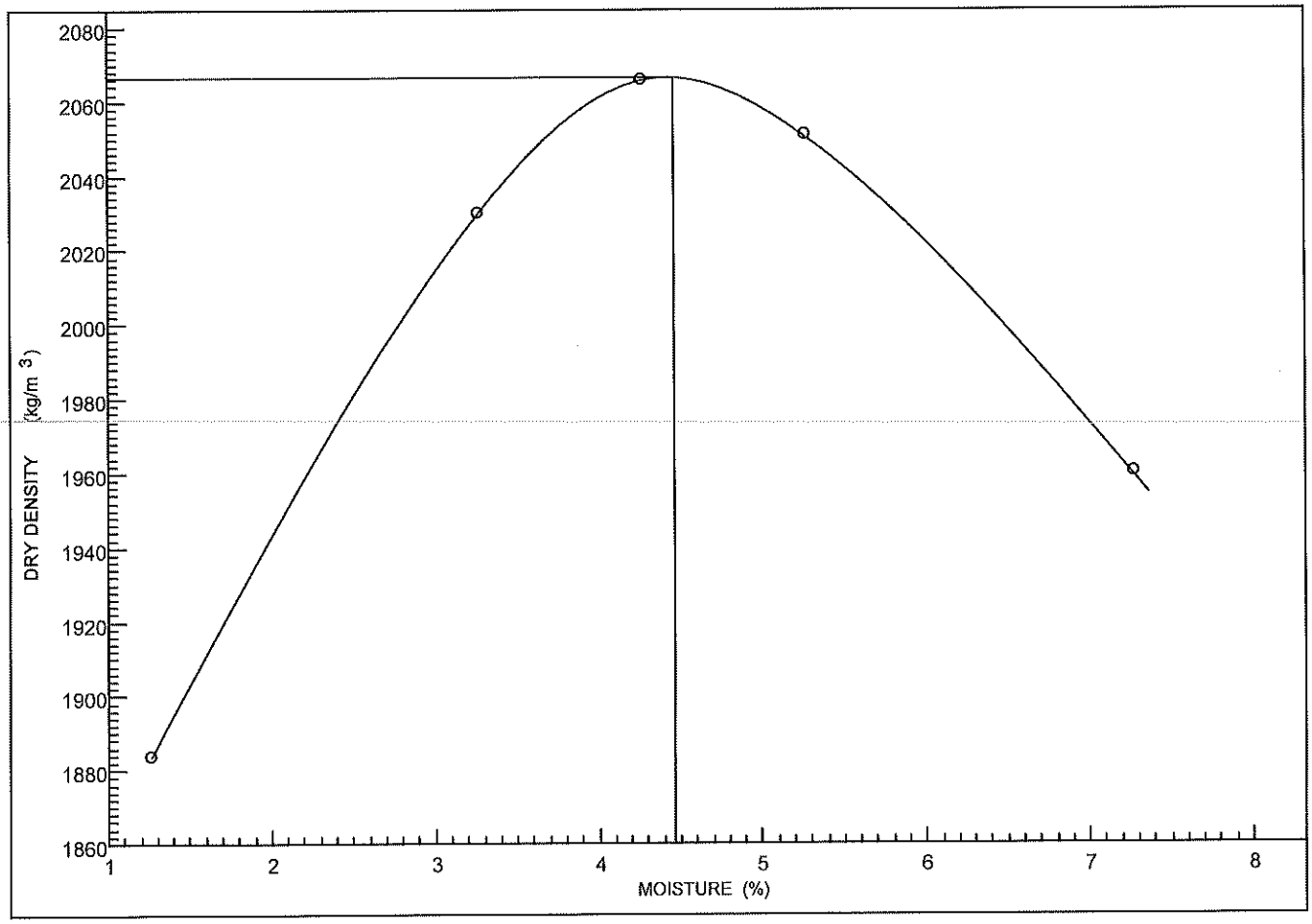
MOISTURE / DENSITY RELATIONSHIP(SANS 3001: GR30)

Sample No.: 0496	Hole No. : Km 50.02 NB	Depth (mm) : 16 - 203
Origin : Ex Base	Stabilized With : Natural	Compaction Energy : MDD
Material Description : Dark Grey Coarse Crushed Basalt Gravel + Fine to Med Grained Sand		

Maximum Dry Density (kg/m^3): 2067

Optimum Moisture Content (%) : 4,5

Point No.	1	2	3	4	5			
Moisture (%)	1,3	3,3	4,3	5,3	7,3			
Density (kg/m^3)	1884	2030	2066	2051	1960			



Remarks :

FORM: GR30

4.4.1(SGS)(2019.12.04)

Technical Signatory : Ronald Ramdeen

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Fax : (031) 579 1344
Email : rasalis.bhikam@sgs.com

TEST RESULTS

SNA SNAVIA Building 285 Albertus Street La Montagne, 0184 Attention: Leendert Theunissen	Project : Hluhluwe Interchange to Bushveld (N2). Your Ref : TP8/2 Our Ref : 55430/E Date Reported : 15.02.2024

SIEVE ANALYSIS, CONSTANTS, CBR(SANS 3001:GR1,GR10,GR12,GR20,GR30,GR40)

SAMPLE NO.	0497				Preparation Method:
HOLE NO.	Km 50.02 NB				
ROAD NO.	-				
DEPTH	203 - 334				
CHAINAGE	-				
LAYER TYPE	Ex Sub Base				
STABILISED WITH	Natural				
SUPPLIER	-				
CURING METHOD	-				
DATE TESTED	-				
DESCRIPTION	Lt Br Cr Basalt Grv+ Fn to Med Grn Sand				- Specification COTO:2020
SIEVE ANALYSIS (% PASSING)					
100.0 mm					
75.00 mm					
63.00 mm					
50.00 mm	100				
37.50 mm	95				
28.00 mm	85				
20.00 mm	75				
14.00 mm	66				
5.000 mm	39				
2.000 mm	24				
0.425 mm	10				
0.075 mm	6				
SOIL MORTAR					
COARSE SAND <2.0mm >0.425mm	58				
FINE SAND <0.425mm >0.075mm	15				
MATERIAL <0.075mm	27				
CONSTANTS					
GRADING MODULUS	2,60				
PRA CLASSIFICATION	A-1-a(0)				
COLTO CLASSIFICATION	G6				
TRH CLASSIFICATION	G5				
LIQUID LIMIT (%)	-				
PLASTICITY INDEX (0.425mm)	NP				
LINEAR SHRINKAGE (%)	0,0				
MDD					
MAXIMUM DRY DENSITY (kg/m^3)	2059				
OPTIMUM MOISTURE CONTENT(%)	11,2				
MOULDING MOISTURE (%)	11,5				
TYPE OF TEST	CBR				
CBR-UCS @ 100% MDD	79				
CBR-UCS @ 98% MDD	64				
CBR-UCS @ 97% MDD	57				
CBR-UCS @ 95% MDD	46				
CBR-UCS @ 93% MDD	36				
CBR-UCS @ 90% MDD	25				

CBR-UCS @ % MDD derived from calculation.

% SWELL MOULD [A][B][C]	0,00	0,00	0,10										

Remarks :

FORM: GR40

4.5.0(SGS)(2021.05.05)

Technical Signatory : Ronald Reindeen

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Fax : (031) 579 1344
Email : rasalis.bhikam@sgs.com

T 0239

TEST RESULTS

BVI Consulting Engineers P.O. Box 86 Century City 7446, Cape Town Attention: Mr Leendert Theunissen	Project : Hluhluwe Interchange to Bushveld (N2) Your Ref : TP8/2 Our Ref : 55430 Date Reported : 15.02.2024

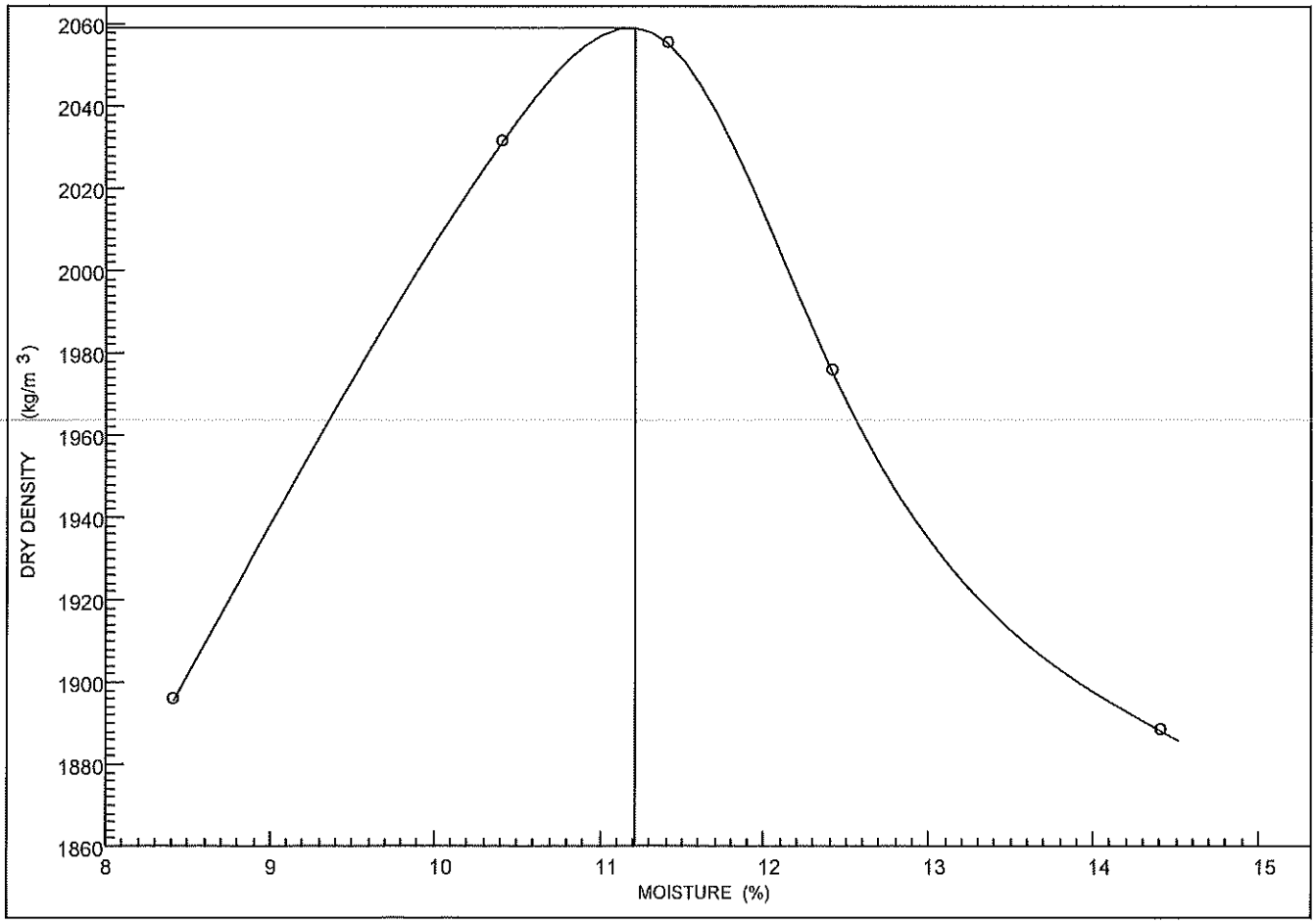
MOISTURE / DENSITY RELATIONSHIP(SANS 3001: GR30)

Sample No.: 0497	Hole No. : Km 50.02 NB	Depth (mm) : 203 - 334
Origin : Ex Sub Base	Stabilized With : Natural	Compaction Energy : MDD
Material Description : Light Brown Cr Basalt Gravel + Fine to Med Grain Sand		

Maximum Dry Density (kg/m^3): 2059

Optimum Moisture Content (%) : 11,2

Point No.	1	2	3	4	5			
Moisture (%)	8,4	10,4	11,4	12,4	14,4			
Density (kg/m^3)	1896	2031	2055	1976	1888			



Remarks :

FORM: GR30

4.4.1(SGS)(2019.12.04)

Technical Signatory : Ronald Ramdeen

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60 Columbine Place, Glen Anil, Durban North, 4051

Tel. : (031) 579 1220/1
Fax : (031) 579 1344
Email : rasalis.bhikam@sgs.com

T 0239

TEST RESULTS

SNA SNAVIA Building 285 Albertus Street La Montagne, 0184 Attention: Leendert Theunissen	Project : Hluhluwe Interchange to Bushveld (N2) Your Ref : TP8/3 Our Ref : 55430/F Date Reported : 14.02.2024

SIEVE ANALYSIS, CONSTANTS, CBR(SANS 3001:GR1,GR10,GR12,GR20,GR30,GR40)

SAMPLE NO.	0498				Preparation Method:
HOLE NO.	KM 50.02 NB				
ROAD NO.	-				
DEPTH	334 - 435				
CHAINAGE	-				
LAYER TYPE	Ex USSG				
STABILISED WITH	Natural				
SUPPLIER	-				
CURING METHOD	-				
DATE TESTED	-				
DESCRIPTION	Dk Br Crs Cr Baslt Gr+Fn to Med Grn San				- Specification COTO:2020
SIEVE ANALYSIS (% PASSING)					
100.0 mm					
75.00 mm					
63.00 mm	100				
50.00 mm	98				
37.50 mm	95				
28.00 mm	89				
20.00 mm	79				
14.00 mm	67				
5.000 mm	43				
2.000 mm	29				
0.425 mm	16				
0.075 mm	10				
SOIL MORTAR					
COARSE SAND <2.0mm >0.425mm	46				
FINE SAND <0.425mm >0.075mm	20				
MATERIAL <0.075mm	34				
CONSTANTS					
GRADING MODULUS	2,45				
PRA CLASSIFICATION	A-1-a(0)				
COLTO CLASSIFICATION	---				
TRH Class.(INSITU |93%|90%|)	- | -				
LIQUID LIMIT (%)	-				
PLASTICITY INDEX (0.425mm)	NP				
LINEAR SHRINKAGE (%)	0,0				
MDD					
MAXIMUM DRY DENSITY (kg/m^3)	2057				
OPTIMUM MOISTURE CONTENT(%)	10,5				
MOULDING MOISTURE (%)	10,2				
TYPE OF TEST	CBR				
CBR-UCS @ 100% MDD	0,0				
CBR-UCS @ 98% MDD	0,0				
CBR-UCS @ 97% MDD	0,0				
CBR-UCS @ 95% MDD	0,0				
CBR-UCS @ 93% MDD	0,0				
CBR-UCS @ 90% MDD	0,0				

CBR-UCS @ % MDD derived from calculation.

