NORWEST HOLST
SOIL ENGINEERING

TEST REPORT

UKAS TESTING
1265

Serial number: LT1050 | Date of issue: 14/03/2008 |

Issued by Norwest Holst Limited - Soil Engineering Division,
Parkside Lane,
Dewsbury Road,
Leeds
LS11 5SX.
Tel: 0113 2711111
Fax: 0113 2760472
Email: soils@norwest.co.uk

Authorised signatory

M. J. Baldwin (Technical Manager)
R. J. Rogers (Principal Engineer)
S. Kirk (Laboratory Manager)
S. K. Sharda (Assistant Laboratory Manager)

Customer name: SRK Consulting
Address: Albion Spring
183 Main Road
Rombebosch
Cape Town
7700
South Africa

Contract name: Koeberg - 385908 - 42C
Your reference: K5888

Dates of receipt of samples: 28/02/2008

Dates of testing: 04/03/2008 to 14/03/2008

Testing was performed to the standard named on individual test results.

Sampling was not performed by the Laboratory of Norwest Holst Soil Engineering.

Testing was performed on 4 number of samples received in good condition.

Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation.

Results reported relate only to the samples tested.

Tests marked 'Not UKAS' in this report are not included in the UKAS accreditation schedule for our laboratory. These results will appear in italics on any summary of tests.

Samples will be retained for 28 days from date of issue of this report and then be disposed of, unless we receive written instruction to the contrary

Quality Control Check performed by K. A. Walker (Laboratory Quality Manager)

Key to Laboratory Summary Sheets

Common to all summaries				
Sample Type	U	Undisturbed sample	D	Small disturbed sample
	P	Piston sample	B	Bulk disturbed sample
	TW	Thin walled sample	BLK	Block sample
	L	Liner sample	C	Rock core
	AMAL	Amalgamated sample		
Test status	Any result in *italics* indicates a test that is not within the scope of the UKAS accreditation for this laboratory.			
Summary of Laboratory Soil Tests: Index / Classification Tests				
Particle density	p	Small pyknometer method	g	Gas jar method
Plastic index	N/P	Non plastic, although liquid limit will have been determined if requested		
Particle size (PSD)	1	Following value in silt column denotes combined clay and silt fraction		
	p	Following value in clay column denotes sedimentation by pipette, else sedimentation is by hydrometer.		
Summary of Laboratory Soil Tests: Strength and Permeability Tests				
Triaxial	UU	Single stage unconsolidated quick undrained	UUM	Multi stage unconsolidated quick undrained
	UU3	Set of 3 unconsolidated quick undrained	CU	Single stage consolidated undrained
	CUM	Multi stage consolidated undrained	CU3	Set of 3 consolidated undrained
	CD	Single stage consolidated drained	CDM	Multi stage consolidated drained
	CD3	Set of 3 consolidated drained		
	Note that single stage tests are reported assuming $\phi = 0$ for total stress and $c' = 0$ for effective stress			
Consol	Oed	One-dimensional oedometer	Hyd	Hydraulic cell consolidation
	m_v	coefficient of compressibility quoted for p0 to p0 + 100kPa, where determined		
Permeability	C	Constant head permeability	T	Triaxial permeability
Shearbox	SSB	Small shear box	LSB	Large shear box
	p	Peak value	r	Residual value
	RS	Ring shear		
Summary of Laboratory Soil Re-Use Test				
MCV	s	* MCV value at natural or specified moisture content	int	Intercept of calibration line in MCV calibration
Summary of Laboratory Rock Strength Tests				
Point Load Type (Combination of)	D	Diametral	A	Axial
	I	Irregular lump	B	Block
	L	Test performed parallel to planes of weakness		
	P	Test performed perpendicular to planes of weakness		
	X	Invalid failure of point load (not broken between points of load application)		
Summary of Laboratory Rock Materials Tests				
Ten% fines	w	Soaked test	d	Dry test
Point Load Index Result				
Point Load Type (Combination of)	D	Diametral	A	Axial
	I	Irregular lump	B	Block
	L	Parallel to planes of weakness	P	Perpendicular to planes of weakness
	X	Invalid failure of point load (not broken between points of load application)		
Dimensions	W	Diameter of core or average smallest width perpendicular to axis of loading in a block or irregular lump		
	D	Distance between platens when just in contact with specimen		
	D'	Distance between platens at point of failure		
	De	Equivalent core diameter	Is	P/De^2
	Is(50)	F x Is	F	$(De/50)^{0.45}$
	Is(50) point load strength index corrected for a diametral test of core diameter 50mm			
	For Axial/Lump tests $De^2 = (4/Pi) \times (W \times D')$		For Diametral tests $De^2 = D \times D'$	

Important note: summary sheets are provided for convenience and in no way replace individual test result sheets which shall, without exception, be regarded as the definitive result.

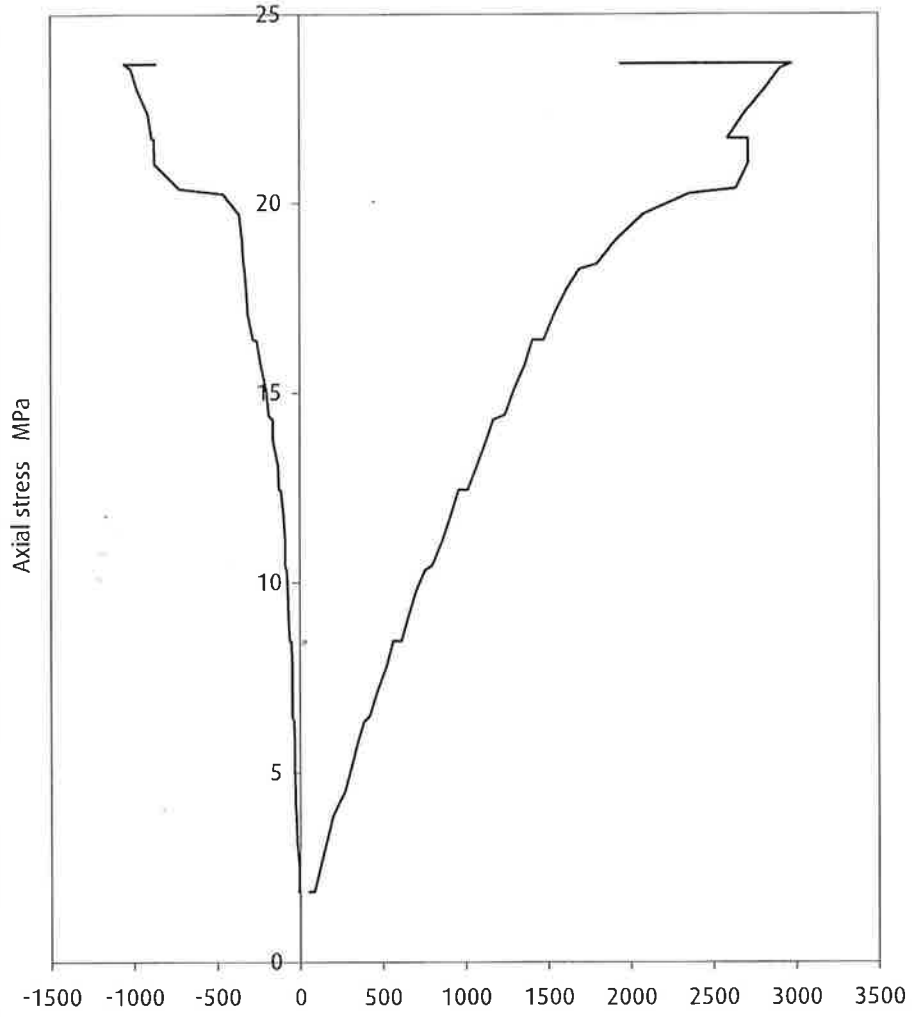
Project Name	Koeberg - 385908 - 42C
Project No.	LT1050
Engineer	Ben Engelsman
Client	SRK Consulting

Summary Of Laboratory Rock Strength Tests

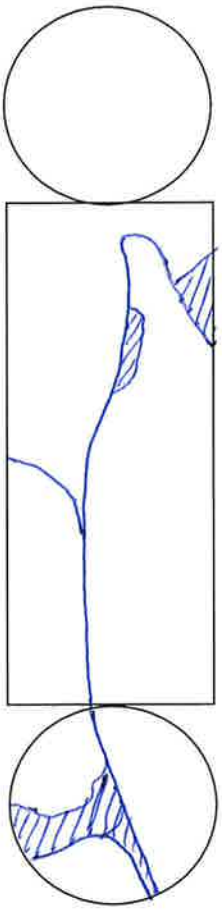
Hole ID	Sample depth m	Sample no.	Sample type	Specimen depth m	Specimen no.	Water Content	Bulk Density	Dry Density	Particle density	Point load			UCS	Brazil	Porosity	Elastic Modulus	Posisssons Ratio
										Type	I_s	I_s50					
						%	kg/m³	kg/m³	Mg/m³		MN/m²	MN/m²	MN/m²	MN/m²	%	GPa	
KB1	18.670	001	C	18.670	01	4.7	2460	2350					*24.8*			*11.5*	*0.132*
KB12	33.000	002	C	33.000	01	0.9	2770	2750					*34.6*			*58*	*0.17*
KB27	22.180	003	C	22.180	01	4.5	2360	2260					*21.5*			*9.87*	*0.155*
KB36	26.280	004	C	26.280	01	0.4	2700	2690					*123*			*101.5*	*0.313*
								End									