% SWELL MOULD [A][B][C]	0,00	0,00	0,00										

Remarks :

FORM: GR40

4.5.0(SGS)(2021.05.05)

Technical Signatory : Ronald Ramdeen

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60 Columbine Place, Glen Anil, Durban North, 4051

Tel. : (031) 579 1220/1
Fax : (031) 579 1344
Email : rasalis.bhikam@sgs.com

sanas Testing Laboratory T 0239

TEST RESULTS

SNA SNAVIA Building 285 Albertus Street La Montagne, 0184 Attention: Leendert Theunissen	Project : Hluhluwe Interchange Your Ref : TP8/3 Our Ref : 55430 Date Reported : 13.02.2024

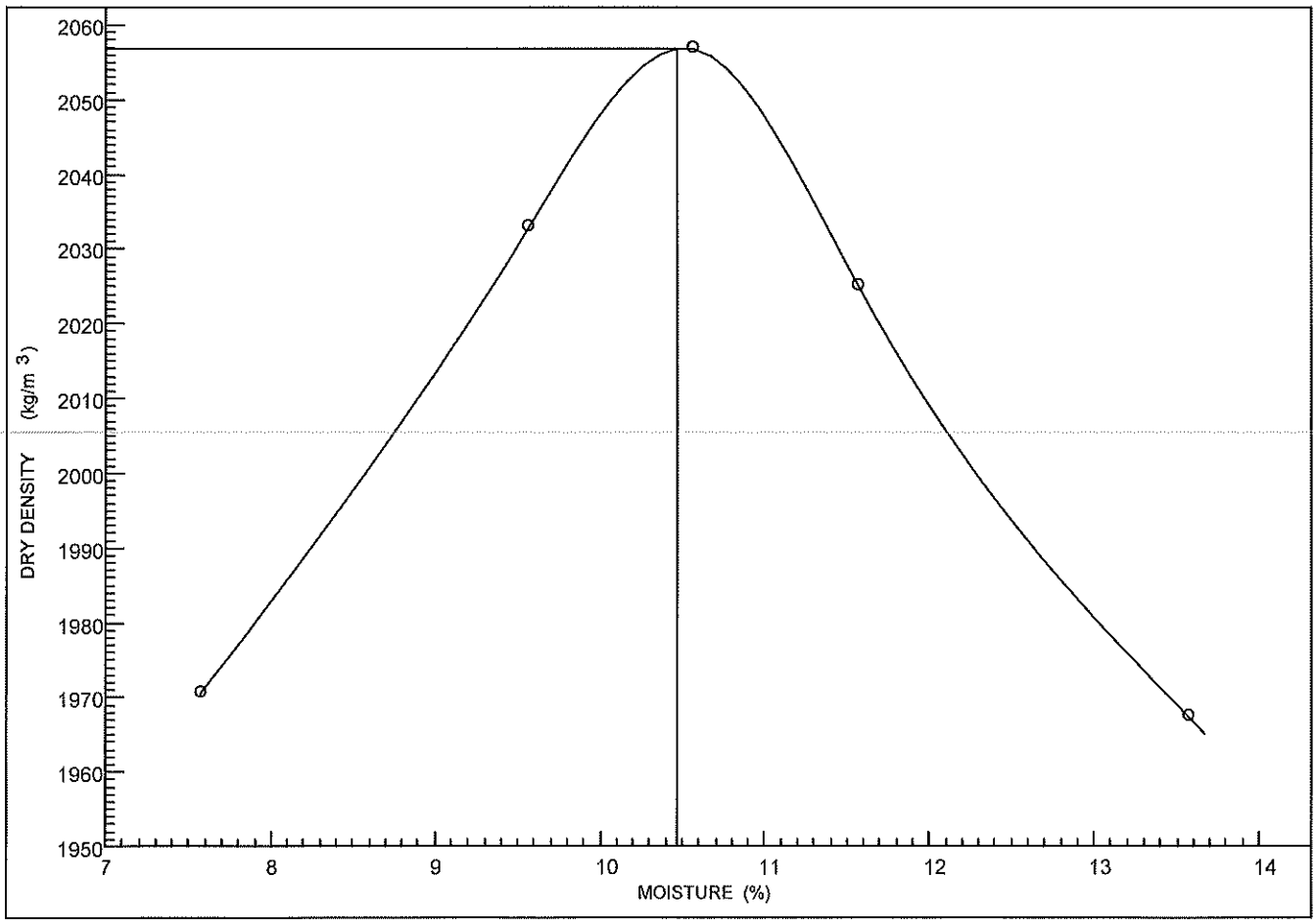
MOISTURE / DENSITY RELATIONSHIP(SANS 3001: GR30)

Sample No.: 0498	Hole No. : Km 50.02 NB	Depth (mm) : 334 - 435
Origin : Ex USSG	Stabilized With : Natural	Compaction Energy : MDD
Material Description : Dark Grey Coarse Crushed Basalt Gravel + Fine to Med Grained Sand		

Maximum Dry Density (kg/m^3): 2057

Optimum Moisture Content (%) : 10,5

Point No.	1	2	3	4	5			
Moisture (%)	7,6	9,6	10,6	11,6	13,6			
Density (kg/m^3)	1970	2033	2057	2025	1967			



Remarks :

FORM: GR30

4.4.1(SGS)(2019.12.04)

Technical Signatory : Ronald Ramjeen

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Email : rasalis.bhikam@sgs.com

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TEST RESULTS

SNA SNAVIA Building 285 Albertus Street La Montagne, 0184 Attention: Leendert Theunissen	Project : Hluhluwe Interchange to Bushveld (N2). Your Ref : TP12/3 Our Ref : 55430/G Date Reported : 15.02.2024

SIEVE ANALYSIS, CONSTANTS, CBR(SANS 3001:GR1,GR10,GR12,GR20,GR30,GR40)

SAMPLE NO.	0513				Preparation Method:
HOLE NO.	Km 51.56 NB				
ROAD NO.	-				
DEPTH	400 - 493				
CHAINAGE	-				
LAYER TYPE	Ex USSG				
STABILISED WITH	Natural				
SUPPLIER	-				
CURING METHOD	-				
DATE TESTED	-				
DESCRIPTION	Lt Br Mod Weath Bslt Grv+Fn to Med Grn Sa				- Specification COTO:2020
SIEVE ANALYSIS (% PASSING)					
100.0 mm					
75.00 mm					
63.00 mm					
50.00 mm	100				
37.50 mm	97				
28.00 mm	92				
20.00 mm	90				
14.00 mm	86				
5.000 mm	73				
2.000 mm	49				
0.425 mm	27				
0.075 mm	18				
SOIL MORTAR					
COARSE SAND <2.0mm >0.425mm	44				
FINE SAND <0.425mm >0.075mm	20				
MATERIAL <0.075mm	36				
CONSTANTS					
GRADING MODULUS	2,07				
PRA CLASSIFICATION	A-1-b(0)				
COLTO CLASSIFICATION	G6				
TRH CLASSIFICATION	G6				
LIQUID LIMIT (%)	24				
PLASTICITY INDEX (0.425mm)	5				
LINEAR SHRINKAGE (%)	2,0				
MDD					
MAXIMUM DRY DENSITY (kg/m^3)	2001				
OPTIMUM MOISTURE CONTENT(%)	12,5				
MOULDING MOISTURE (%)	12,2				
TYPE OF TEST	CBR				
CBR-UCS @ 100% MDD	49				
CBR-UCS @ 98% MDD	40				
CBR-UCS @ 97% MDD	37				
CBR-UCS @ 95% MDD	30				
CBR-UCS @ 93% MDD	28				
CBR-UCS @ 90% MDD	25				

CBR-UCS @ % MDD derived from calculation.

% SWELL MOULD [A][B][C]	0,00	0,00	0,10										

Remarks :

FORM: GR40

4.5.0(SGS)(2021.05.05)

Technical Signatory : Ronald Ramdeen

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Tel. : (031) 579 1220/1
Fax : (031) 579 1344
Email : rasalis.bhikam@sgs.com

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TEST RESULTS

SNA SNAVIA Building 285 Albertus Street La Montagne, 0184 Attention: Mr Leendert Theunissen	Project : Hluhluwe Interchange to Bushveld (N2) Your Ref : TP12/3 Our Ref : 55430 Date Reported : 15.02.2024

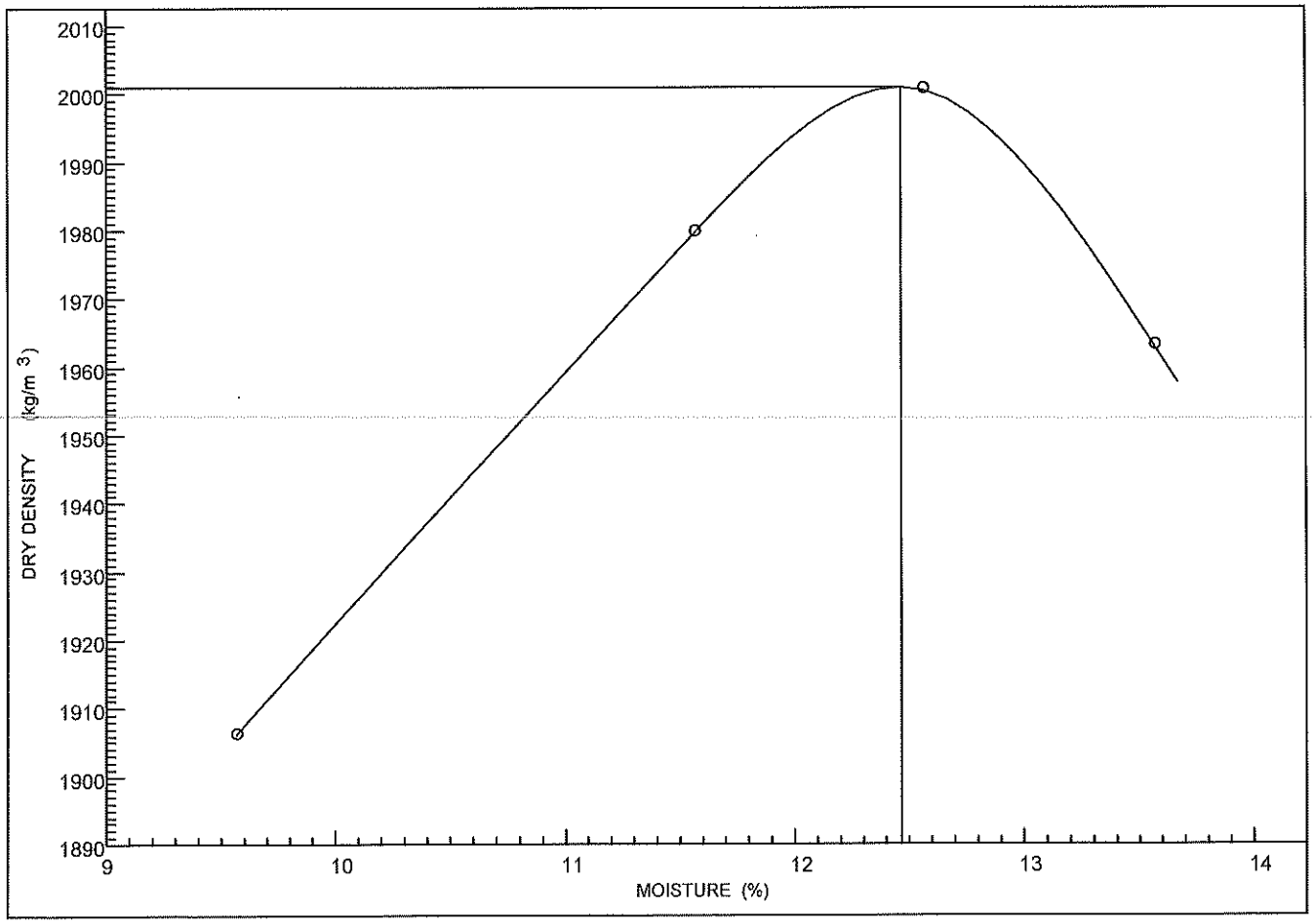
MOISTURE / DENSITY RELATIONSHIP(SANS 3001: GR30)

Sample No.: 0513	Hole No. : Km 51.56 NB	Depth (mm) : 400 - 493
Origin : Ex USSG	Stabilized With : Natural	Compaction Energy : MDD
Material Description : Light Brown Moderately Weath Basalt Grvl+Fine to Med Grain Sand		

Maximum Dry Density (kg/m^3): 2001

Optimum Moisture Content (%) : 12,5

Point No.	1	2	3	4				
Moisture (%)	9,6	11,6	12,6	13,6				
Density (kg/m^3)	1906	1980	2001	1963				



Remarks :

FORM: GR30

4.4.1(SGS)(2019.12.04)

Technical Signatory : Ronald Ramjeen

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Tel. : (031) 579 1220/1
Fax : (031) 579 1344
Email : rasalis.bhikam@sgs.com

TEST RESULTS

SNA
SNAVIA Building
285 Albertus Street
La Montagne, 0184
Attention: Leendert Theunissen

Project : Hluhluwe Interchange to Bushveld (N2)

Your Ref : TP2/1
Our Ref : 55430/H
Date Reported : 15.02.2024

SIEVE ANALYSIS, CONSTANTS, CBR(SANS 3001:GR1,GR10,GR12,GR20,GR30,GR40)

SAMPLE NO.	0469				Preparation Method:
HOLE NO.	Km 47.33				
ROAD NO.	-				
DEPTH	40 - 175				
CHAINAGE	-				
LAYER TYPE	Ex Base				
STABILISED WITH	Natural				
SUPPLIER	-				
CURING METHOD	-				
DATE TESTED	-				
DESCRIPTION	Dk Gr Coarse Cr Basalt Gravel				- Specification COTO:2020
SIEVE ANALYSIS (% PASSING)					
100.0 mm					
75.00 mm					
63.00 mm					
50.00 mm	100				
37.50 mm	99				
28.00 mm	87				
20.00 mm	70				
14.00 mm	68				
5.000 mm	44				
2.000 mm	28				
0.425 mm	15				
0.075 mm	8				
SOIL MORTAR					
COARSE SAND <2.0mm >0.425mm	47				
FINE SAND <0.425mm >0.075mm	22				
MATERIAL <0.075mm	31				
CONSTANTS					
GRADING MODULUS	2,50				
PRA CLASSIFICATION	A-1-a(0)				
COLTO CLASSIFICATION	G4				
TRH CLASSIFICATION	G4				
LIQUID LIMIT (%)	-				
PLASTICITY INDEX (0.425mm)	SP				
LINEAR SHRINKAGE (%)	1,0				
MDD					
MAXIMUM DRY DENSITY (kg/m^3)	2348				
OPTIMUM MOISTURE CONTENT(%)	6,3				
MOULDING MOISTURE (%)	6,0				
TYPE OF TEST	CBR				
CBR-UCS @ 100% MDD	157				
CBR-UCS @ 98% MDD	130				
CBR-UCS @ 97% MDD	119				
CBR-UCS @ 95% MDD	99				
CBR-UCS @ 93% MDD	65				
CBR-UCS @ 90% MDD	33				

CBR-UCS @ % MDD derived from calculation.

% SWELL MOULD [A][B][C]	0,00	0,00	0,00										

Remarks :

FORM: GR40

4.5.0(SGS)(2021.05.05)

Technical Signatory : Ronald Ramdeen

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Tel. : (031) 579 1220/1
Fax : (031) 579 1344
Email : rasalis.bhikam@sgs.com

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TEST RESULTS

SNA SNAVIA Building 285 Albertus Street La Montagne, 0184 Attention: Mr Leendert Theunissen	Project : Hluhluwe Interchange to Bushveld (N2) Your Ref : TP2/1 Our Ref : 55430 Date Reported : 15.02.2024

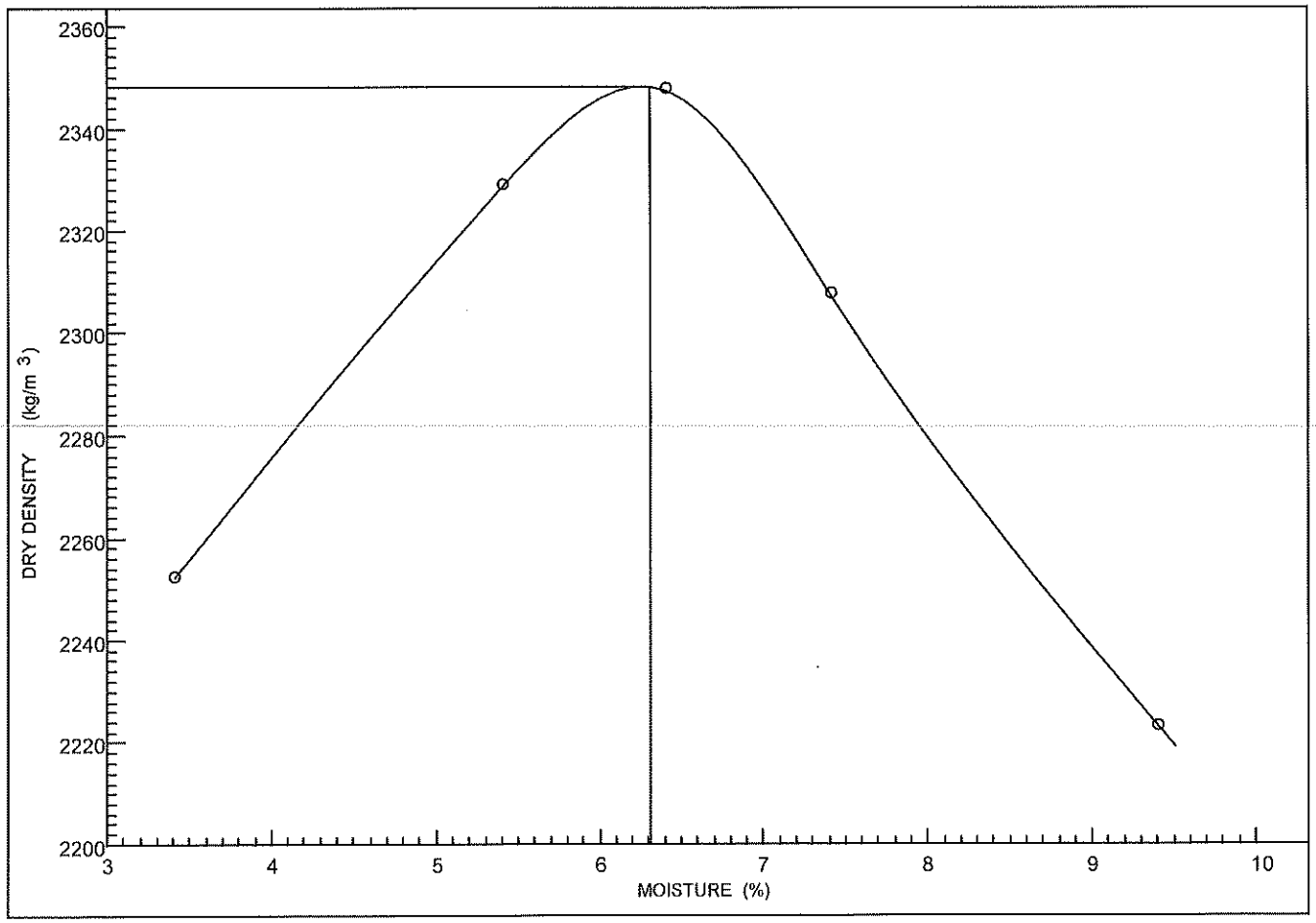
MOISTURE / DENSITY RELATIONSHIP(SANS 3001: GR30)

Sample No.: 0469	Hole No. : Km 47.83 NB	Depth (mm) : 40 - 175
Origin : Ex Base	Stabilized With : Natural	Compaction Energy : MDD
Material Description : Dark Grey Coarse Crushed Basalt Gravel		

Maximum Dry Density (kg/m^3): 2348

Optimum Moisture Content (%) : 6,3

Point No.	1	2	3	4	5			
Moisture (%)	3,4	5,4	6,4	7,4	9,4			
Density (kg/m^3)	2252	2329	2347	2307	2223			



Remarks :

FORM: GR30

4.4.1(SGS)(2019.12.04)

Technical Signatory : Ronald Ramdeen

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Tel. : (031) 579 1220/1
Fax : (031) 579 1344
Email : rasalis.bhikam@sgs.com

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TEST RESULTS

SNA
SNAVIA Building
285 Albertus Street
La Montagne, 0184
Attention: Leendert Theunissen

Project : Hluhluwe Interchange to Bushveld (N2).

Your Ref : TP2/3
Our Ref : 55430/I
Date Reported : 15.02.2024

SIEVE ANALYSIS, CONSTANTS, CBR(SANS 3001:GR1,GR10,GR12,GR20,GR30,GR40)

SAMPLE NO.	0471				Preparation Method:
HOLE NO.	Km 47.33 NB				
ROAD NO.	-				
DEPTH	300 - 370				
CHAINAGE	-				
LAYER TYPE	Ex USSG				
STABILISED WITH	Natural				
SUPPLIER	-				
CURING METHOD	-				
DATE TESTED	-				
DESCRIPTION	Dk Br Weath Basalt Grvl + Clayey Sand				- Specification COTO:2020
SIEVE ANALYSIS (% PASSING)					
100.0 mm					
75.00 mm	100				
63.00 mm	98				
50.00 mm	92				
37.50 mm	88				
28.00 mm	81				
20.00 mm	74				
14.00 mm	71				
5.000 mm	47				
2.000 mm	34				
0.425 mm	23				
0.075 mm	11				
SOIL MORTAR					
COARSE SAND <2.0mm >0.425mm	32				
FINE SAND <0.425mm >0.075mm	35				
MATERIAL <0.075mm	33				
CONSTANTS					
GRADING MODULUS	2,31				
PRA CLASSIFICATION	A-1-a(0)				
COLTO CLASSIFICATION	G6				
TRH CLASSIFICATION	G7				
LIQUID LIMIT (%)	-				
PLASTICITY INDEX (0.425mm)	SP				
LINEAR SHRINKAGE (%)	1,0				
MDD					
MAXIMUM DRY DENSITY (kg/m^3)	2061				
OPTIMUM MOISTURE CONTENT(%)	10,9				
MOULDING MOISTURE (%)	10,6				
TYPE OF TEST	CBR				
CBR-UCS @ 100% MDD	86				
CBR-UCS @ 98% MDD	74				
CBR-UCS @ 97% MDD	68				
CBR-UCS @ 95% MDD	58				
CBR-UCS @ 93% MDD	39				
CBR-UCS @ 90% MDD	19				

CBR-UCS @ % MDD derived from calculation.

% SWELL MOULD [A][B][C]	0,00	0,00	0,00										

Remarks :

FORM: GR40

4.5.0(SGS)(2021.05.05)

Technical Signatory : Ronald Ramdeen

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Tel. : (031) 579 1220/1
Fax : (031) 579 1344
Email : rasalis.bhikam@sgs.com

T 0239

TEST RESULTS

SNA SNAVIA Building 285 Albertus Street La Montagne, 0184 Attention: Mr Leendert Theunissen	Project : Hluhluwe Interchange to Bushveld (N2) Your Ref : TP2/3 Our Ref : 55430 Date Reported : 15.02.2024

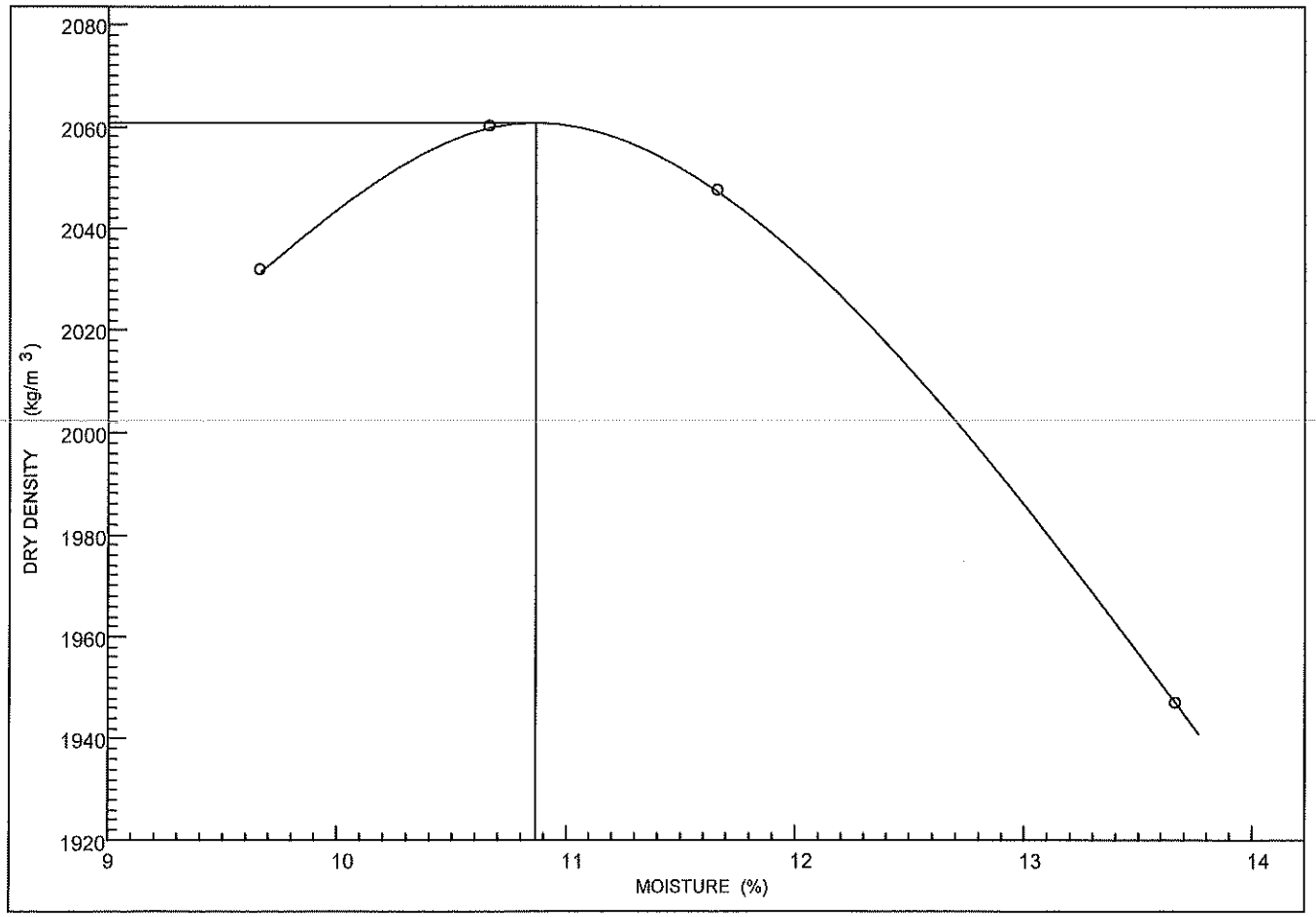
MOISTURE / DENSITY RELATIONSHIP(SANS 3001: GR30)

Sample No.: 0471	Hole No. : Km 47.83 NB	Depth (mm) : 300 - 370
Origin : Ex USSG	Stabilized With : Natural	Compaction Energy : MDD
Material Description : Dark Brown Weathered Basalt Gravel + Clayey Sand		

Maximum Dry Density (kg/m^3): 2061

Optimum Moisture Content (%) : 10,9

Point No.	1	2	3	4				
Moisture (%)	9,7	10,7	11,7	13,7				
Density (kg/m^3)	2031	2060	2047	1947				



Remarks :

FORM: GR30

4.4.1(SGS)(2019.12.04)

Technical Signatory : Ronald Ramdeen

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Tel. : (031) 579 1220/1
Fax : (031) 579 1344
Email : rasalis.bhikam@sgs.com

TEST RESULTS

SNA SNAVIA Building 285 Albertus Street La Montagne, 0184 Attention: Leendert Theunissen	Project : Hluhluwe Interchange to Bushveld (N2). Your Ref : TP4/1 Our Ref : 55430/J Date Reported : 15.02.2024

SIEVE ANALYSIS, CONSTANTS, CBR(SANS 3001:GR1,GR10,GR12,GR20,GR30,GR40)

SAMPLE NO.	0478				Preparation Method:
HOLE NO.	Km 48.83 NB				
ROAD NO.	-				
DEPTH	20 - 166				
CHAINAGE	-				
LAYER TYPE	Ex Base				
STABILISED WITH	Natural				
SUPPLIER	-				
CURING METHOD	-				
DATE TESTED	-				
DESCRIPTION	Dk Gr Crs Cr Bslt Gr +Fn to Med Grn Sand				- Specification COTO:2020
SIEVE ANALYSIS (% PASSING)					
100.0 mm					
75.00 mm					
63.00 mm					
50.00 mm	100				
37.50 mm	98				
28.00 mm	92				
20.00 mm	74				
14.00 mm	69				
5.000 mm	44				
2.000 mm	28				
0.425 mm	15				
0.075 mm	9				
SOIL MORTAR					
COARSE SAND <2.0mm >0.425mm	47				
FINE SAND <0.425mm >0.075mm	22				
MATERIAL <0.075mm	31				
CONSTANTS					
GRADING MODULUS	2,49				
PRA CLASSIFICATION	A-1-a(0)				
COLTO CLASSIFICATION	G4				
TRH CLASSIFICATION	G4				
LIQUID LIMIT (%)	23				
PLASTICITY INDEX (0.425mm)	4				
LINEAR SHRINKAGE (%)	2,0				
MDD					
MAXIMUM DRY DENSITY (kg/m^3)	2352				
OPTIMUM MOISTURE CONTENT(%)	7,6				
MOULDING MOISTURE (%)	7,3				
TYPE OF TEST	CBR				
CBR-UCS @ 100% MDD	142				
CBR-UCS @ 98% MDD	113				
CBR-UCS @ 97% MDD	101				
CBR-UCS @ 95% MDD	80				
CBR-UCS @ 93% MDD	58				
CBR-UCS @ 90% MDD	30				

CBR-UCS @ % MDD derived from calculation.

% SWELL MOULD [A][B][C]	0,00	0,00	0,10										

Remarks :

FORM: GR40

4.5.0(SGS)(2021.05.05)

Technical Signatory : Ronald Ramdeen

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Fax : (031) 579 1344
Email : rasalis.bhikam@sgs.com

TEST RESULTS

SNA
SNAVIA Building
285 Albertus Street
La Montagne, 0184
Attention: Mr Leendert Theunissen

Project : Hluhluwe Interchange to Bushveld (N2)

Your Ref : TP4/1
Our Ref : 55430
Date Reported : 15.02.2024

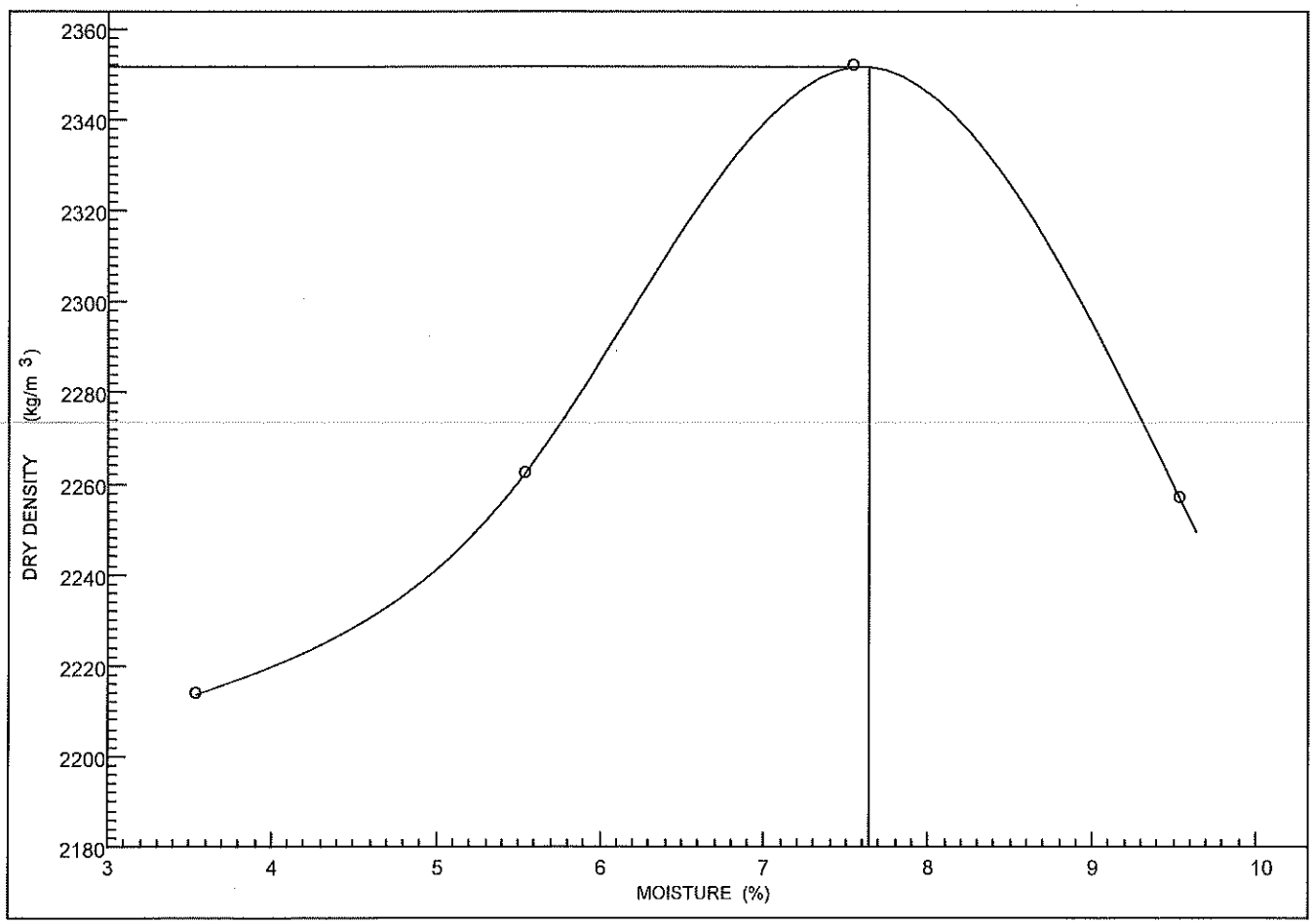
MOISTURE / DENSITY RELATIONSHIP(SANS 3001: GR30)