Project Name	Koeberg - 385908 - 42C	**Unconfined Compressive Strength With Youngs Modulus And Poissons Ratio**	Hole ID: KB1
Project No.	LT1050		Sample Depth: 18.67m
Engineer	Ben Engelsman		Sample Number: 001
Client	SRK Consulting	I.S.R.M. Suggested methods 1981	Sample Type: C
Description	Grey metamorphic SHALE.		Specimen Depth: 18.67m
			Specimen Number: 1

Graph of stress strain curves



Failure sketch



Failure type: Axial

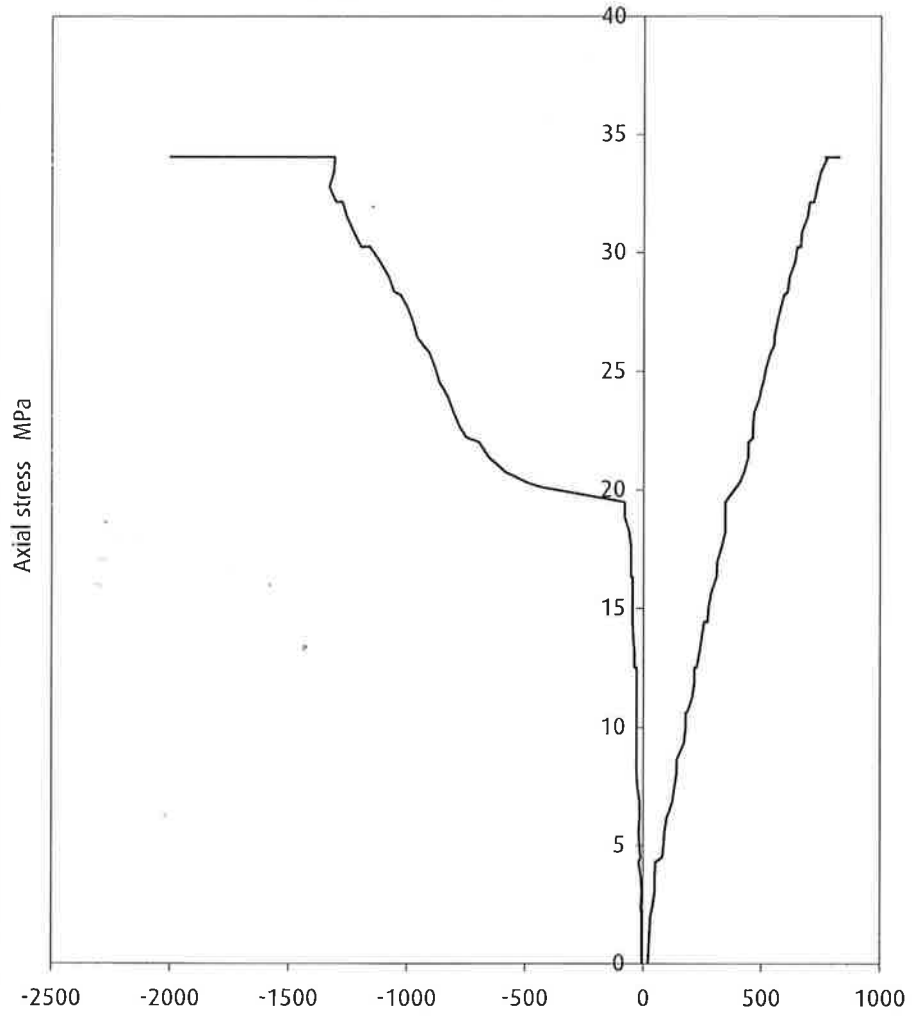
Moisture content	%	4.7	Stress rate	MPa/s	0.10	Tangent modulus	E_t	9.36 GPa
Length	mm	139.97	Test duration	min	04:11	Average modulus	E_{ave}	9.86 GPa
Diameter	mm	50.44	U.C.S.	MPa	24.8	Secant modulus	E_{sec}	11.5 GPa
Mass	g	689.00	Type of machine	Controls 1300/Automax 5		Poissons ratio (Determined using E_{ave})	v	0.132
Bulk density	kg/m^3	2460						
Dry density	kg/m^3	2350						
Date		04/03/2008						

Test remarks

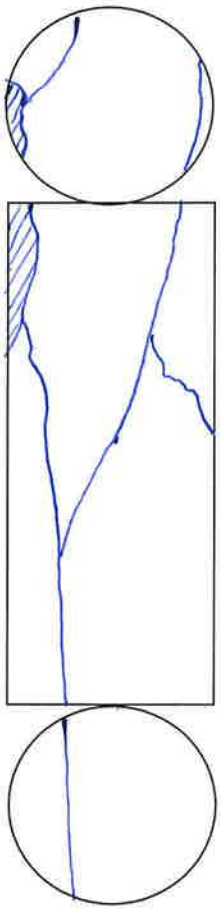
Specimen remarks: Top and bottom of specimen fails ISRM criteria for perpendicularity and/or flatness. Top of specimen is flat and perpendicular to 0.441mm. Bottom of specimen is flat and perpendicular to 0.317mm.

Project Name	Koeberg - 385908 - 42C	**Unconfined Compressive Strength With Youngs Modulus And Poissons Ratio**	Hole ID KB12
Project No.	LT1050		Sample Depth 33.00m
Engineer	SRK Consulting		Sample Number 002
Client	SRK Consulting	I.S.R.M. Suggested methods 1981	Sample Type C
Description	Grey metamorphic SHALE.		Specimen Depth 33.00m
			Specimen Number 1

Graph of stress strain curves



Failure sketch



Failure type: Axial

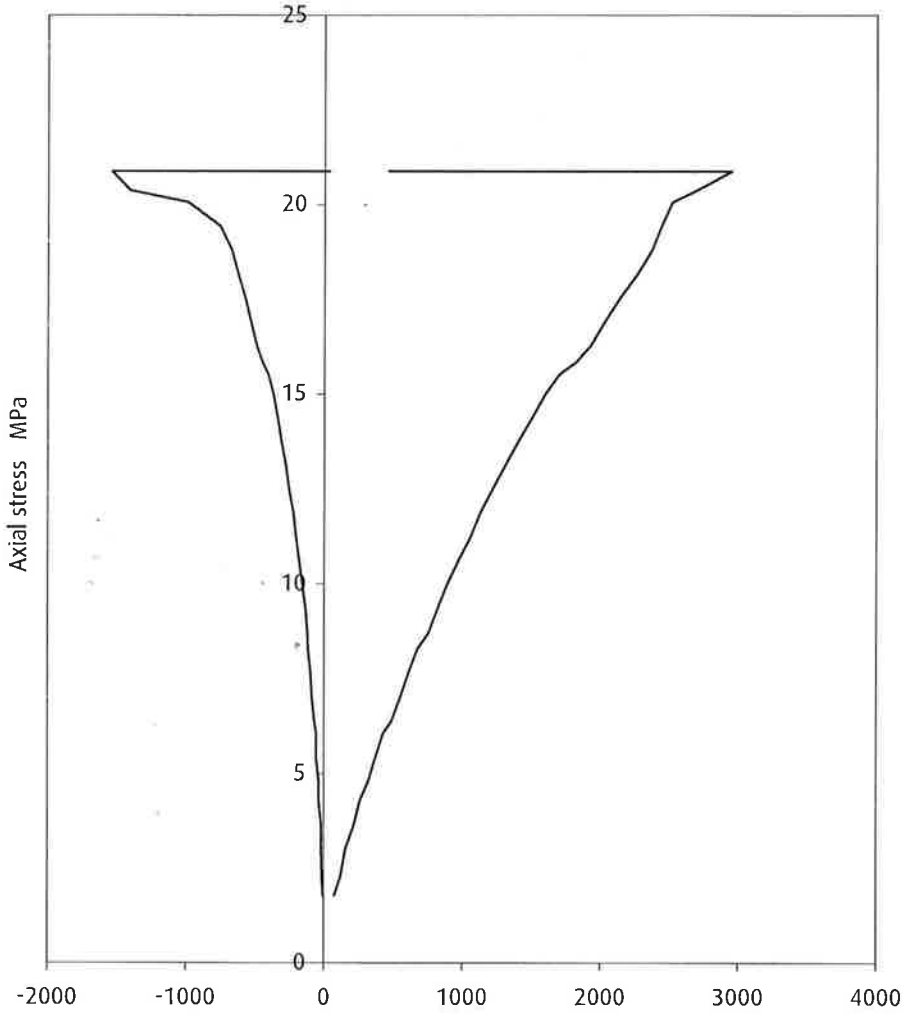
Moisture content	%	0.9	Stress rate	MPa/s	0.09	Tangent modulus	E_t	53.7 GPa
Length	mm	139.19	Test duration	min	06:08	Average modulus	E_{ave}	51.5 GPa
Diameter	mm	51.59	U.C.S.	MPa	34.6	Secant modulus	E_{sec}	58.0 GPa
Mass	g	806.44	Type of machine	Controls 1300/Automax 5		Poissons ratio (Determined using E_{ave})	v	0.170
Bulk density	kg/m^3	2770						
Dry density	kg/m^3	2750						
Date		03/03/2008						

Test remarks

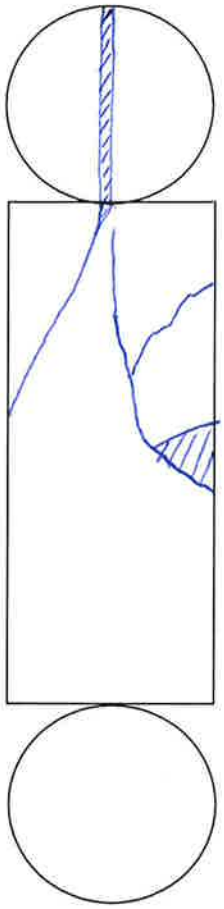
Specimen remarks: Top and bottom of specimen fails ISRM criteria for perpendicularity and/or flatness. Top of specimen is flat and perpendicular to 0.298mm. Bottom of specimen is flat and perpendicular to 0.319mm.

Project Name	Koeberg - 385908 - 42C	**Unconfined Compressive Strength With Youngs Modulus And Poissons Ratio**	Hole ID KB27
Project No.	LT1050		Sample Depth 22.18m
Engineer	SRK Consulting		Sample Number 003
Client	SRK Consulting	I.S.R.M. Suggested methods 1981	Sample Type C
Description	Grey fine grained SANDSTONE.		Specimen Depth 22.18m
			Specimen Number 1

Graph of stress strain curves



Failure sketch



Failure type: Irregular

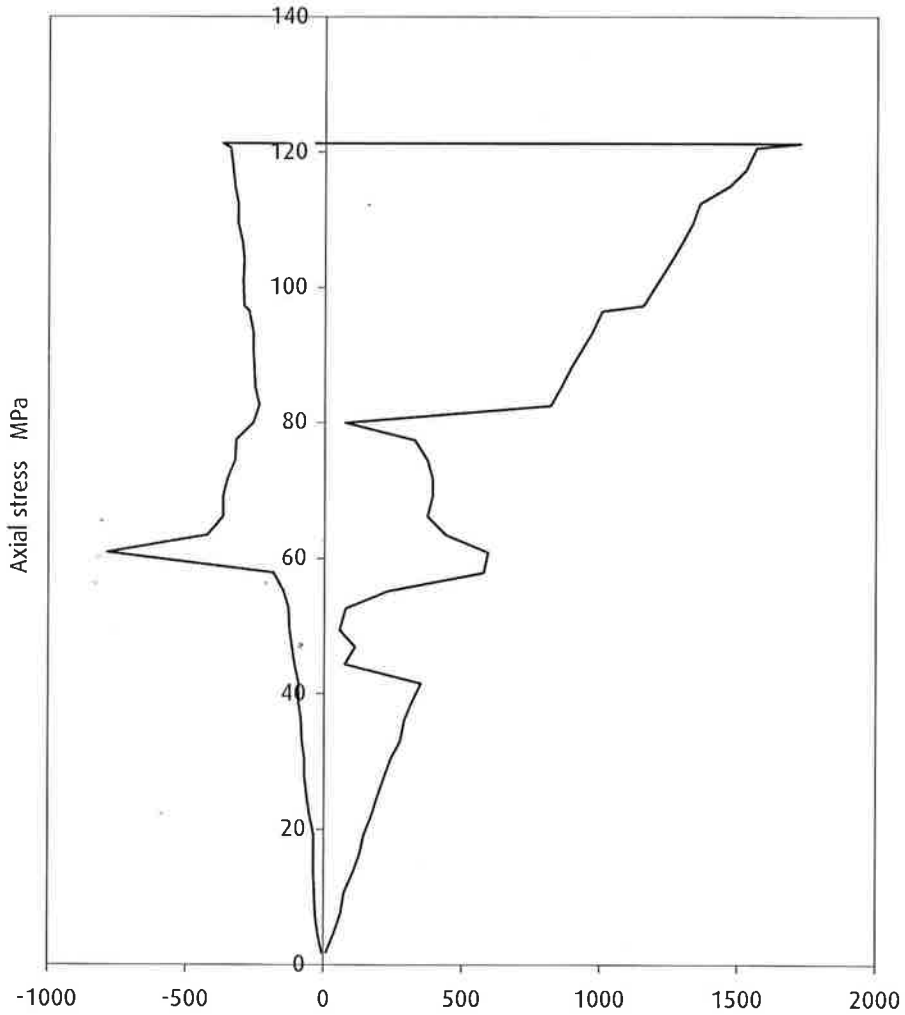
Moisture content	%	4.5	Stress rate	MPa/s	0.12	Tangent modulus	E_t	7.68 GPa
Length	mm	140.82	Test duration	min	02:58	Average modulus	E_{ave}	8.31 GPa
Diameter	mm	51.65	U.C.S.	MPa	21.5	Secant modulus	E_{sec}	9.87 GPa
Mass	g	696.00	Type of machine	Controls 1300/Automax 5		Poissons ratio	v	0.155
Bulk density	kg/m^3	2360				(Determined using E_{ave})		
Dry density	kg/m^3	2260						
Date		05/03/2008						

Test remarks

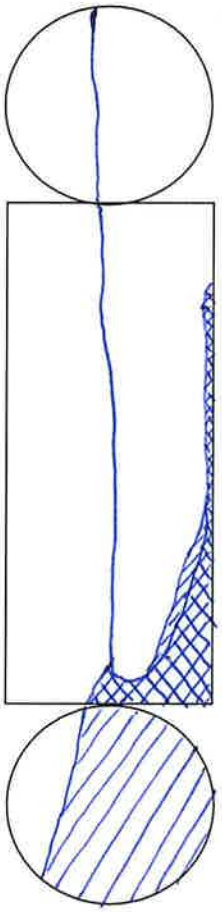
Specimen remarks: Top and bottom of specimen fails ISRM criteria for perpendicularity and/or flatness. Top of specimen is flat and perpendicular to 0.351mm. Bottom of specimen is flat and perpendicular to 0.579mm.

Project Name	Koeberg - 385908 - 42C	**Unconfined Compressive Strength With Youngs Modulus And Poissons Ratio**	Hole ID KB36
Project No.	LT1050		Sample Depth 26.28m
Engineer	SRK Consulting		Sample Number 004
Client	SRK Consulting	I.S.R.M. Suggested methods 1981	Sample Type C
Description	Grey metamorphic SANDSTONE.		Specimen Depth 26.28m
			Specimen Number 1

Graph of stress strain curves



Failure sketch



Failure type: Axial

Moisture content	%	0.4	Stress rate	MPa/s	0.54	Tangent modulus	E_t	66.4	GPa
Length	mm	133.86	Test duration	min	03:49	Average modulus	E_{ave}	117	GPa
Diameter	mm	51.47	U.C.S.	MPa	123	Secant modulus	E_{sec}	102	GPa
Mass	g	751.73	Type of machine	Controls 1300/Automax 5		Poissons ratio (Determined using E_{ave})	v	0.313	
Bulk density	kg/m^3	2700							
Dry density	kg/m^3	2690							
Date		04/03/2008							

Test remarks

Specimen remarks: Top and bottom of specimen fails ISRM criteria for perpendicularity and/or flatness. Top of specimen is flat and perpendicular to 0.074mm. Bottom of specimen is flat and perpendicular to 0.718mm.

SUPPORTING FACTUAL DATA

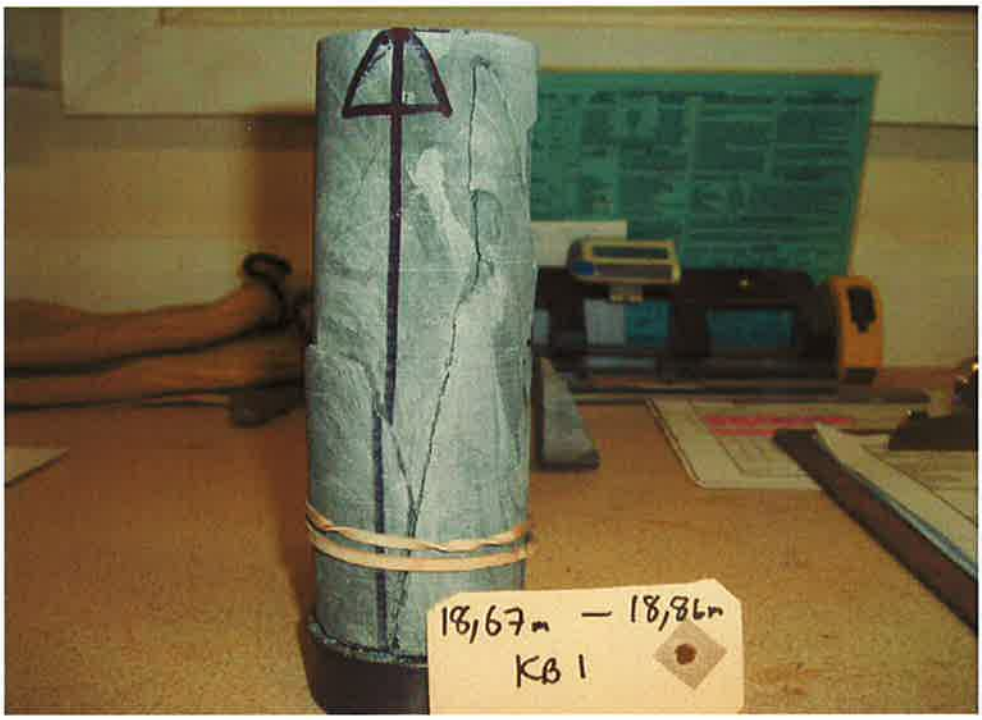
SECTION E
Photographs

SOIL SAMPLE / ROCK CORE / CONCRETE CORE PHOTOGRAPHS

NORWEST
HOLST
SOIL ENGINEERING

Project Name	Koeberg - 385908 - 42C	**Photographic Record**	Hole ID
Project No.	LT1050		KB1
Engineer	SRK Consulting		Fig no.
Client	SRK Consulting		01

18.67-18.86m Before Test



18.67-18.86m After Test

Photographed by	Date photographed	Filename 1 P3040020.JPG	NORWEST HOLST SOIL ENGINEERING
P. Ashworth	04/03/2008	Filename 2 P3040021.JPG	
Form No. SI PMPA4	Revision No. 2.02	Issue Date 26/02/2007	