Sample No.: 0478	Hole No. : Km 48.83 NB	Depth (mm) : 20 - 166
Origin : Ex Base	Stabilized With : Natural	Compaction Energy : MDD
Material Description : Dark Grey Coarse Cr Basalt Gravel + Fine to Med Grain Sand		

Maximum Dry Density (kg/m^3): 2352

Optimum Moisture Content (%) : 7,6

Point No.	1	2	3	4				
Moisture (%)	3,5	5,5	7,5	9,5				
Density (kg/m^3)	2214	2262	2352	2257				



Remarks :

FORM: GR30

4.4.1(SGS)(2019.12.04)

Technical Signatory : Ronald Ramdeen

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sanas Testing Laboratory T 0239

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a SANAS Accredited Testing Laboratory, No. T 0239

60 Columbine Place, Glen Anil, Durban North, 4051

Tel. : (031) 579 1220/1
Fax : (031) 579 1344
Email : rasalis.bhikam@sgs.com

TEST RESULTS

SNA
SNAVIA Building
285 Albertus Street
La Montagne, 0184
Attention: Leendert Theunissen

Project : Hluhluwe Interchange to Bushveld (N2).

Your Ref : TP5/2
Our Ref : 55430/K
Date Reported : 15.02.2024

SIEVE ANALYSIS, CONSTANTS, CBR(SANS 3001:GR1,GR10,GR12,GR20,GR30,GR40)

SAMPLE NO.	0483				Preparation Method:
HOLE NO.	Km 49.10 NB				
ROAD NO.	-				
DEPTH	180 - 405				
CHAINAGE	-				
LAYER TYPE	Ex Sub Base				
STABILISED WITH	Natural				
SUPPLIER	-				
CURING METHOD	-				
DATE TESTED	-				
DESCRIPTION	Lt Br Crs Cr Bslt Gr +Fn to Med Grn Sand				- Specification COTO:2020
SIEVE ANALYSIS (% PASSING)					
100.0 mm					
75.00 mm					
63.00 mm					
50.00 mm	100				
37.50 mm	98				
28.00 mm	90				
20.00 mm	75				
14.00 mm	67				
5.000 mm	47				
2.000 mm	34				
0.425 mm	19				
0.075 mm	9				
SOIL MORTAR					
COARSE SAND <2.0mm >0.425mm	44				
FINE SAND <0.425mm >0.075mm	28				
MATERIAL <0.075mm	28				
CONSTANTS					
GRADING MODULUS	2,39				
PRA CLASSIFICATION	A-1-a(0)				
COLTO CLASSIFICATION	G5				
TRH CLASSIFICATION	G5				
LIQUID LIMIT (%)	-				
PLASTICITY INDEX (0.425mm)	SP				
LINEAR SHRINKAGE (%)	1,0				
MDD					
MAXIMUM DRY DENSITY (kg/m^3)	2055				
OPTIMUM MOISTURE CONTENT(%)	11,7				
MOULDING MOISTURE (%)	12,0				
TYPE OF TEST	CBR				
CBR-UCS @ 100% MDD	90				
CBR-UCS @ 98% MDD	71				
CBR-UCS @ 97% MDD	63				
CBR-UCS @ 95% MDD	50				
CBR-UCS @ 93% MDD	38				
CBR-UCS @ 90% MDD	25				

CBR-UCS @ % MDD derived from calculation.

% SWELL MOULD [A][B][C]	0,00	0,00	0,00										

Remarks :

FORM: GR40

4.5.0(SGS)(2021.05.05)

Technical Signatory : Ronald Ramdeen

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60 Columbine Place, Glen Anil, Durban North, 4051

Tel. : (031) 579 1220/1
Fax : (031) 579 1344
Email : rasalis.bhikam@sgs.com

T 0239

TEST RESULTS

SNA SNAVIA Building 285 Albertus Street La Montagne, 0184 Attention: Mr Leendert Theunissen	Project : Hluhluwe Interchange to Bushveld (N2) Your Ref : TP5/2 Our Ref : 55430 Date Reported : 15.02.2024

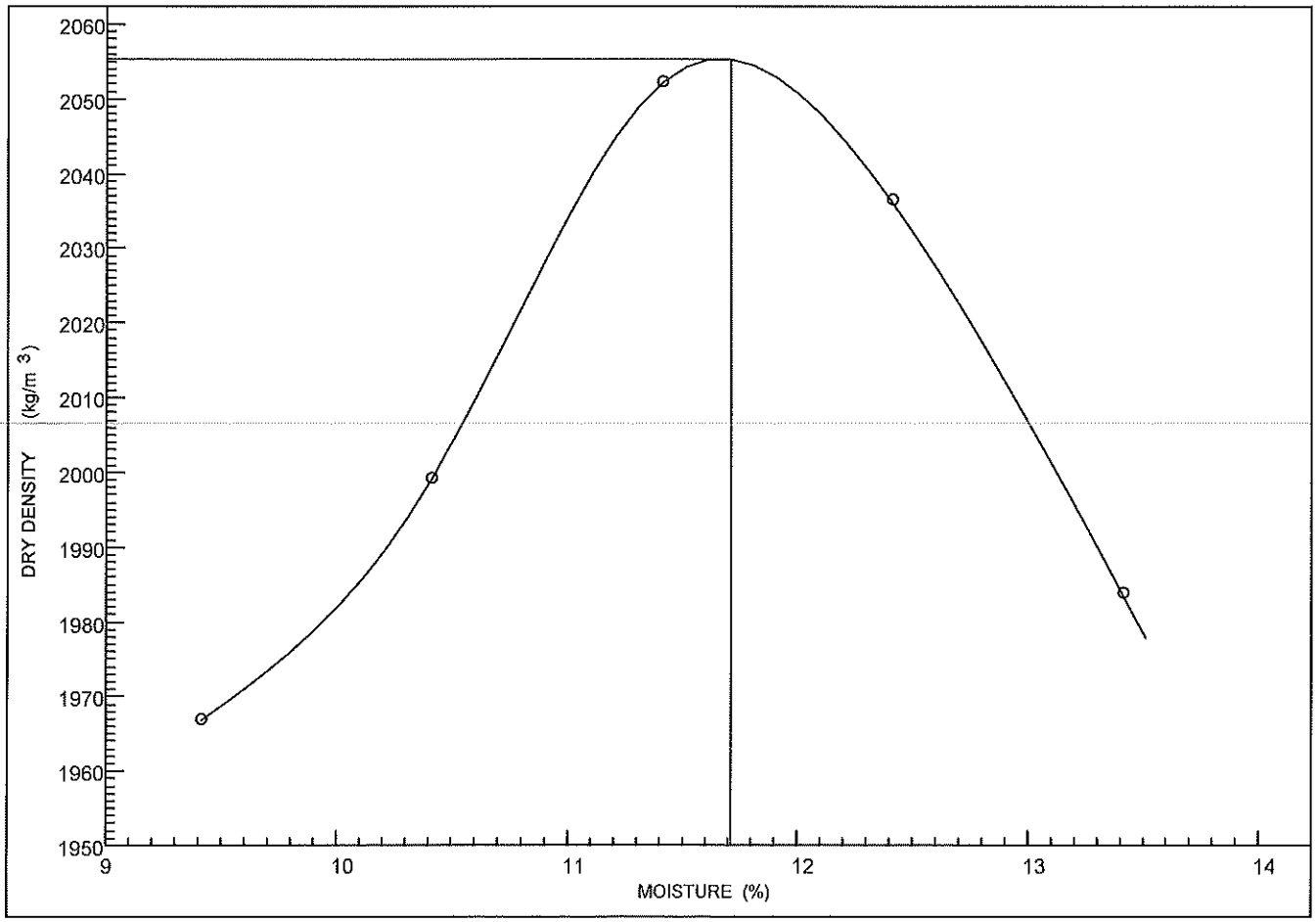
MOISTURE / DENSITY RELATIONSHIP(SANS 3001: GR30)

Sample No.: 0483	Hole No. : Km 49.10 NB	Depth (mm) : 180 - 405
Origin : Ex Sub Base	Stabilized With : Natural	Compaction Energy : MDD
Material Description : Light Brown Cr Basalt Gravel + Fine to Med Grain Sand		

Maximum Dry Density (kg/m^3): 2055

Optimum Moisture Content (%) : 11,7

Point No.	1	2	3	4	5			
Moisture (%)	9,4	10,4	11,4	12,4	13,4			
Density (kg/m^3)	1967	1999	2052	2036	1984			



Remarks :

FORM: GR30

4.4.1(SGS)(2019.12.04)

Technical Signatory : Ronald Ramdeen

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Fax : (031) 579 1344
Email : rasalis.bhikam@sgs.com

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TEST RESULTS

SNA SNAVIA Building 285 Albertus Street La Montagne, 0184 Attention: Mr Leendert Theunissen	Project : Hluhluwe Interchange to Bushveld (N2) Your Ref : TP2/2 Our Ref : 55430/L Date Reported : 15.02.2024

SIEVE ANALYSIS, CONSTANTS, CBR(SANS 3001:GR1,GR10,GR12,GR20,GR30,GR40)

SAMPLE NO.	0470				Preparation Method:
HOLE NO.	Km 47.33 NB				
ROAD NO.	-				
DEPTH	175 - 300				
CHAINAGE	-				
LAYER TYPE	Ex Sub Base				
STABILISED WITH	Natural				
SUPPLIER	-				
CURING METHOD	-				
DATE TESTED	-				
DESCRIPTION	Lt Br Coarse Cr Basalt Grv + Asphalt				- Specification COTO:2020
SIEVE ANALYSIS (% PASSING)					
100.0 mm					
75.00 mm	100				
63.00 mm	97				
50.00 mm	92				
37.50 mm	89				
28.00 mm	80				
20.00 mm	66				
14.00 mm	62				
5.000 mm	43				
2.000 mm	31				
0.425 mm	19				
0.075 mm	8				
SOIL MORTAR					
COARSE SAND <2.0mm >0.425mm	38				
FINE SAND <0.425mm >0.075mm	35				
MATERIAL <0.075mm	27				
CONSTANTS					
GRADING MODULUS	2,41				
PRA CLASSIFICATION	A-1-a(0)				
COLTO CLASSIFICATION	G6				
TRH CLASSIFICATION	G7				
LIQUID LIMIT (%)	-				
PLASTICITY INDEX (0.425mm)	SP				
LINEAR SHRINKAGE (%)	1,0				
MDD					
MAXIMUM DRY DENSITY (kg/m^3)	2229				
OPTIMUM MOISTURE CONTENT(%)	8,0				
MOULDING MOISTURE (%)	7,7				
TYPE OF TEST	CBR				
CBR-UCS @ 100% MDD	156				
CBR-UCS @ 98% MDD	100				
CBR-UCS @ 97% MDD	80				
CBR-UCS @ 95% MDD	53				
CBR-UCS @ 93% MDD	38				
CBR-UCS @ 90% MDD	24				

CBR-UCS @ % MDD derived from calculation.

% SWELL MOULD [A][B][C]	0,00	0,00	0,10										

Remarks :

FORM: GR40

4.5.0(SGS)(2021.05.05)

Technical Signatory : Ronald Ramdeen

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60 Columbine Place, Glen Anil, Durban North, 4051

Tel. : (031) 579 1220/1
Fax : (031) 579 1344
Email : rasalis.bhikam@sgs.com

TEST RESULTS

SNA SNAVIA Building 285 Albertus Street La Montagne, 0184 Attention: Mr Leendert Theunissen	Project : Hluhluwe Interchange to Bushveld (N2) Your Ref : TP2/2 Our Ref : 55430 Date Reported : 15.02.2024

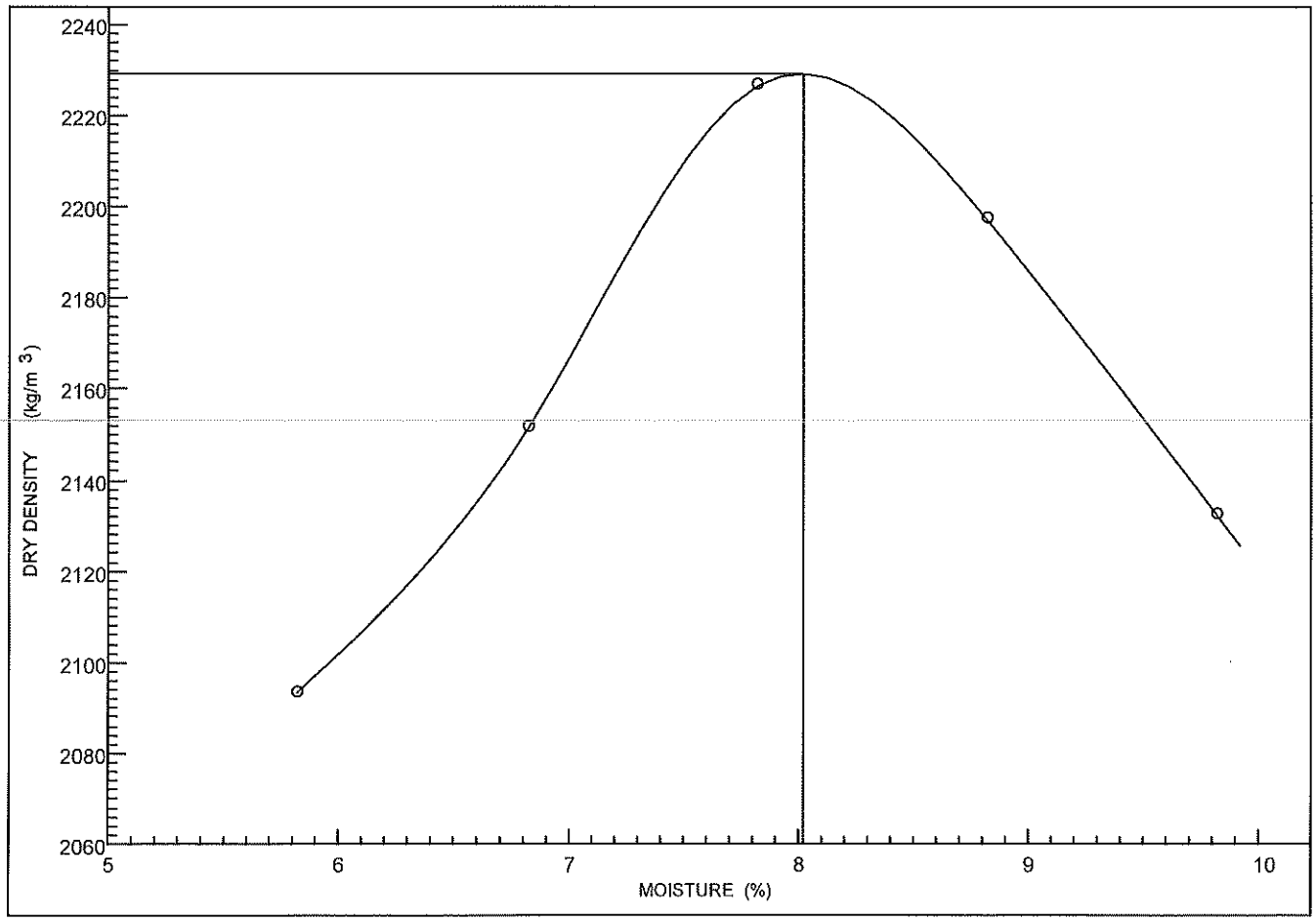
MOISTURE / DENSITY RELATIONSHIP(SANS 3001: GR30)

Sample No.: 0470	Hole No. : Km 47.83 NB	Depth (mm) : 175 - 300
Origin : Ex Sub Base	Stabilized With : Natural	Compaction Energy : MDD
Material Description : Light Brown Coarse Crushed Basalt Gravel + Asphalt		

Maximum Dry Density (kg/m^3): 2229

Optimum Moisture Content (%) : 8,0

Point No.	1	2	3	4	5			
Moisture (%)	5,8	6,8	7,8	8,8	9,8			
Density (kg/m^3)	2093	2151	2227	2197	2132			



Remarks :

FORM: GR30

4.4.1(SGS)(2019.12.04)

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Tel. : (031) 579 1220/1
Fax : (031) 579 1344
Email : rasalis.bhikam@sgs.com

TEST RESULTS

SNA SNAVIA Building 285 Albertus Street La Montagne, 0184 Attention: Leendert Theunissen	Project : Hluhluwe Interchange to Bushveld (N2) Your Ref : TP12/2 Our Ref : 55430/M Date Reported : 14.02.2024

SIEVE ANALYSIS, CONSTANTS, CBR(SANS 3001:GR1,GR10,GR12,GR20,GR30,GR40)

SAMPLE NO.	0512				Preparation Method:
HOLE NO.	Km 51.56 NB				
ROAD NO.	-				
DEPTH	172 - 400				
CHAINAGE	-				
LAYER TYPE	Ex Sub Base				
STABILISED WITH	Natural				
SUPPLIER	-				
CURING METHOD	-				
DATE TESTED	-				
DESCRIPTION	Lt Br Crs Cr Bslt Gr Fn to Med Gr Snd+Asp				- Specification COTO:2020
SIEVE ANALYSIS (% PASSING)					
100.0 mm					
75.00 mm					
63.00 mm					
50.00 mm	100				
37.50 mm	97				
28.00 mm	91				
20.00 mm	82				
14.00 mm	73				
5.000 mm	44				
2.000 mm	28				
0.425 mm	18				
0.075 mm	9				
SOIL MORTAR					
COARSE SAND <2.0mm >0.425mm	36				
FINE SAND <0.425mm >0.075mm	31				
MATERIAL <0.075mm	33				
CONSTANTS					
GRADING MODULUS	2,44				
PRA CLASSIFICATION	A-1-a(0)				
COLTO CLASSIFICATION	- | -				
TRH Class.(INSITU |93%|90%|)	- | -				
LIQUID LIMIT (%)	-				
PLASTICITY INDEX (0.425mm)	SP				
LINEAR SHRINKAGE (%)	1,0				
MDD					
MAXIMUM DRY DENSITY (kg/m^3)	2178				
OPTIMUM MOISTURE CONTENT(%)	7,8				
MOULDING MOISTURE (%)	7,5				
TYPE OF TEST	CBR				
CBR-UCS @ 100% MDD	0,0				
CBR-UCS @ 98% MDD	0,0				
CBR-UCS @ 97% MDD	0,0				
CBR-UCS @ 95% MDD	0,0				
CBR-UCS @ 93% MDD	0,0				
CBR-UCS @ 90% MDD	0,0				

CBR-UCS @ % MDD derived from calculation.

% SWELL MOULD [A][B][C]	0,00	0,00	0,10										

Remarks :

FORM: GR40

4.5.0(SGS)(2021.05.05)

Technical Signatory : Ronald Ramdeen

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Tel. : (031) 579 1220/1
Fax : (031) 579 1344
Email : rasalis.bhikam@sgs.com

sanas Testing Laboratory T 0239

TEST RESULTS

SNA
SNAVIA Building
285 Albertus Street
La Montagne, 0184
Attention: Leendert Theunissen

Project : Hluhluwe Interchange

Your Ref : TP12/2
Our Ref : 55430
Date Reported : 13.02.2024

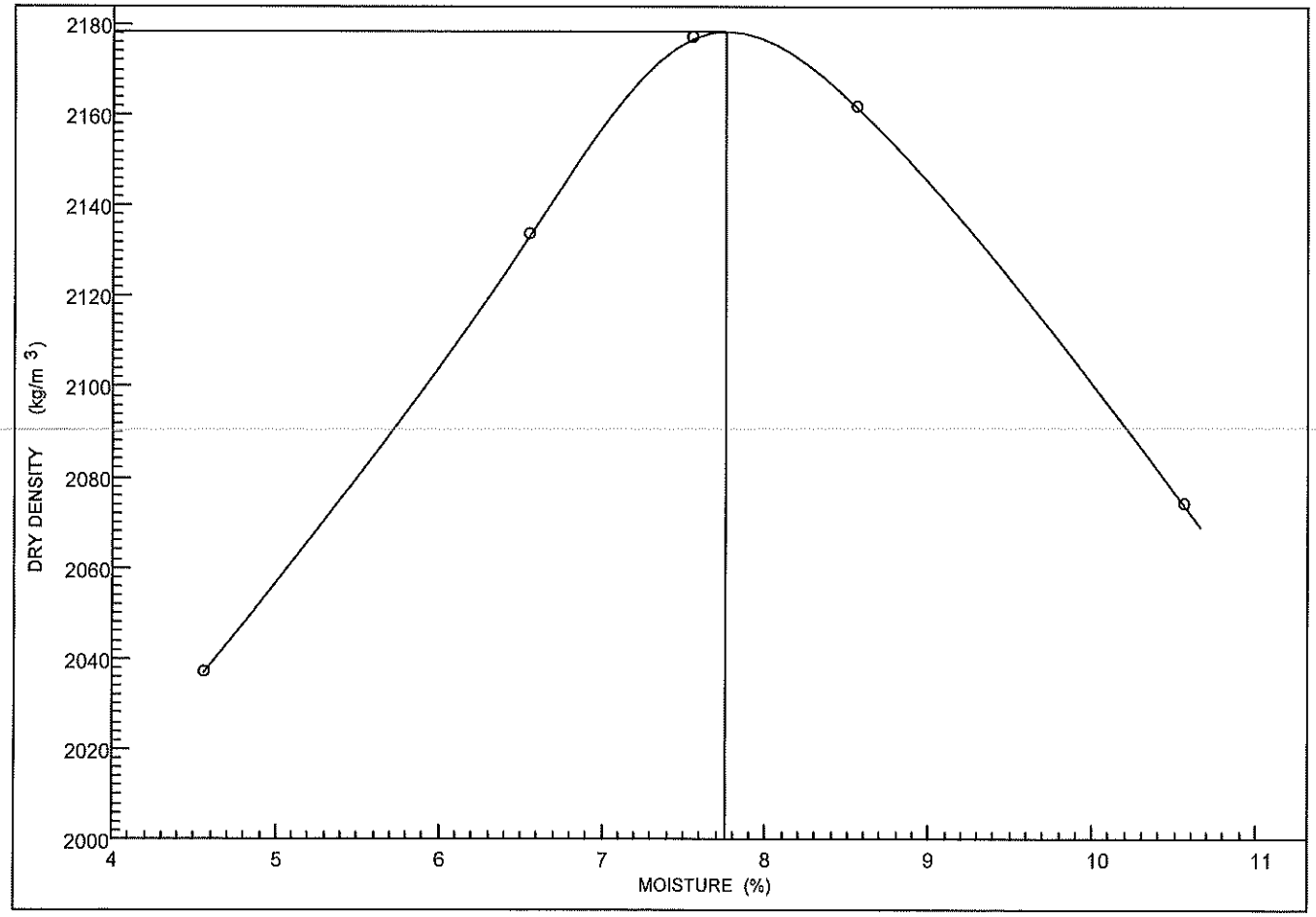
MOISTURE / DENSITY RELATIONSHIP(SANS 3001: GR30)

Sample No.: 0512	Hole No. : Km 51.56 Nb	Depth (mm) : 172 - 400
Origin : Ex Sub Base	Stabilized With : Natural	Compaction Energy : MDD
Material Description : Light Brown Coarse Orange Basalt Grvl+Fn to Med Grain Sand+Asphalt		

Maximum Dry Density (kg/m^3): 2178

Optimum Moisture Content (%) : 7,8

Point No.	1	2	3	4	5			
Moisture (%)	4,6	6,6	7,6	8,6	10,6			
Density (kg/m^3)	2037	2133	2177	2162	2074			



Remarks :

FORM: GR30

4.4.1(SGS)(2019.12.04)

Technical Signatory : Ronald Ramdeen

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60 Columbine Place, Glen Anil, Durban North, 4051

Tel. : (031) 579 1220/1
Fax : (031) 579 1344
Email : rasalis.bhikam@sgs.com

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TEST RESULTS

SNA SNAVIA Building 285 Albertus Street La Montagne, 0184 Attention: Leendert Theunissen	Project : Hluhluwe Interchange to Bushveld (N2). Your Ref : TP6/2 Our Ref : 55430/CC Date Reported : 06.03.2024

SIEVE ANALYSIS, CONSTANTS, CBR(SANS 3001:GR1,GR10,GR12,GR20,GR30,GR40)

SAMPLE NO.	487				Preparation Method:
HOLE NO.	TP6/2				
ROAD NO.	-				
DEPTH	162 - 392				
CHAINAGE	KM 49.29 NB				
LAYER TYPE	Sub Base				
STABILISED WITH	Natural				
SUPPLIER	-				
CURING METHOD	-				
DATE TESTED	-				
DESCRIPTION	Lt Br Crs Cr Bas Grv +Fn to Med Grain San				- Specification COTO:2020
SIEVE ANALYSIS (% PASSING)					
100.0 mm					
75.00 mm					
63.00 mm					
50.00 mm	100				
37.50 mm	99				
28.00 mm	97				
20.00 mm	94				
14.00 mm	89				
5.000 mm	61				
2.000 mm	43				
0.425 mm	23				
0.075 mm	16				
SOIL MORTAR					
COARSE SAND <2.0mm >0.425mm	46				
FINE SAND <0.425mm >0.075mm	17				
MATERIAL <0.075mm	37				
CONSTANTS					
GRADING MODULUS	2,18				
PRA CLASSIFICATION	A-1-b(0)				
COLTO CLASSIFICATION	G6				
TRH CLASSIFICATION	G7				
LIQUID LIMIT (%)	-				
PLASTICITY INDEX (0.425mm)	SP				
LINEAR SHRINKAGE (%)	1,5				
MDD					
MAXIMUM DRY DENSITY (kg/m^3)	2011				
OPTIMUM MOISTURE CONTENT(%)	12,3				
MOULDING MOISTURE (%)	12,0				
TYPE OF TEST	CBR				
CBR-UCS @ 100% MDD	86				
CBR-UCS @ 98% MDD	52				
CBR-UCS @ 97% MDD	41				
CBR-UCS @ 95% MDD	30				
CBR-UCS @ 93% MDD	22				
CBR-UCS @ 90% MDD	14				

CBR-UCS @ % MDD derived from calculation.

% SWELL MOULD [A][B][C]	0,00	0,00	0,10										

Remarks :

FORM: GR40

4.5.0(SGS)(2021.05.05)

Technical Signatory : Ronald Ramdeen

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60 Columbine Place, Glen Anil, Durban North, 4051

Tel. : (031) 579 1220/1
Fax : (031) 579 1344
Email : rasalis.bhikam@sgs.com

sanas Testing Laboratory T 0239

TEST RESULTS

SNA
SNAVIA Building
285 Albertus Street
La Montagne, 0184
Attention: Leendert Theunissen

Project : Hluhluwe Interchange

Your Ref : TP6/2
Our Ref : 55430
Date Reported : 05.03.2024

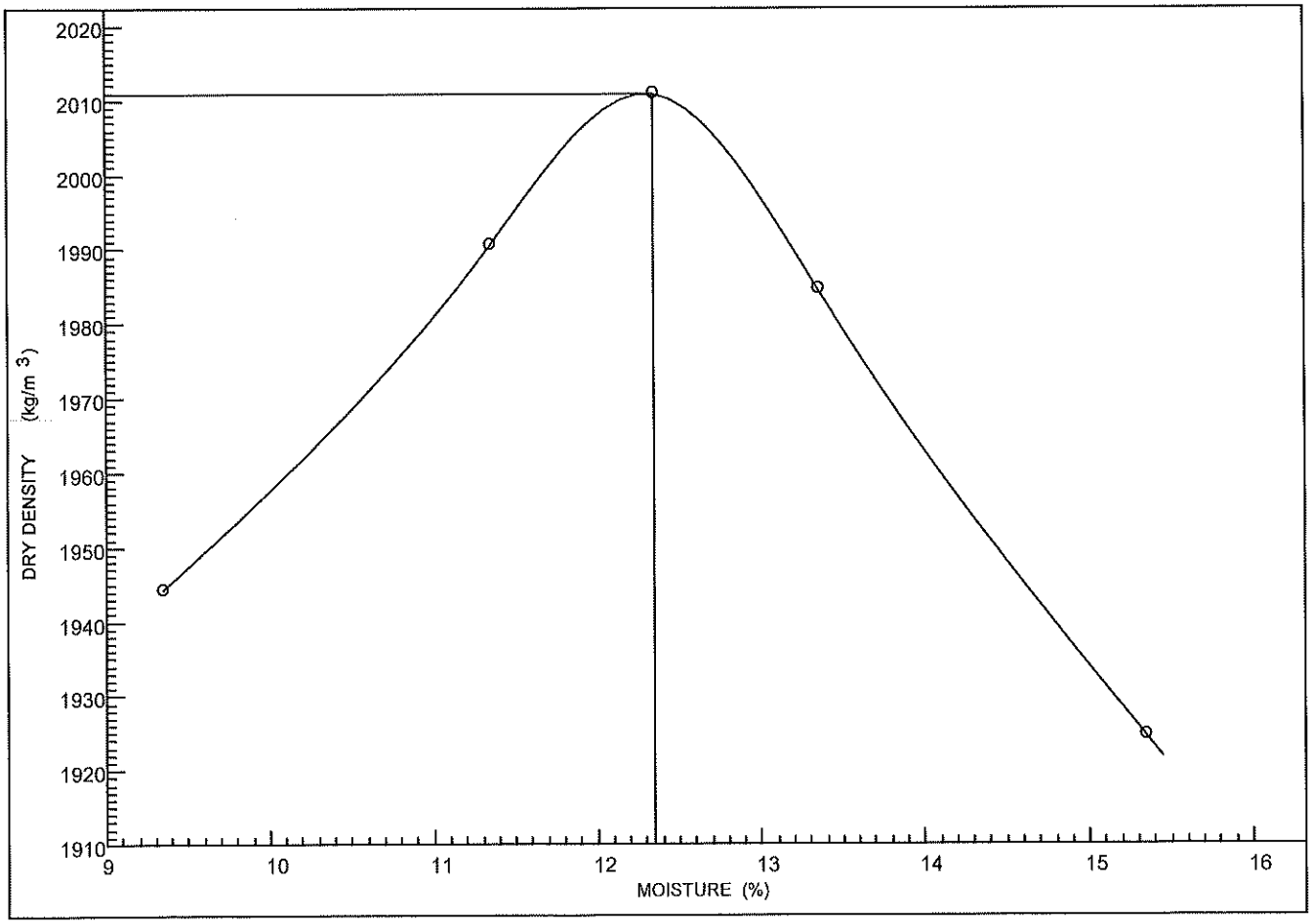
MOISTURE / DENSITY RELATIONSHIP(SANS 3001: GR30)

Sample No.: 487	Hole No. : Km 49.29	Depth (mm) : 162 - 392
Origin : Sub Base	Stabilized With : Natural	Compaction Energy : MDD
Material Description : Light Brown Coarse Cr Basalt Grv + Fine to Med Grain Sand		

Maximum Dry Density (kg/m^3): 2011

Optimum Moisture Content (%) : 12,3

Point No.	1	2	3	4	5			
Moisture (%)	9,3	11,3	12,3	13,3	15,3			
Density (kg/m^3)	1944	1991	2011	1985	1925			



Remarks :

FORM: GR30

4.4.1(SGS)(2019.12.04)

Technical Signatory : Ronald Ramdeen

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Email : rasalis.bhikam@sgs.com

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TEST RESULTS

SNA
SNAVIA Building
285 Albertus Street
La Montagne, 0184
Attention: Leendert Theunissen

Project : Hluhluwe Interchange to Bushveld (N2).