Project Name	Koeberg - 385908 - 42C	**Photographic Record**	Hole ID
Project No.	LT1050		KB12
Engineer	SRK Consulting		Fig no.
Client	SRK Consulting		02

33.00-33.30m Before Test

33.00-33.30m After Test

Photographed by	Date photographed	Filename 1 P3040001.JPG	NORWEST HOLST SOIL ENGINEERING
P. Ashworth	03/03/2008	Filename 2 P3040005.JPG	
Form No. SI PMPA4	Revision No. 2.02	Issue Date 26/02/2007	

Project Name Koeberg - 385908 - 42C	**Photographic Record**	Hole ID
Project No. LT1050		KB27
Engineer SRK Consulting		Fig no.
Client SRK Consulting		03

22.18-22.38m Before Test

22.18-22.38m After Test

Photographed by	Date photographed	Filename 1 P3040032.JPG	NORWEST HOLST SOIL ENGINEERING
P. Ashworth	05/03/2008	Filename 2 P3040034.JPG	
Form No. SI PMPA4	Revision No. 2.02	Issue Date 26/02/2007	

Project Name	Koeberg - 385908 - 42C	**Photographic Record**	Hole ID
Project No.	LT1050		KB36
Engineer	SRK Consulting		Fig no.
Client	SRK Consulting		04

26.28-26.57m Before Test

26.28-26.57m After Test

Photographed by	Date photographed	Filename 1 P3040009.JPG	NORWEST HOLST SOIL ENGINEERING
P. Ashworth	04/03/2008	Filename 2 P3040011.JPG	
Form No. SI PMPA4	Revision No. 2.02	Issue Date 26/02/2007	

NORWEST HOLST
SOIL ENGINEERING

TEST REPORT

UKAS TESTING
1265

Serial number: LT1064 Date of issue: 18/07/2008

Issued by Norwest Holst Limited - Soil Engineering Division,
Parkside Lane,
Dewsbury Road,
Leeds
LS11 5SX.
Tel: 0113 2711111
Fax: 0113 2760472
Email: soils@norwest.co.uk

Authorised signatory

M. J. Baldwin (Technical Manager)
R. J. Rogers (Principal Engineer)
S. Kirk (Laboratory Manager)
S. K. Sharda (Assistant Laboratory Manager)

Customer name SRK Consulting
Address Postnet Suite #206
Private Bag X18
Rondebosch
7701 South Africa

Contract name #2 Duynefontein
Your reference 385908 - 42C

Dates of receipt of samples 10/06/2008

Dates of testing 21/06/2008 to 18/07/2008

Testing was performed to the standard named on individual test results.

Sampling was not performed by the Laboratory of Norwest Holst Soil Engineering.

Testing was performed on 18 number of samples received in good condition.

Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation.

Results reported relate only to the samples tested.

Tests marked 'Not UKAS' in this report are not included in the UKAS accreditation schedule for our laboratory. These results will appear in italics on any summary of tests.

Samples will be retained for 28 days from date of issue of this report and then be disposed of, unless we receive written instruction to the contrary

Quality Control Check performed by K. A. Walker (Laboratory Quality Manager)

Key to Laboratory Summary Sheets

Common to all summaries				
Sample Type	U	Undisturbed sample	D	Small disturbed sample
	P	Piston sample	B	Bulk disturbed sample
	TW	Thin walled sample	BLK	Block sample
	L	Liner sample	C	Rock core
	AMAL	Amalgamated sample		
Test status	Any result in *italics* indicates a test that is not within the scope of the UKAS accreditation for this laboratory.			
Summary of Laboratory Soil Tests: Index / Classification Tests				
Particle density	p	Small pyknometer method	g	Gas jar method
Plastic index	N/P	Non plastic, although liquid limit will have been determined if requested		
Particle size (PSD)	1	Following value in silt column denotes combined clay and silt fraction		
	p	Following value in clay column denotes sedimentation by pipette, else sedimentation is by hydrometer.		
Summary of Laboratory Soil Tests: Strength and Permeability Tests				
Triaxial	UU	Single stage unconsolidated quick undrained	UUM	Multi stage unconsolidated quick undrained
	UU3	Set of 3 unconsolidated quick undrained	CU	Single stage consolidated undrained
	CUM	Multi stage consolidated undrained	CU3	Set of 3 consolidated undrained
	CD	Single stage consolidated drained	CDM	Multi stage consolidated drained
	CD3	Set of 3 consolidated drained		
	Note that single stage tests are reported assuming $\phi = 0$ for total stress and $c' = 0$ for effective stress			
Consol	Oed	One-dimensional oedometer	Hyd	Hydraulic cell consolidation
	m_v	coefficient of compressibility quoted for p0 to p0 + 100kPa, where determined		
Permeability	C	Constant head permeability	T	Triaxial permeability
Shearbox	SSB	Small shear box	LSB	Large shear box
	p	Peak value	r	Residual value
	RS	Ring shear		
Summary of Laboratory Soil Re-Use Test				
MCV	s	MCV value at natural or specified moisture content	int	Intercept of calibration line in MCV calibration
Summary of Laboratory Rock Strength Tests				
Point Load Type	D	Diametral	A	Axial
(Combination of)	I	Irregular lump	B	Block
	L	Test performed parallel to planes of weakness		
	P	Test performed perpendicular to planes of weakness		
	X	Invalid failure of point load (not broken between points of load application)		
Summary of Laboratory Rock Materials Tests				
Ten% fines	w	Soaked test	d	Dry test
Point Load Index Result				
Point Load Type	D	Diametral	A	Axial
(Combination of)	I	Irregular lump	B	Block
	L	Parallel to planes of weakness	P	Perpendicular to planes of weakness
	X	Invalid failure of point load (not broken between points of load application)		
Dimensions	W	Diameter of core or average smallest width perpendicular to axis of loading in a block or irregular lump		
	D	Distance between platens when just in contact with specimen		
	D'	Distance between platens at point of failure		
	De	Equivalent core diameter	Is	P/De^2
	Is(50)	F x Is	F	$(De/50)^{0.45}$
	Is(50) point load strength index corrected for a diametral test of core diameter 50mm			
	For Axial/Lump tests $De^2 = (4/Pi) \times (W \times D')$		For Diametral tests $De^2 = D \times D'$	

Important note: summary sheets are provided for convenience and in no way replace individual test result sheets which shall, without exception, be regarded as the definitive result.