Your Ref : TP15/3
Our Ref : 55430/W
Date Reported : 06.03.2024

SIEVE ANALYSIS, CONSTANTS, CBR(SANS 3001:GR1,GR10,GR12,GR20,GR30,GR40)

SAMPLE NO.	0525				Preparation Method:
HOLE NO.	TP15/3				
ROAD NO.	-				
DEPTH	350 - 520				
CHAINAGE	Km 54.65 SB				
LAYER TYPE	Ex USSG				
STABILISED WITH	Natural				
SUPPLIER	-				
CURING METHOD	-				
DATE TESTED	-				
DESCRIPTION	Lt Yl Br Sl W/Bas Gr + Fn to Med Grn Sand				- Specification COTO:2020
SIEVE ANALYSIS (% PASSING)					
100.0 mm					
75.00 mm	100				
63.00 mm	97				
50.00 mm	94				
37.50 mm	88				
28.00 mm	79				
20.00 mm	72				
14.00 mm	64				
5.000 mm	40				
2.000 mm	23				
0.425 mm	10				
0.075 mm	8				
SOIL MORTAR					
COARSE SAND <2.0mm >0.425mm	55				
FINE SAND <0.425mm >0.075mm	12				
MATERIAL <0.075mm	33				
CONSTANTS					
GRADING MODULUS	2,59				
PRA CLASSIFICATION	A-1-a(0)				
COLTO CLASSIFICATION	G6				
TRH CLASSIFICATION	G7				
LIQUID LIMIT (%)	-				
PLASTICITY INDEX (0.425mm)	NP				
LINEAR SHRINKAGE (%)	0,0				
MDD					
MAXIMUM DRY DENSITY (kg/m^3)	2017				
OPTIMUM MOISTURE CONTENT(%)	11,9				
MOULDING MOISTURE (%)	11,6				
TYPE OF TEST	CBR				
CBR-UCS @ 100% MDD	77				
CBR-UCS @ 98% MDD	61				
CBR-UCS @ 97% MDD	54				
CBR-UCS @ 95% MDD	43				
CBR-UCS @ 93% MDD	31				
CBR-UCS @ 90% MDD	18				

CBR-UCS @ % MDD derived from calculation.

% SWELL MOULD [A][B][C]	0,00	0,00	0,10											

Remarks :

FORM: GR40

4.5.0(SGS)(2021.05.05)

Technical Signatory : Ronald Ramdeen

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T 0239

TEST RESULTS

SNA
SNAVIA Building
285 Albertus Street
La Montagne, 0184
Attention: Leendert Theunissen

Project : Hluhluwe Interchange

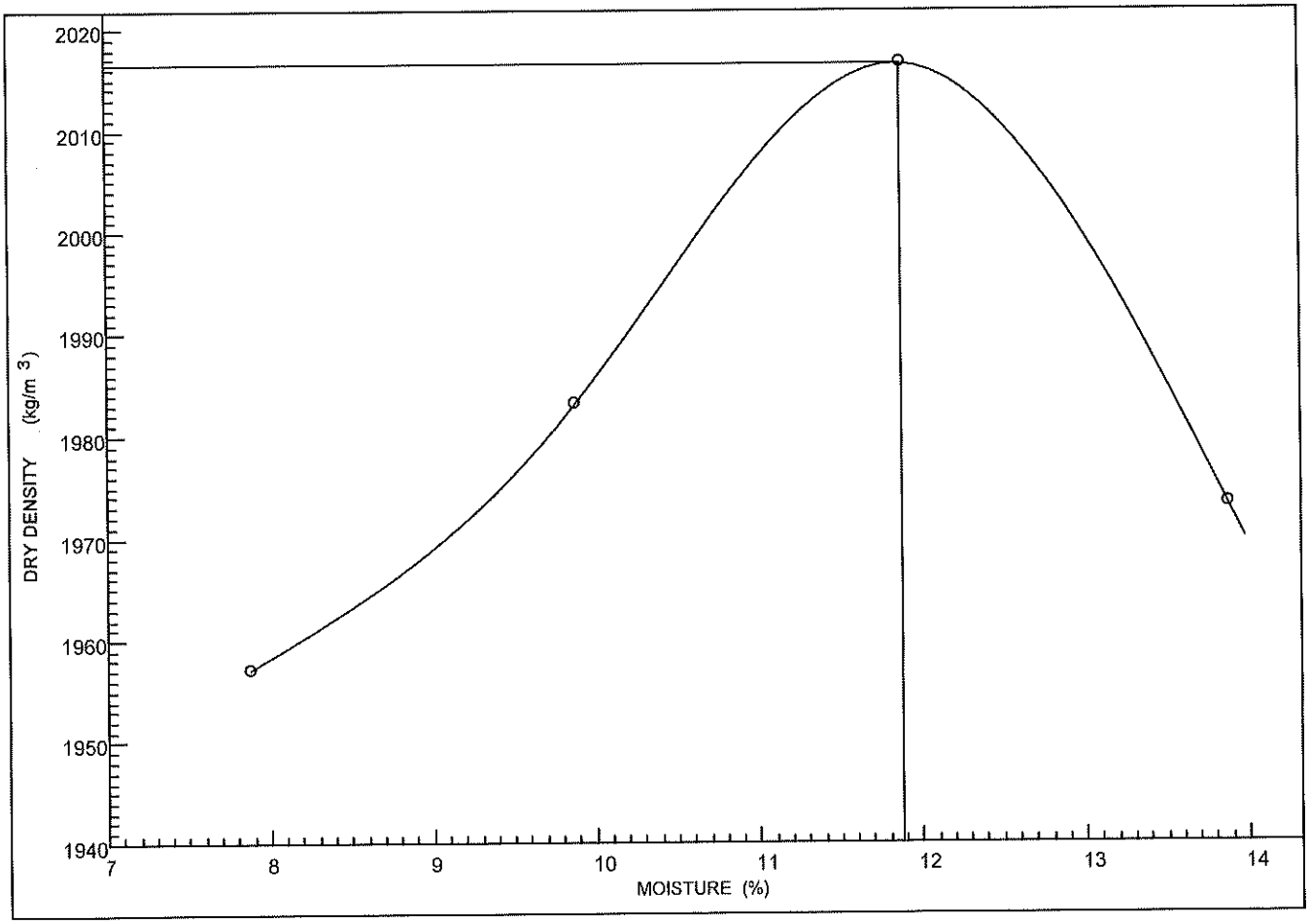
Your Ref : TP15/3
Our Ref : 55430
Date Reported : 05.03.2024

MOISTURE / DENSITY RELATIONSHIP(SANS 3001: GR30)

Sample No.: 525	Hole No. : Km 54.65	Depth (mm) : 350 - 520
Origin : USSG	Stabilized With : Natural	Compaction Energy : MDD
Material Description : Light Yellow Brown SI Weath Basalt Grv + Fine to Med Grain Sand		

Maximum Dry Density (kg/m^3): 2017
Optimum Moisture Content (%) : 11,9

Point No.	1	2	3	4				
Moisture (%)	7,9	9,9	11,9	13,9				
Density (kg/m^3)	1957	1983	2017	1973				



Remarks :

FORM: GR30

4.4.1(SGS)(2019.12.04)

Technical Signatory : Ronald Ramdeen

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- CIVIL ENGINEERING SERVICES -
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a SANAS Accredited Testing Laboratory, No. T 0239

60 Columbine Place, Glen Anil, Durban North, 4051

Tel. : (031) 579 1220/1
Fax : (031) 579 1344
Email : rasalis.bhikam@sgs.com

TEST RESULTS

SNA
SNAVIA Building
285 Albertus Street
La Montagne, 0184
Attention: Leendert Theunissen

Project : Hluhluwe Interchange to Bushveld (N2).

Your Ref : TP18/2
Our Ref : 55430/X
Date Reported : 06.03.2024

SIEVE ANALYSIS, CONSTANTS, CBR(SANS 3001:GR1,GR10,GR12,GR20,GR30,GR40)

SAMPLE NO.	0542				Preparation Method:
HOLE NO.	TP18/2				
ROAD NO.	-				
DEPTH	25 - 200				
CHAINAGE	Km 49.7 SB				
LAYER TYPE	-				
STABILISED WITH	Natural				
SUPPLIER	-				
CURING METHOD	-				
DATE TESTED	-				
DESCRIPTION	Dk Gr Cr Bas Grv+Fn to Med Sl Claye Sand				- Specification COTO:2020
SIEVE ANALYSIS (% PASSING)					
100.0 mm					
75.00 mm					
63.00 mm	100				
50.00 mm	97				
37.50 mm	96				
28.00 mm	90				
20.00 mm	79				
14.00 mm	68				
5.000 mm	43				
2.000 mm	29				
0.425 mm	18				
0.075 mm	9				
SOIL MORTAR					
COARSE SAND <2.0mm >0.425mm	37				
FINE SAND <0.425mm >0.075mm	32				
MATERIAL <0.075mm	31				
CONSTANTS					
GRADING MODULUS	2,43				
PRA CLASSIFICATION	A-1-a(0)				
COLTO CLASSIFICATION	G6				
TRH CLASSIFICATION	G6				
LIQUID LIMIT (%)	23				
PLASTICITY INDEX (0.425mm)	4				
LINEAR SHRINKAGE (%)	2,0				
MDD					
MAXIMUM DRY DENSITY (kg/m^3)	2301				
OPTIMUM MOISTURE CONTENT(%)	6,0				
MOULDING MOISTURE (%)	6,3				
TYPE OF TEST	CBR				
CBR-UCS @ 100% MDD	75				
CBR-UCS @ 98% MDD	57				
CBR-UCS @ 97% MDD	50				
CBR-UCS @ 95% MDD	39				
CBR-UCS @ 93% MDD	29				
CBR-UCS @ 90% MDD	18				

CBR-UCS @ % MDD derived from calculation.

% SWELL MOULD [A][B][C]	0,00	0,00	0,00										

Remarks :

FORM: GR40

4.5.0(SGS)(2021.05.05)

Technical Signatory : Ronald Ramdeen

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60 Columbine Place, Glen Anil, Durban North, 4051

Tel. : (031) 579 1220/1
Fax : (031) 579 1344
Email : rasalis.bhikam@sgs.com

TEST RESULTS

SNA
SNAVIA Building
285 Albertus Street
La Montagne, 0184
Attention: Leendert Theunissen

Project : Hluhluwe Interchange

Your Ref : TP18/2
Our Ref : 55430
Date Reported : 05.03.2024

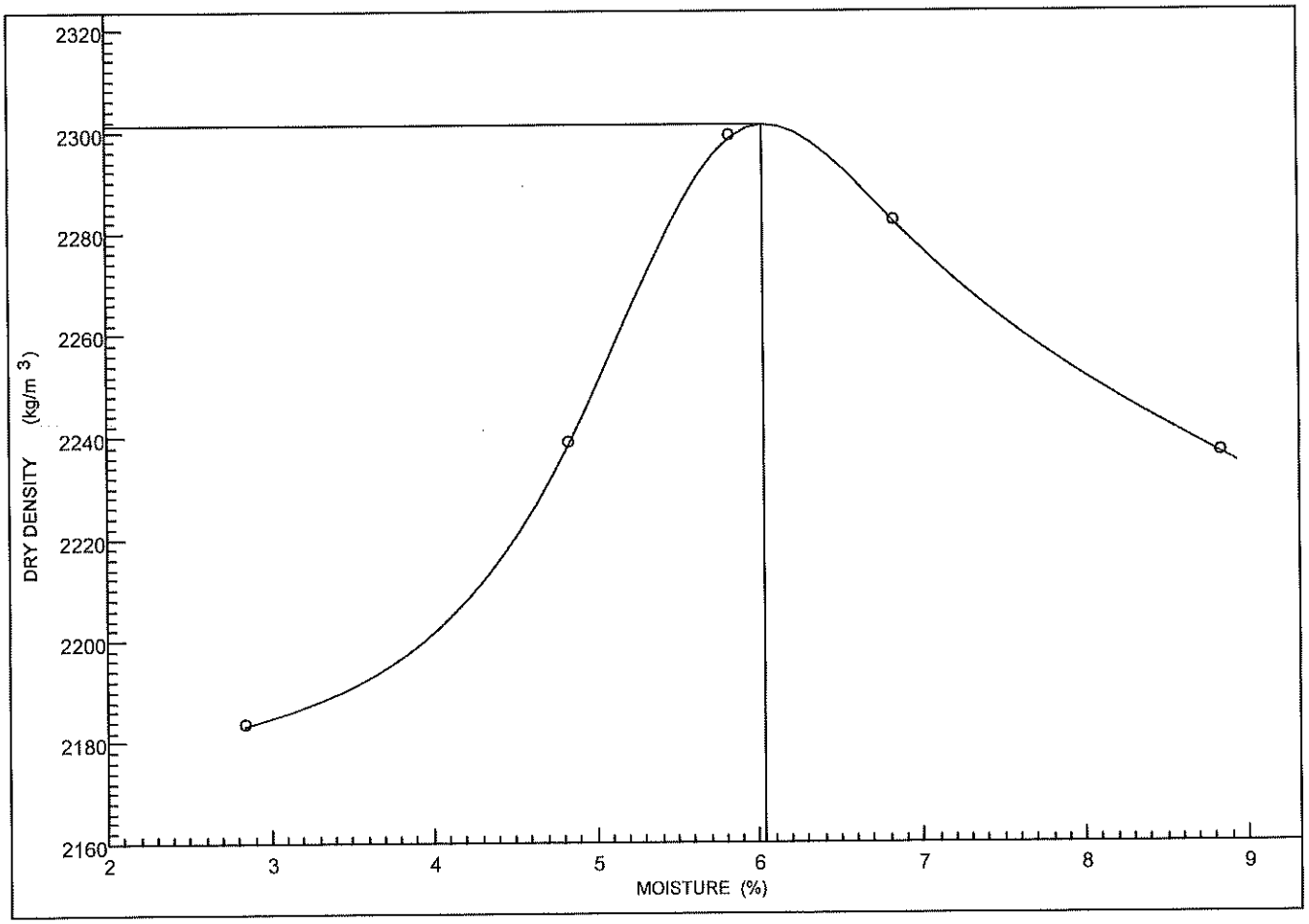
MOISTURE / DENSITY RELATIONSHIP(SANS 3001: GR30)

Sample No.: 542	Hole No. : Km 49.7	Depth (mm) : 25 - 200
Origin : -	Stabilized With : Natural	Compaction Energy : MDD
Material Description : Dark Grey Cr Basalt Grv + Fine to Med Sl Clayey Sand		

Maximum Dry Density (kg/m^3): 2301

Optimum Moisture Content (%) : 6,0

Point No.	1	2	3	4	5			
Moisture (%)	2,8	4,8	5,8	6,8	8,8			
Density (kg/m^3)	2183	2239	2299	2282	2237			



Remarks :

FORM: GR30

4.4.1(SGS)(2019.12.04)

Technical Signatory : Ronald Ramdeen

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60 Columbine Place, Glen Anil, Durban North, 4051

Tel. : (031) 579 1220/1
Fax : (031) 579 1344
Email : rasalis.bhikam@sgs.com

TEST RESULTS

SNA
SNAVIA Building
285 Albertus Street
La Montagne, 0184
Attention: Leendert Theunissen

Project : Hluhluwe Interchange to Bushveld (N2).