Project Name #2 Duynefontein

Project No. LT1064

Engineer BM Engelsman

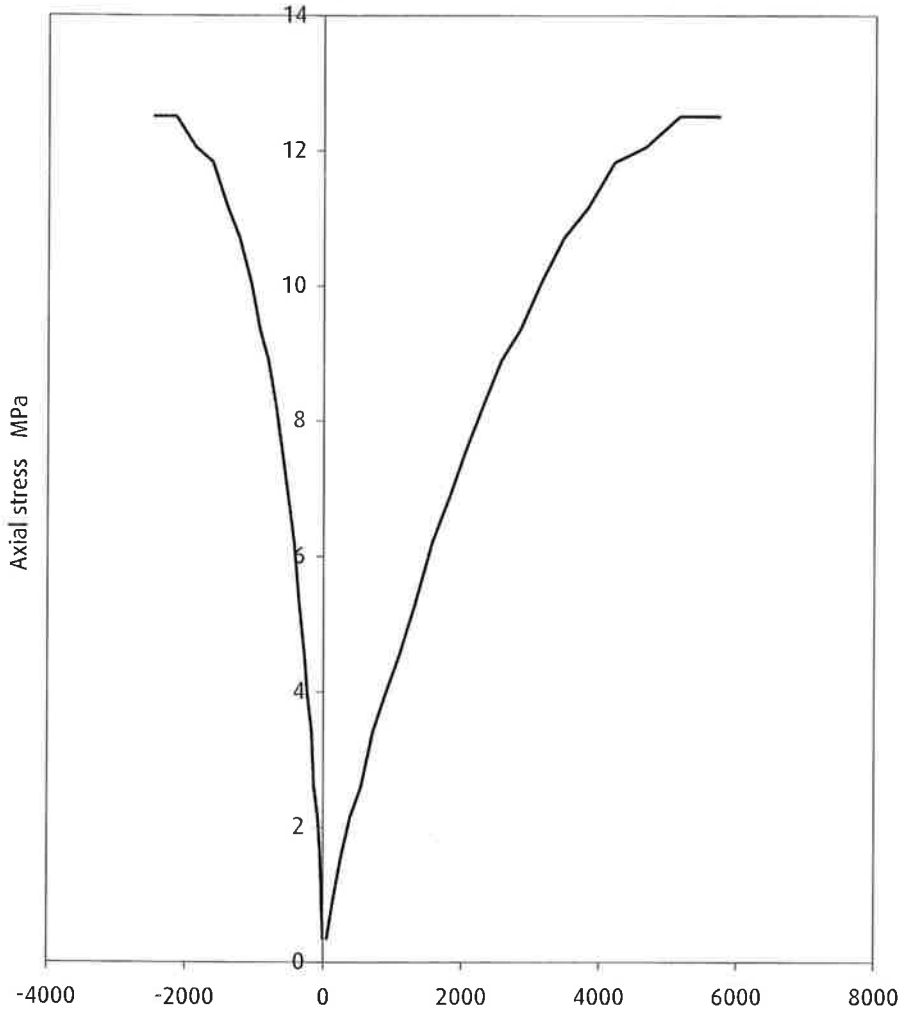
Client SRK Consulting

Summary Of Laboratory Rock Strength Tests

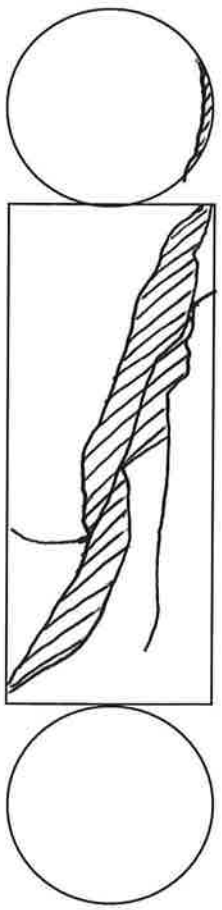
Hole ID	Sample depth m	Sample no.	Sample type	Specimen depth m	Specimen no.	Water Content	Bulk Density	Dry Density	Particle density	Point load			UCS	Brazil	Porosity	Elastic Modulus	Posissons Ratio
										Type	I_s	I_s50					
						%	kg/m³	kg/m³	Mg/m³		MN/m²	MN/m²	MN/m²	MN/m²	%	GPa	
KB05	25.460	001	C	25.460	01	1.0	2290	2270					*13.1*			*0.24*	*0.229*
KB08	37.820	001	C	37.820	01	0.5	2480	2470					*39.4*			*14.5*	*0.212*
KB09	28.610	001	C	28.610	01	8.2	2230	2060					*3.11*			*0.748*	*0.746*
KB11	28.990	001	C	28.990	01	1.6	2470	2430					*10.7*			*22.5*	*0.218*
KB18	23.630	001	C	23.630	01	0.7	2580	2570					*10.7*			*54.4*	*0.163*
KB19	24.480	001	C	24.480	01	2.4	2500	2440					*10.6*			*24.9*	*0.0217*
KB25	19.130	001	C	19.130	01	3.1	1900	1840					*2.81*			*5.34*	*0.144*
KB26	28.940	001	C	28.940	01	2.0	2400	2350					*15.1*			*9.55*	*0.146*
KB30	19.700	001	C	19.700	01	2.9	2480	2410					*29.6*			*27.3*	*0.297*
KB31	29.540	001	C	29.540	01	0.4	2520	2510					*31.7*			*22.3*	*0.334*
KB33	14.740	001	C	14.740	01	0.2	2600	2590					*95.4*			*39*	*0.336*
KB33	25.910	002	C	25.910	01	0.4	2590	2580					*6.23*			*203.9*	*0.184*
KB40	27.210	001	C	27.210	01	4.9	2450	2340					*20.8*			*8.82*	*0.324*
KB41	19.900	001	C	19.900	01	1.2	2480	2450					*53.1*			*24.3*	*0.202*
KB41	22.790	002	C	22.790	01	0.6	2620	2610					*28.0*			*59.7*	*0.176*
KB42	29.680	001	C	29.680	01	0.6	2490	2480					*10.7*			*42.4*	*0.132*
KB43	30.710	001	C	30.710	01	3.9	2340	2250					*11.2*			*2.94*	*0.661*
KB45	28.730	001	C	28.730	01	0.8	2620	2600					*53.1*			*85.5*	*0.25*
								End									

Project Name	#2 Duynefontein	**Unconfined Compressive Strength With Youngs Modulus And Poissons Ratio**	Hole ID: KB05
Project No.	LT1064		Sample Depth: 25.46m
Engineer	SRK Consulting		Sample Number: 001
Client	SRK Consulting	I.S.R.M. Suggested methods 1981	Sample Type: C
Description	Grey SANDSTONE.		Specimen Depth: 25.46m
			Specimen Number: 1

Graph of stress strain curves



Failure sketch



Failure type: Shear

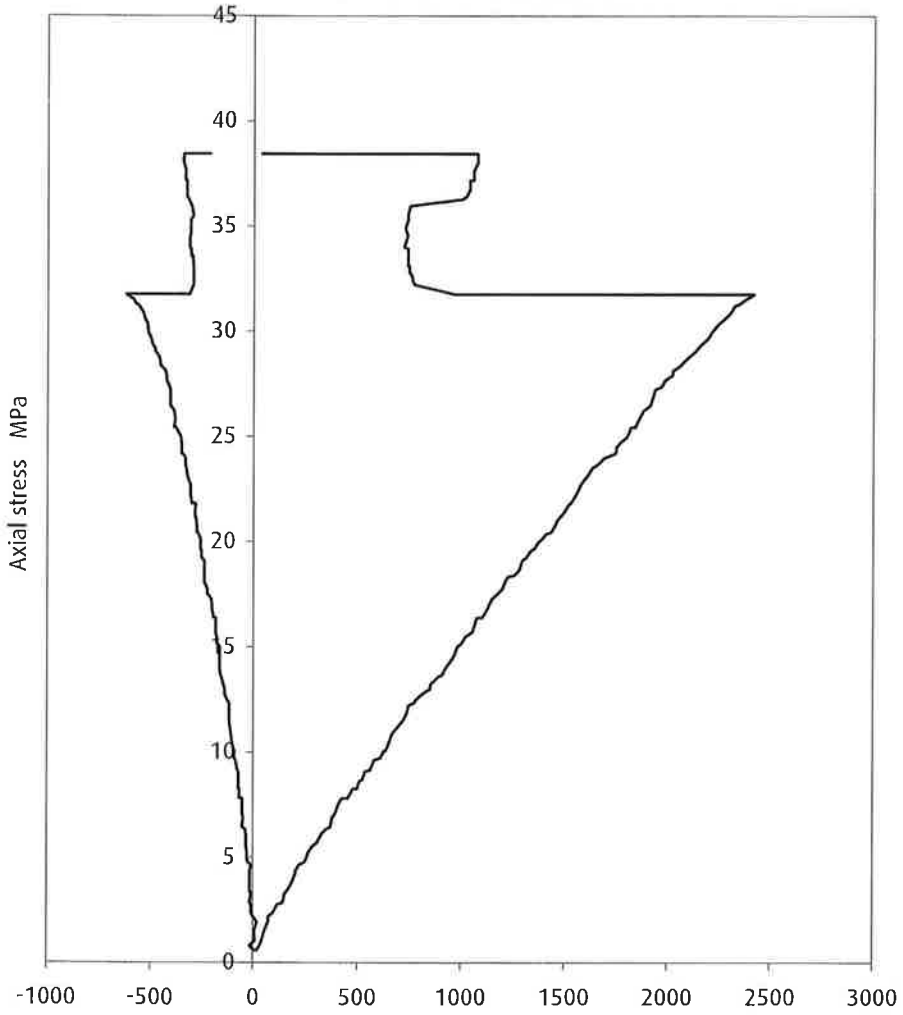
Moisture content	%	1.0	Stress rate	MPa/s	0.11	Tangent modulus	E_t	2.95 GPa
Length	mm	138.29	Test duration	min	02:00	Average modulus	E_{ave}	2.95 GPa
Diameter	mm	50.25	U.C.S.	MPa	13.1	Secant modulus	E_{sec}	0.240 GPa
Mass	g	629.01	Type of machine	Controls 1300/Automax 5		Poissons ratio	v	0.229
Bulk density	kg/m^3	2290				(Determined using E_{ave})		
Dry density	kg/m^3	2270						
Date		20/06/2008						

Test remarks

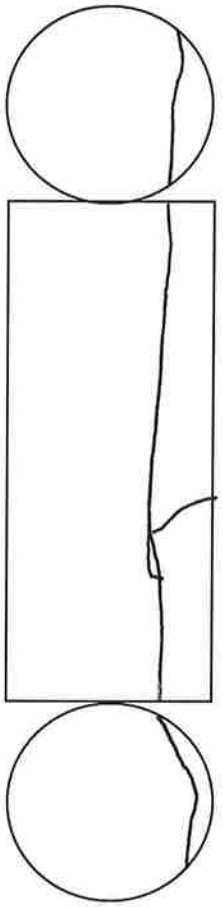
Specimen remarks: Top and bottom of specimen fails ISRM criteria for perpendicularity and/or flatness. Top of specimen is flat and perpendicular to 0.250mm. Bottom of specimen is flat and perpendicular to 0.112mm.

Project Name	#2 Duynefontein	**Unconfined Compressive Strength With Youngs Modulus And Poissons Ratio**	Hole ID KB08
Project No.	LT1064		Sample Depth 37.82m
Engineer	SRK Consulting		Sample Number 001
Client	SRK Consulting	I.S.R.M. Suggested methods 1981	Sample Type C
Description	Grey SANDSTONE.		Specimen Depth 37.82m
			Specimen Number 1