Your Ref : TP
Our Ref : 55430/Z
Date Reported : 03.2024

SIEVE ANALYSIS, CONSTANTS, CBR(SANS 3001:GR1,GR10,GR12,GR20,GR30,GR40)

SAMPLE NO.	0553				Preparation Method:
HOLE NO.	TP9/2				
ROAD NO.	-				
DEPTH	200 - 310				
CHAINAGE	Km 50.15 SB				
LAYER TYPE	-				
STABILISED WITH	Natural				
SUPPLIER	-				
CURING METHOD	-				
DATE TESTED	-				
DESCRIPTION	Dk Gr Fn to Med Grn Sl Cl Snd+Cr Bas Grv				- Specification COTO:2020
SIEVE ANALYSIS (% PASSING)					
100.0 mm	100				
75.00 mm	97				
63.00 mm	97				
50.00 mm	94				
37.50 mm	91				
28.00 mm	87				
20.00 mm	75				
14.00 mm	69				
5.000 mm	45				
2.000 mm	33				
0.425 mm	23				
0.075 mm	11				
SOIL MORTAR					
COARSE SAND <2.0mm >0.425mm	31				
FINE SAND <0.425mm >0.075mm	35				
MATERIAL <0.075mm	34				
CONSTANTS					
GRADING MODULUS	2,33				
PRA CLASSIFICATION	A-1-a(0)				
COLTO CLASSIFICATION	G6				
TRH CLASSIFICATION	G7				
LIQUID LIMIT (%)	-				
PLASTICITY INDEX (0.425mm)	SP				
LINEAR SHRINKAGE (%)	0,5				
MDD					
MAXIMUM DRY DENSITY (kg/m^3)	2214				
OPTIMUM MOISTURE CONTENT(%)	6,6				
MOULDING MOISTURE (%)	6,3				
TYPE OF TEST	CBR				
CBR-UCS @ 100% MDD	71				
CBR-UCS @ 98% MDD	54				
CBR-UCS @ 97% MDD	48				
CBR-UCS @ 95% MDD	34				
CBR-UCS @ 93% MDD	24				
CBR-UCS @ 90% MDD	14				

CBR-UCS @ % MDD derived from calculation.

% SWELL MOULD [A][B][C]	0,00	0,00	0,10										

Remarks :

FORM: GR40

4.5.0(SGS)(2021.05.05)

Technical Signatory : Ronald Ramdeen

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60 Columbine Place, Glen Anil, Durban North, 4051

Tel. : (031) 579 1220/1
Fax : (031) 579 1344
Email : rasalis.bhikam@sgs.com

TEST RESULTS

SNA
SNAVIA Building
285 Albertus Street
La Montagne, 0184
Attention: Leendert Theunissen

Project : Hluhluwe Interchange

Your Ref : TP9/2
Our Ref : 55430
Date Reported : 05.03.2024

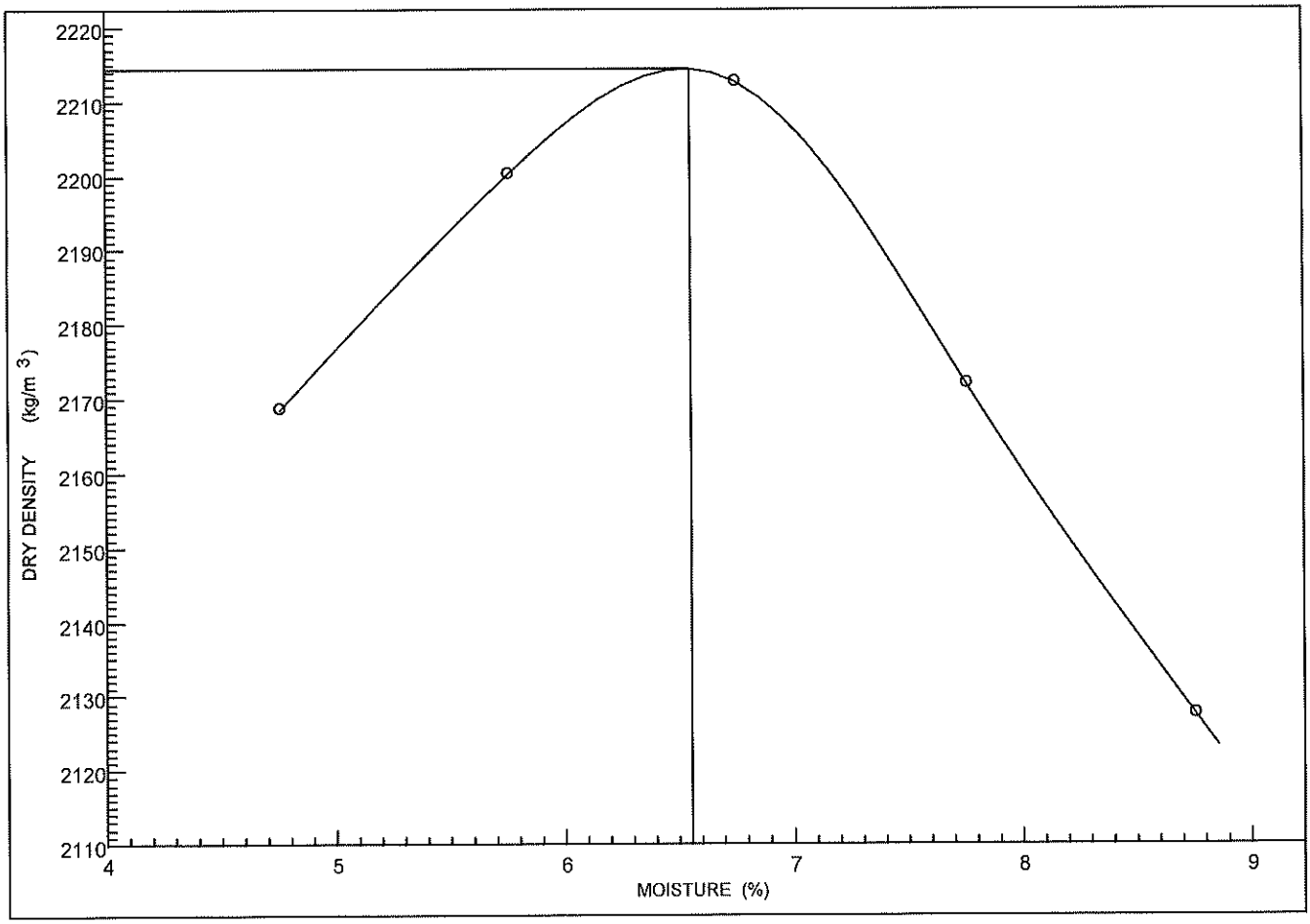
MOISTURE / DENSITY RELATIONSHIP(SANS 3001: GR30)

Sample No.: 553	Hole No. : Km 50.15	Depth (mm) : 200 - 310
Origin : -	Stabilized With : Natural	Compaction Energy : MDD
Material Description : Dark Gr Fine to Med Grain Sl CL Sand + Cr Basalt Grv		

Maximum Dry Density (kg/m^3): 2214

Optimum Moisture Content (%) : 6,6

Point No.	1	2	3	4	5			
Moisture (%)	4,8	5,8	6,8	7,8	8,8			
Density (kg/m^3)	2169	2200	2213	2172	2128			



Remarks :

FORM: GR30

4.4.1(SGS)(2019.12.04)

Technical Signatory : Ronald Ramdeen

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60 Columbine Place, Glen Anil, Durban North, 4051

Tel. : (031) 579 1220/1
Fax : (031) 579 1344
Email : rasalis.bhikam@sgs.com

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TEST RESULTS

SNA SNAVIA Building 285 Albertus Street La Montagne, 0184 Attention: Leendert Theunissen	Project : Hluhluwe Interchange to Bushveld (N2). Your Ref : TP16/5 Our Ref : 55430/HH Date Reported : 14.03.2024

SIEVE ANALYSIS, CONSTANTS, CBR(SANS 3001:GR1,GR10,GR12,GR20,GR30,GR40)

SAMPLE NO.	531				Preparation Method:
HOLE NO.	-				
ROAD NO.	-				
DEPTH	705 - 885				
CHAINAGE	Km 54.65 SB				
LAYER TYPE	Ex Insitu				
STABILISED WITH	Natural				
SUPPLIER	-				
CURING METHOD	-				
DATE TESTED	-				
DESCRIPTION	Dark Yellow Brown Clayey Silty Sand				- Specification COTO:2020
SIEVE ANALYSIS (% PASSING)					
100.0 mm					
75.00 mm					
63.00 mm					
50.00 mm					
37.50 mm					
28.00 mm	100				
20.00 mm	99				
14.00 mm	97				
5.000 mm	94				
2.000 mm	90				
0.425 mm	85				
0.075 mm	61				
SOIL MORTAR					
COARSE SAND <2.0mm >0.425mm	6				
FINE SAND <0.425mm >0.075mm	26				
MATERIAL <0.075mm	68				
CONSTANTS					
GRADING MODULUS	0,63				
PRA CLASSIFICATION	A-4(5)				
COLTO CLASSIFICATION	---				
TRH Class.(INSITU |93%|90%|)	G8|G9				
LIQUID LIMIT (%)	-				
PLASTICITY INDEX (0.425mm)	NP				
LINEAR SHRINKAGE (%)	0,0				
MDD					
MAXIMUM DRY DENSITY (kg/m^3)	1946				
OPTIMUM MOISTURE CONTENT(%)	11,5				
MOULDING MOISTURE (%)	11,2				
TYPE OF TEST	CBR				
CBR-UCS @ 100% MDD	24				
CBR-UCS @ 98% MDD	20				
CBR-UCS @ 97% MDD	18				
CBR-UCS @ 95% MDD	15				
CBR-UCS @ 93% MDD	12				
CBR-UCS @ 90% MDD	9,2				

CBR-UCS @ % MDD derived from calculation.

% SWELL MOULD [A][B][C]	0,10	0,20	0,20										

Remarks :

FORM: GR40

4.5.0(SGS)(2021.05.05)

Technical Signatory : Ronald Ramdeen

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60 Columbine Place, Glen Anil, Durban North, 4051

Tel. : (031) 579 1220/1
Fax : (031) 579 1344
Email : rasalis.bhikam@sgs.com

T 0239

TEST RESULTS

SNA
SNAVIA Building
285 Albertus Street
La Montagne, 0184
Attention: Leendert Theunissen

Project : Hluhluwe Interchange

Your Ref : TP16/5
Our Ref : 55430
Date Reported : 14.03.2024

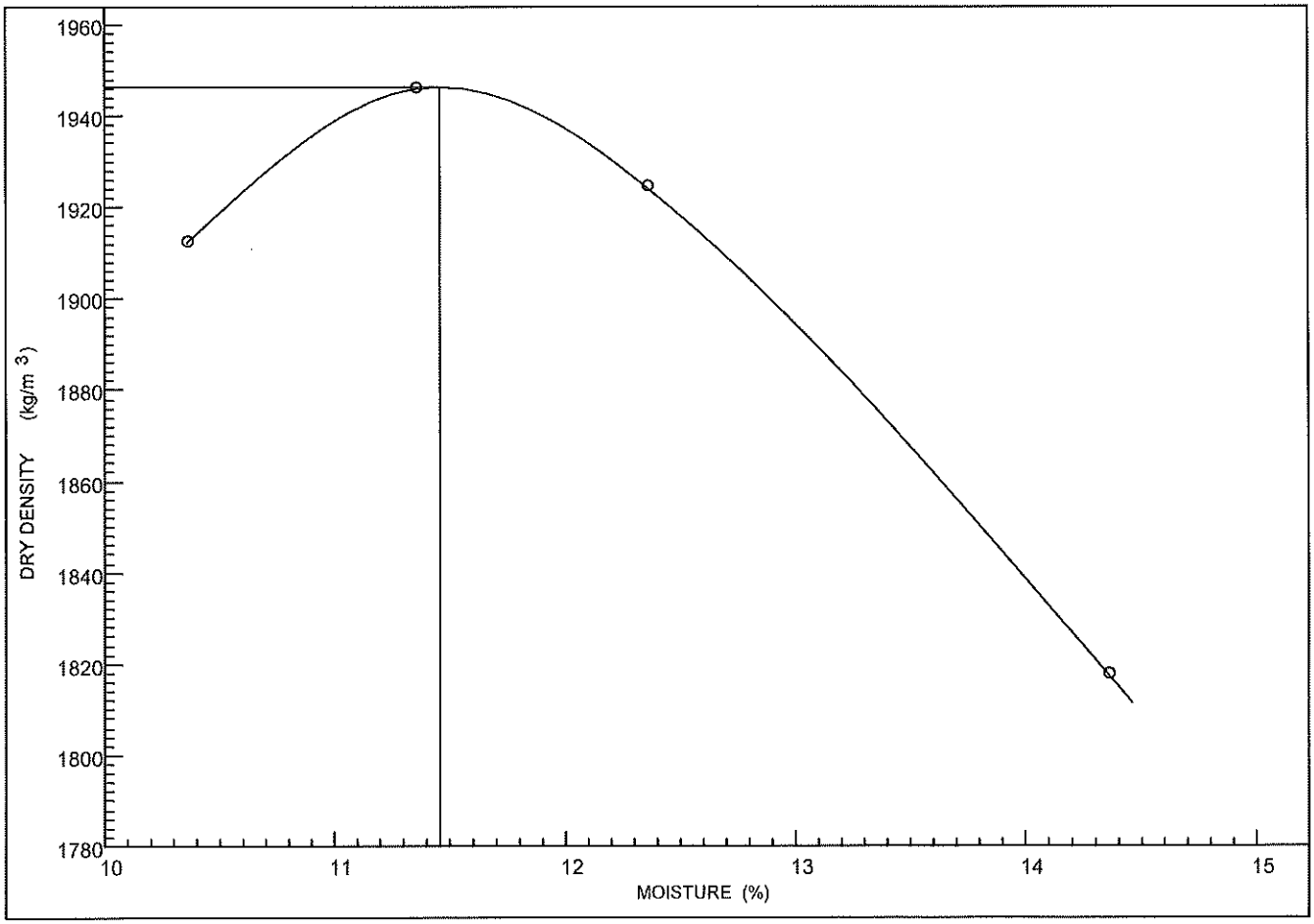
MOISTURE / DENSITY RELATIONSHIP(SANS 3001: GR30)

Sample No.: 0531	Hole No. : Km 48.87 SB	Depth (mm) : 705 - 885
Origin : Ex Insitu	Stabilized With : Natural	Compaction Energy : MDD
Material Description : Dark Yellow Brown Clayey Silty Sand		