Graph of stress strain curves



Failure sketch



Failure type: Axial

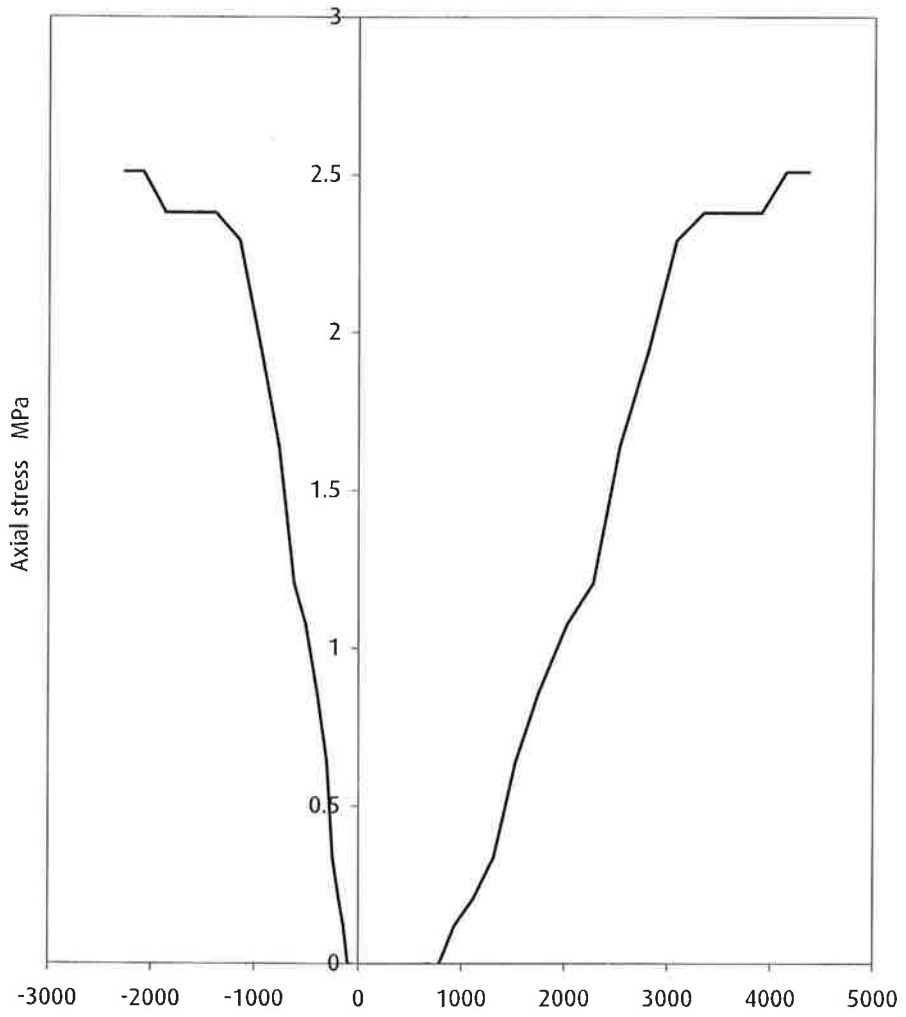
Moisture content	%	0.5	Stress rate	MPa/s	0.05	Tangent modulus	E_t	11.6 GPa
Length	mm	137.75	Test duration	min	13:23	Average modulus	E_{ave}	13.1 GPa
Diameter	mm	50.16	U.C.S.	MPa	39.4	Secant modulus	E_{sec}	14.5 GPa
Mass	g	676.11	Type of machine	Controls 1300/Automax 5		Poissons ratio	v	0.212
Bulk density	kg/m^3	2480				(Determined using E_{ave})		
Dry density	kg/m^3	2470						
Date		23/06/2008						

Test remarks

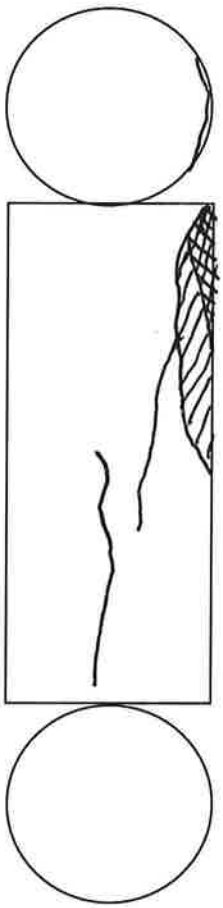
Specimen remarks: Top and bottom of specimen fails ISRM criteria for perpendicularity and/or flatness. Top of specimen is flat and perpendicular to 0.469mm. Bottom of specimen is flat and perpendicular to 0.351mm.

Project Name	#2 Duynefontein	**Unconfined Compressive Strength With Youngs Modulus And Poissons Ratio**	Hole ID KB09
Project No.	LT1064		Sample Depth 28.61m
Engineer	SRK Consulting		Sample Number 001
Client	SRK Consulting	I.S.R.M. Suggested methods 1981	Sample Type C
Description	Grey SANDSTONE.		Specimen Depth 28.61m
			Specimen Number 1

Graph of stress strain curves



Failure sketch



Failure type: Shear

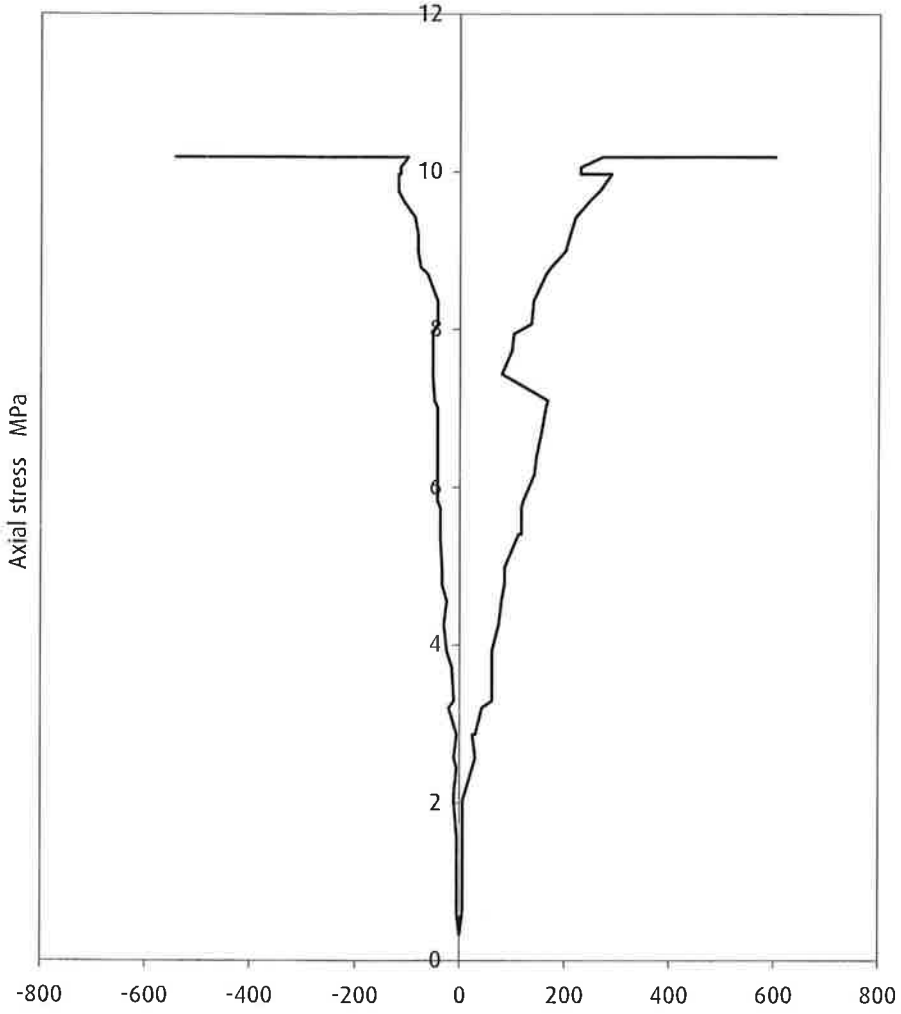
Moisture content	%	8.2	Stress rate	MPa/s	0.03	Tangent modulus	E_t	1.07 GPa
Length	mm	138.87	Test duration	min	01:36	Average modulus	E_{ave}	0.923 GPa
Diameter	mm	51.15	U.C.S.	MPa	3.11	Secant modulus	E_{sec}	0.748 GPa
Mass	g	636.05	Type of machine	Controls 1300/Automax 5		Poissons ratio	v	0.746
Bulk density	kg/m^3	2230				(Determined using E_{ave})		
Dry density	kg/m^3	2060						
Date		20/06/2008						

Test remarks

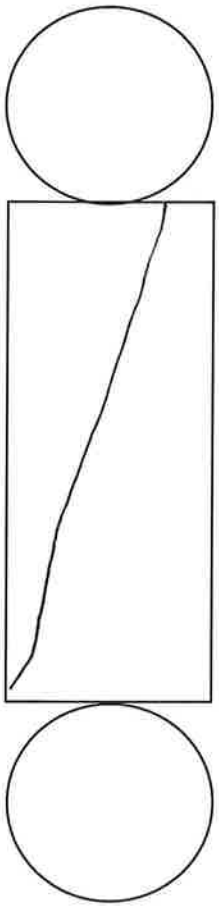
Specimen remarks: Top and bottom of specimen fails ISRM criteria for perpendicularity and/or flatness. Top of specimen is flat and perpendicular to 0.322mm. Bottom of specimen is flat and perpendicular to 0.326mm.

Project Name	#2 Duynefontein	**Unconfined Compressive Strength With Youngs Modulus And Poissons Ratio**	Hole ID KB18
Project No.	LT1064		Sample Depth 23.63m
Engineer	SRK Consulting		Sample Number 001
Client	SRK Consulting	I.S.R.M. Suggested methods 1981	Sample Type C
Description	Grey MICRODIORITE with crystalline veins.		Specimen Depth 23.63m
			Specimen Number 1

Graph of stress strain curves



Failure sketch



Failure type: Axial

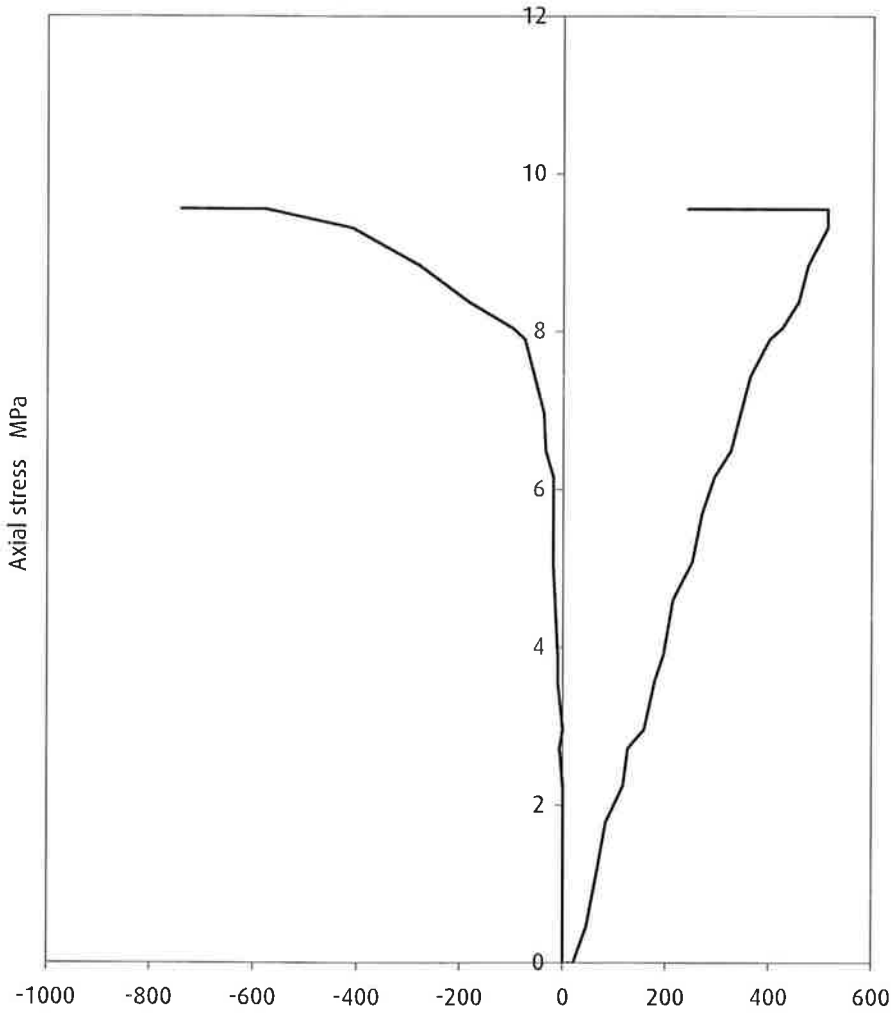
Moisture content	%	0.7	Stress rate	MPa/s	0.05	Tangent modulus	E_t	34.6	GPa
Length	mm	136.12	Test duration	min	03:52	Average modulus	E_{ave}	31.2	GPa
Diameter	mm	51.84	U.C.S.	MPa	10.7	Secant modulus	E_{sec}	54.4	GPa
Mass	g	742.01	Type of machine	Controls 1300/Automax 5		Poissons ratio	v	0.163	
Bulk density	kg/m^3	2580				(Determined using E_{ave})			
Dry density	kg/m^3	2570							
Date		23/06/2008							

Test remarks

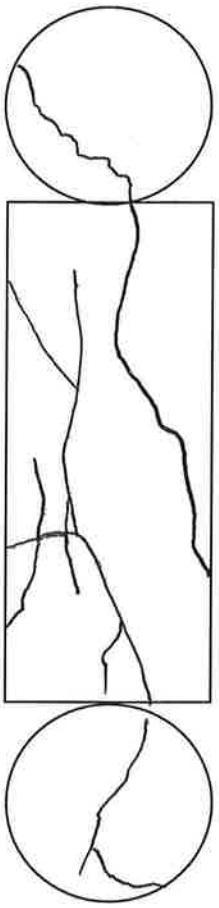
Specimen remarks: Top and bottom of specimen fails ISRM criteria for perpendicularity and/or flatness. Top of specimen is flat and perpendicular to 0.425mm. Bottom of specimen is flat and perpendicular to 0.327mm.

Project Name	#2 Duynefontein	**Unconfined Compressive Strength With Youngs Modulus And Poissons Ratio**	Hole ID KB11
Project No.	LT1064		Sample Depth 28.99m
Engineer	SRK Consulting		Sample Number 001
Client	SRK Consulting	I.S.R.M. Suggested methods 1981	Sample Type C
Description	Grey veined metamorphosed SANDSTONE.		Specimen Depth 28.99m
			Specimen Number 1

Graph of stress strain curves



Failure sketch



Failure type: Irregular

Moisture content	%	1.6	Stress rate	MPa/s	0.07	Tangent modulus	E_t	23.2	GPa
Length	mm	133.51	Test duration	min	02:26	Average modulus	E_{ave}	20.4	GPa
Diameter	mm	49.12	U.C.S.	MPa	10.7	Secant modulus	E_{sec}	22.5	GPa
Mass	g	624.10	Type of machine	Controls 1300/Automax 5		Poissons ratio	v	0.218	
Bulk density	kg/m^3	2470				(Determined using E_{ave})			
Dry density	kg/m^3	2430							
Date		21/06/2008							

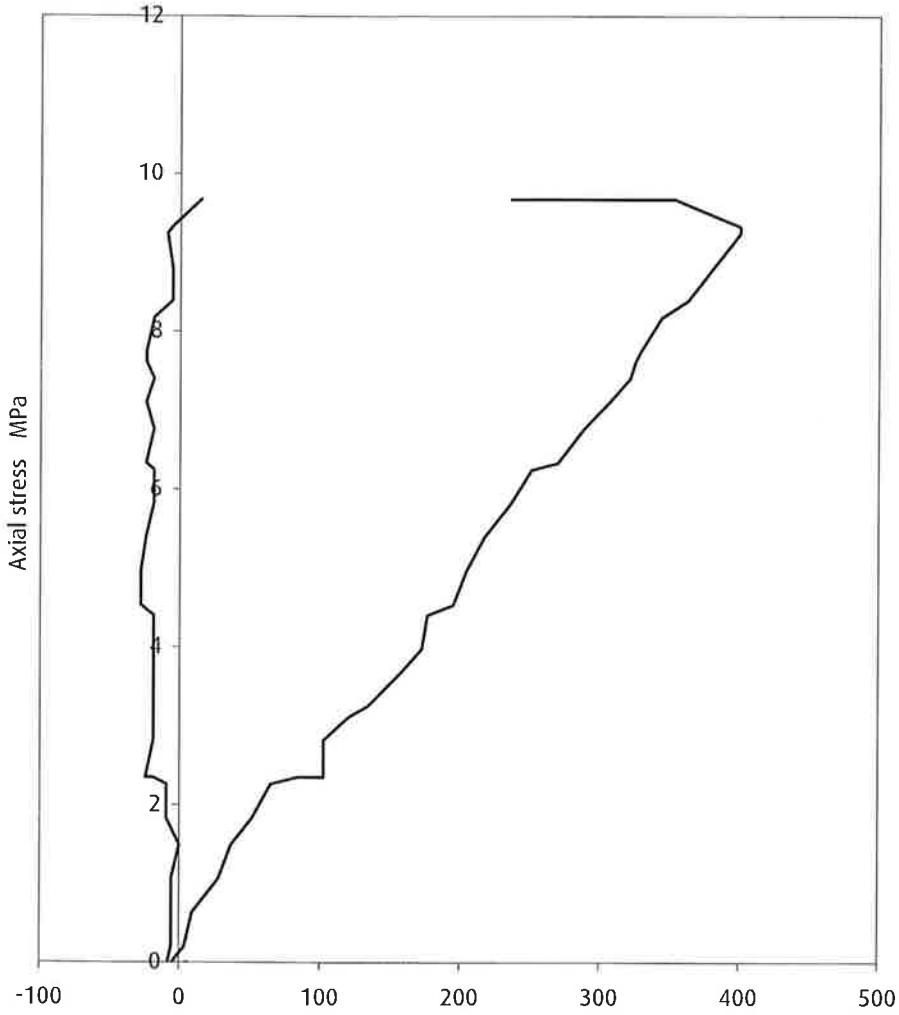
Test remarks

Specimen remarks: Top and bottom of specimen fails ISRM criteria for perpendicularity and/or flatness. Top of specimen is flat and perpendicular to 0.474mm. Bottom of specimen is flat and perpendicular to 0.269mm. Sides of specimen are not smooth and straight to within ISRM tolerance, the largest irregularity measured as 0.50mm.

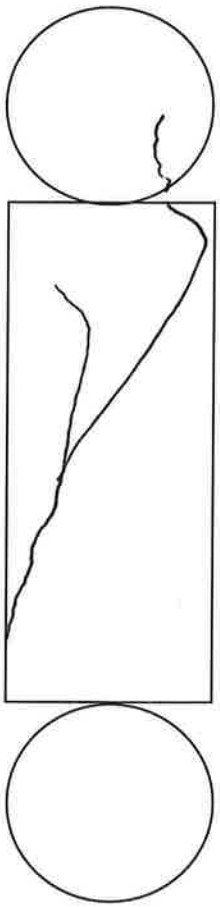
NORWEST HOLST SOIL ENGINEERING

Project Name	#2 Duynefontein	**Unconfined Compressive Strength With Youngs Modulus And Poissons Ratio**	Hole ID KB19
Project No.	LT1064		Sample Depth 24.48m
Engineer	SRK Consulting		Sample Number 001
Client	SRK Consulting	I.S.R.M. Suggested methods 1981	Sample Type C
Description	Grey fractured metamorphosed SANDSTONE.		Specimen Depth 24.48m
			Specimen Number 1