Maximum Dry Density (kg/m^3): 1946

Optimum Moisture Content (%) : 11,5

Point No.	1	2	3	4				
Moisture (%)	10,4	11,4	12,4	14,4				
Density (kg/m^3)	1912	1946	1924	1818				



Remarks :

FORM: GR30

4.4.1(SGS)(2019.12.04)

Technical Signatory : Ronald Ramdeen

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60 Columbine Place, Glen Anil, Durban North, 4051

Tel. : (031) 579 1220/1
Fax : (031) 579 1344
Email : rasalis.bhikam@sgs.com

T 0239

TEST RESULTS

SNA SNAVIA Building 285 Albertus Street La Montagne, 0184 Attention: Leendert Theunissen	Project : Hluhluwe Interchange to Bushveld (N2). Your Ref : TP17/1 Our Ref : 55430/II Date Reported : 11.03.2024

SIEVE ANALYSIS, CONSTANTS, CBR(SANS 3001:GR1,GR10,GR12,GR20,GR30,GR40)

SAMPLE NO.	534				Preparation Method:
HOLE NO.	-				
ROAD NO.	-				
DEPTH	0 - 80				
CHAINAGE	Km 49.32 SB				
LAYER TYPE	Ex Base				
STABILISED WITH	Natural				
SUPPLIER	-				
CURING METHOD	-				
DATE TESTED	-				
DESCRIPTION	Dk Br fn to Med Grn Cl Snd + Cr Bas Grvl				- Specification COTO:2020
SIEVE ANALYSIS (% PASSING)					
100.0 mm					
75.00 mm					
63.00 mm					
50.00 mm					
37.50 mm	100				
28.00 mm	86				
20.00 mm	75				
14.00 mm	70				
5.000 mm	60				
2.000 mm	53				
0.425 mm	46				
0.075 mm	27				
SOIL MORTAR					
COARSE SAND <2.0mm >0.425mm	13				
FINE SAND <0.425mm >0.075mm	36				
MATERIAL <0.075mm	51				
CONSTANTS					
GRADING MODULUS	1,74				
PRA CLASSIFICATION	A-2-4(0)				
COLTO CLASSIFICATION	G9				
TRH Class.(INSITU |93%|90%|)	G9|G10				
LIQUID LIMIT (%)	26				
PLASTICITY INDEX (0.425mm)	8				
LINEAR SHRINKAGE (%)	4,0				
MDD					
MAXIMUM DRY DENSITY (kg/m^3)	1915				
OPTIMUM MOISTURE CONTENT(%)	14,0				
MOULDING MOISTURE (%)	14,3				
TYPE OF TEST	CBR				
CBR-UCS @ 100% MDD	20				
CBR-UCS @ 98% MDD	16				
CBR-UCS @ 97% MDD	14				
CBR-UCS @ 95% MDD	11				
CBR-UCS @ 93% MDD	8,6				
CBR-UCS @ 90% MDD	6,1				

CBR-UCS @ % MDD derived from calculation.

% SWELL MOULD [A][B][C]	1,00	1,10	1,20										

Remarks :

FORM: GR40

4.5.0(SGS)(2021.05.05)

Technical Signatory : Ronald Ramdeen

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60 Columbine Place, Glen Anil, Durban North, 4051

Tel. : (031) 579 1220/1
Fax : (031) 579 1344
Email : rasalis.bhikam@sgs.com

TEST RESULTS

SNA
SNAVIA Building
285 Albertus Street
La Montagne, 0184
Attention: Leendert Theunissen

Project : Hluhluwe Interchange

Your Ref : TP17/1
Our Ref : 55430
Date Reported : 05.03.2024

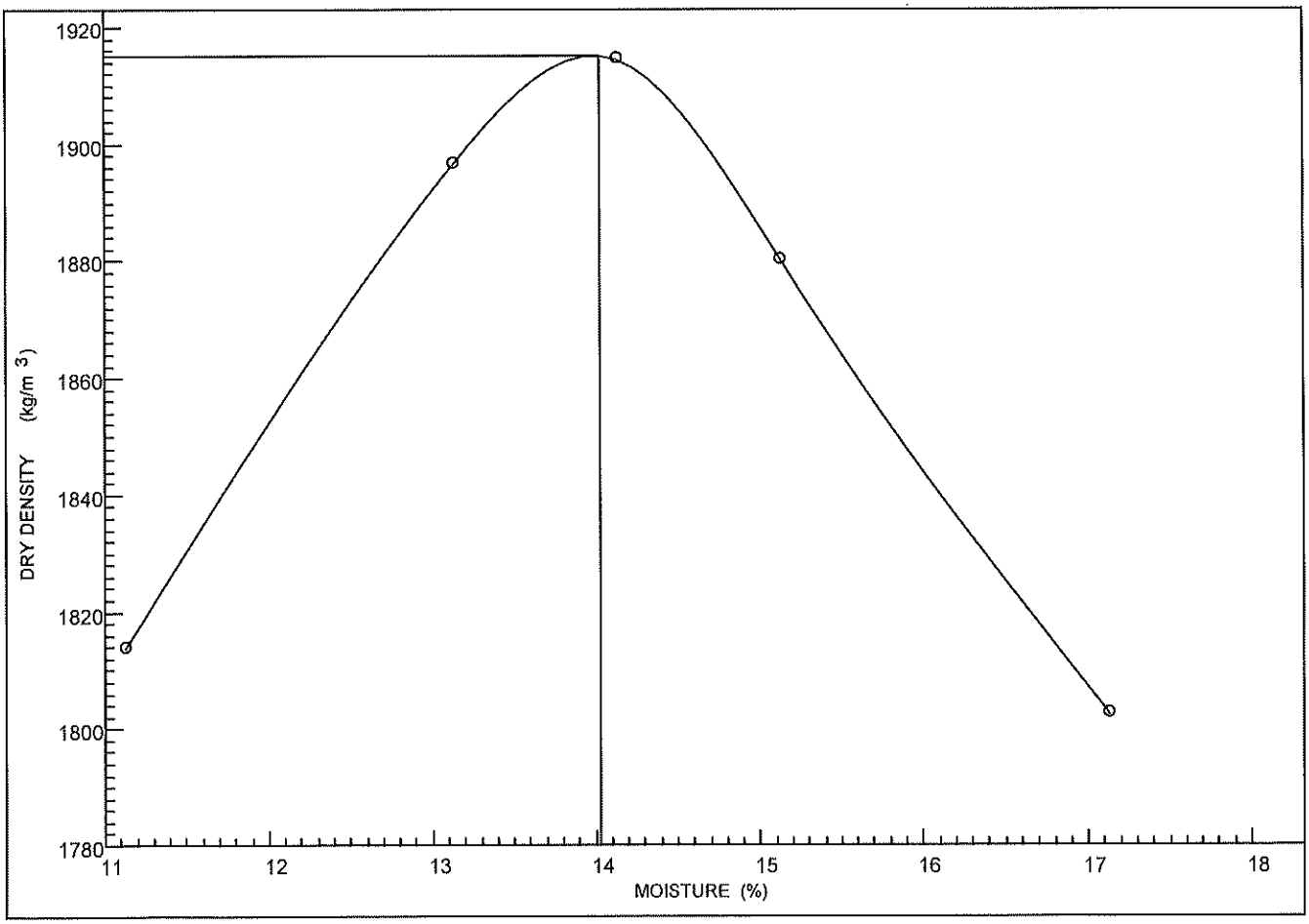
MOISTURE / DENSITY RELATIONSHIP(SANS 3001: GR30)

Sample No.: 534	Hole No. : Km 54.65	Depth (mm) : 0 - 80
Origin : Base	Stabilized With : Natural	Compaction Energy : MDD
Material Description : Dark Brown Fine to Med Grain Cl Sand + Cr Basalt Gravel		

Maximum Dry Density (kg/m^3): 1915

Optimum Moisture Content (%) : 14,0

Point No.	1	2	3	4	5			
Moisture (%)	11,1	13,1	14,1	15,1	17,1			
Density (kg/m^3)	1814	1897	1914	1880	1803			



Remarks :

FORM: GR30

4.4.1(SGS)(2019.12.04)

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60 Columbine Place, Glen Anil, Durban North, 4051

Tel. : (031) 579 1220/1
Fax : (031) 579 1344
Email : rasalis.bhikam@sgs.com

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TEST RESULTS

SNA
SNAVIA Building
285 Albertus Street
La Montagne, 0184
Attention: Leendert Theunissen

Project : Hluhluwe Interchange to Bushveld (N2).

Your Ref : TP23/1
Our Ref : 55430/MM
Date Reported : 12.03.2024

SIEVE ANALYSIS, CONSTANTS, CBR(SANS 3001:GR1,GR10,GR12,GR20,GR30,GR40)

SAMPLE NO.	572				Preparation Method:
HOLE NO.	-				
ROAD NO.	-				
DEPTH	0 - 200				
CHAINAGE	KM 50.55 SB				
LAYER TYPE	-				
STABILISED WITH	Natural				
SUPPLIER	-				
CURING METHOD	-				
DATE TESTED	-				
DESCRIPTION	Dk Gr Br Medium to Fine Clay Sand				- Specification COTO:2020
SIEVE ANALYSIS (% PASSING)					
100.0 mm					
75.00 mm					
63.00 mm					
50.00 mm					
37.50 mm					
28.00 mm					
20.00 mm	100				
14.00 mm	100				
5.000 mm	92				
2.000 mm	82				
0.425 mm	76				
0.075 mm	24				
SOIL MORTAR					
COARSE SAND <2.0mm >0.425mm	7				
FINE SAND <0.425mm >0.075mm	64				
MATERIAL <0.075mm	29				
CONSTANTS					
GRADING MODULUS	1,18				
PRA CLASSIFICATION	A-2-4(0)				
COLTO CLASSIFICATION	---				
TRH Class.(INSITU ¦93%¦90%¦)	- ¦ -				
LIQUID LIMIT (%)	-				
PLASTICITY INDEX (0,425mm)	NP				
LINEAR SHRINKAGE (%)	0,0				
MDD					
MAXIMUM DRY DENSITY (kg/m^3)	1637				
OPTIMUM MOISTURE CONTENT(%)	19,5				
MOULDING MOISTURE (%)	19,2				
TYPE OF TEST	CBR				
CBR-UCS @ 100% MDD	7,4				
CBR-UCS @ 98% MDD	5,5				
CBR-UCS @ 97% MDD	4,7				
CBR-UCS @ 95% MDD	3,5				
CBR-UCS @ 93% MDD	2,6				
CBR-UCS @ 90% MDD	1,7				

CBR-UCS @ % MDD derived from calculation.

% SWELL MOULD [A][B][C]	2,40	2,60	2,80										

Remarks :

FORM: GR40

4.5.0(SGS)(2021.05.05)

Technical Signatory : Ronald Ramdeen

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- CIVIL ENGINEERING SERVICES -
Reg.No.: 2003/029180/07 - VAT. Reg.No.: 4040210587
a SANAS Accredited Testing Laboratory, No. T 0239

60 Columbine Place, Glen Anil, Durban North, 4051

Tel. : (031) 579 1220/1
Fax : (031) 579 1344
Email : rasalis.bhikam@sgs.com

TEST RESULTS

SNA
SNAVIA Building
285 Albertus Street
La Montagne, 0184
Attention: Leendert Theunissen

Project : Hluhluwe Interchange

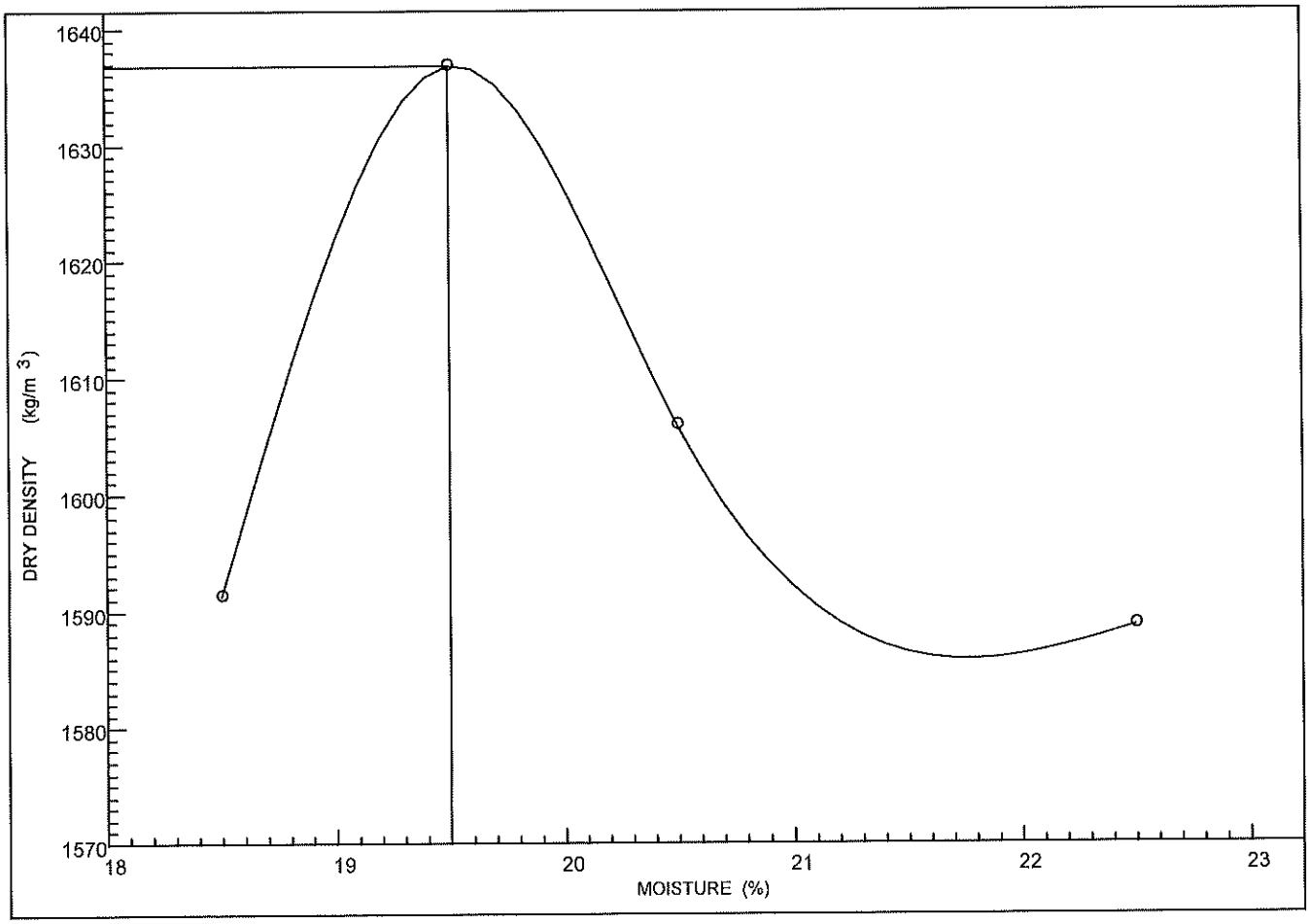
Your Ref : TP23/1
Our Ref : 55430
Date Reported : 12.03.2024

MOISTURE / DENSITY RELATIONSHIP(SANS 3001: GR30)

Sample No.: 572	Hole No. : Km 50.55	Depth (mm) : 0 - 200
Origin : -	Stabilized With : Natural	Compaction Energy : MDD
Material Description : Dark Grey Brown Medium to Fine Clay Sand		

Maximum Dry Density (kg/m^3): 1637
Optimum Moisture Content (%) : 19,5

Point No.	1	2	3	4				
Moisture (%)	18,5	19,5	20,5	22,5				
Density (kg/m^3)	1591	1637	1606	1589				



Remarks :

FORM: GR30

4.4.1(SGS)(2019.12.04)

Technical Signatory : Ronald Ramdeen

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