Graph of stress strain curves



Failure sketch



Failure type: Shear

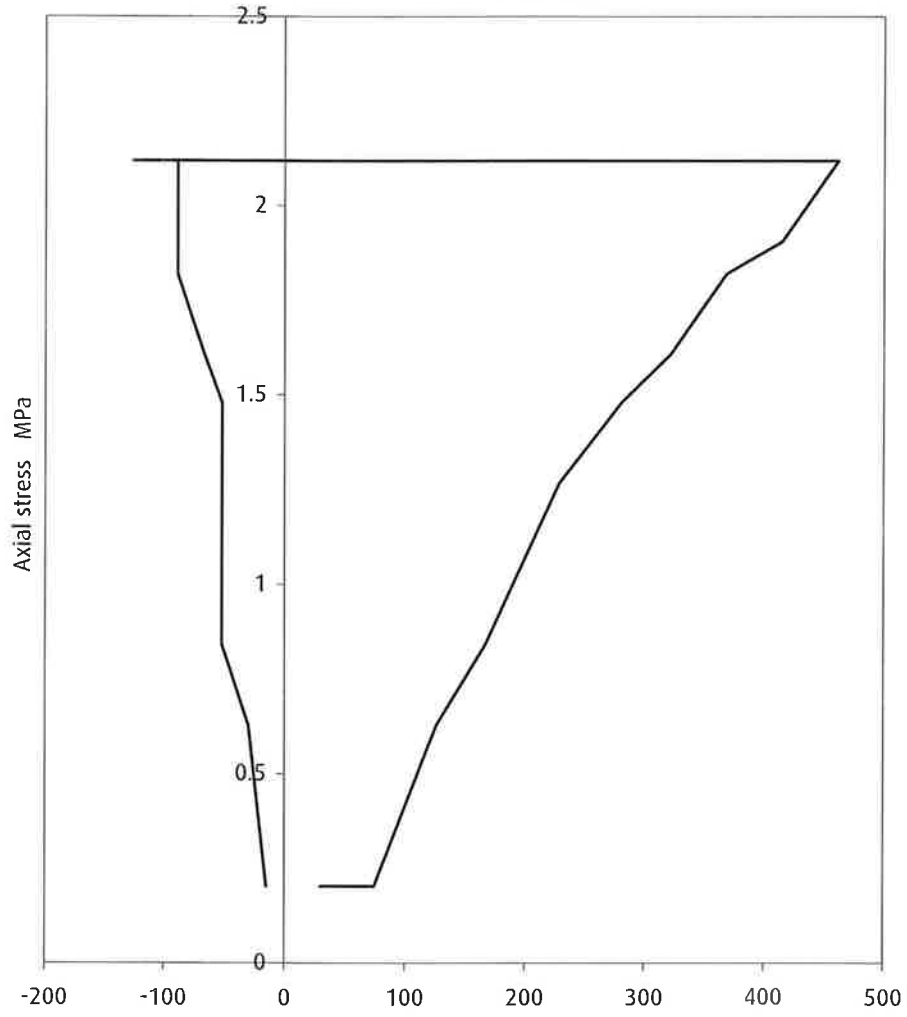
Moisture content	%	2.4	Stress rate	MPa/s	0.06	Tangent modulus	E_t	29.1 GPa
Length	mm	139.85	Test duration	min	03:07	Average modulus	E_{ave}	22.6 GPa
Diameter	mm	51.51	U.C.S.	MPa	10.6	Secant modulus	E_{sec}	24.9 GPa
Mass	g	728.03	Type of machine	Controls 1300/Automax 5		Poissons ratio (Determined using E_{ave})	v	0.0217
Bulk density	kg/m^3	2500						
Dry density	kg/m^3	2440						
Date		21/06/2008						

Test remarks

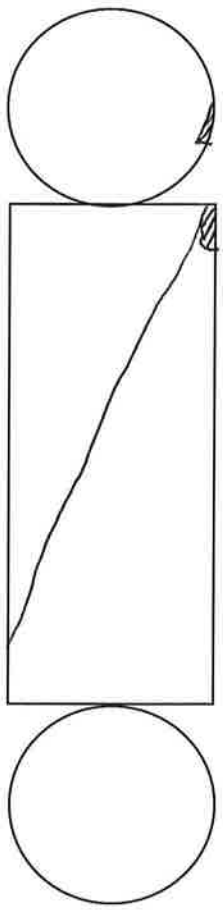
Specimen remarks: Top and bottom of specimen fails ISRM criteria for perpendicularity and/or flatness. Top of specimen is flat and perpendicular to 0.344mm. Bottom of specimen is flat and perpendicular to 0.165mm.

Project Name	#2 Duynefontein	**Unconfined Compressive Strength With Youngs Modulus And Poissons Ratio**	Hole ID KB25
Project No.	LT1064		Sample Depth 19.13m
Engineer	SRK Consulting		Sample Number 001
Client	SRK Consulting	I.S.R.M. Suggested methods 1981	Sample Type C
Description	Light orangish grey SILTSTONE.		Specimen Depth 19.13m
			Specimen Number 1

Graph of stress strain curves



Failure sketch



Failure type: Shear

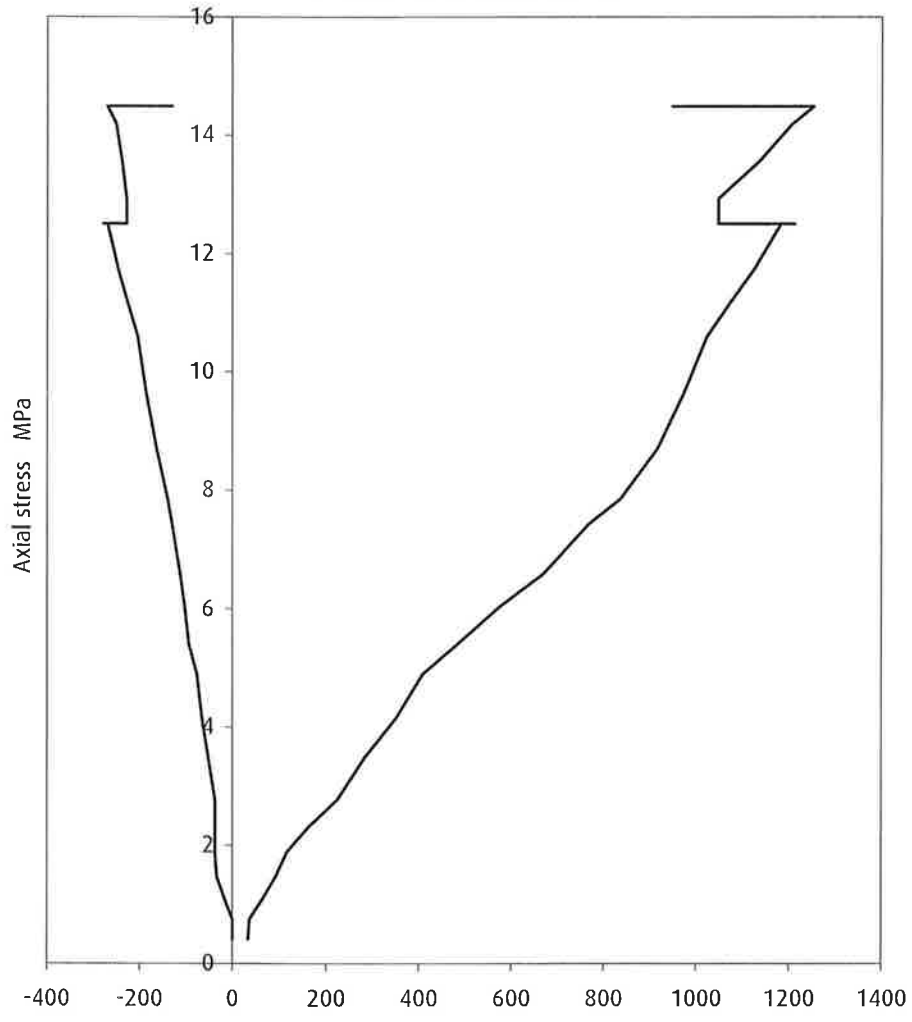
Moisture content	%	3.1	Stress rate	MPa/s	0.05	Tangent modulus	E_t	5.01 GPa
Length	mm	138.53	Test duration	min	00:59	Average modulus	E_{ave}	4.93 GPa
Diameter	mm	51.68	U.C.S.	MPa	2.81	Secant modulus	E_{sec}	5.34 GPa
Mass	g	552.14	Type of machine	Controls 1300/Automax 5		Poissons ratio	v	0.144
Bulk density	kg/m^3	1900				(Determined using E_{ave})		
Dry density	kg/m^3	1840						
Date		23/06/2008						

Test remarks

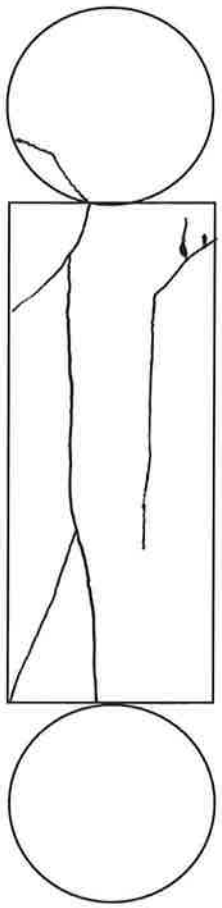
Specimen remarks: Top and bottom of specimen fails ISRM criteria for perpendicularity and/or flatness. Top of specimen is flat and perpendicular to 0.250mm. Bottom of specimen is flat and perpendicular to 0.463mm.

Project Name	#2 Duynefontein	**Unconfined Compressive Strength With Youngs Modulus And Poissons Ratio**	Hole ID KB26
Project No.	LT1064		Sample Depth 28.94m
Engineer	SRK Consulting		Sample Number 001
Client	SRK Consulting	I.S.R.M. Suggested methods 1981	Sample Type C
Description	Grey veined SCHIST.		Specimen Depth 28.94m
			Specimen Number 1

Graph of stress strain curves



Failure sketch



Failure type: Axial

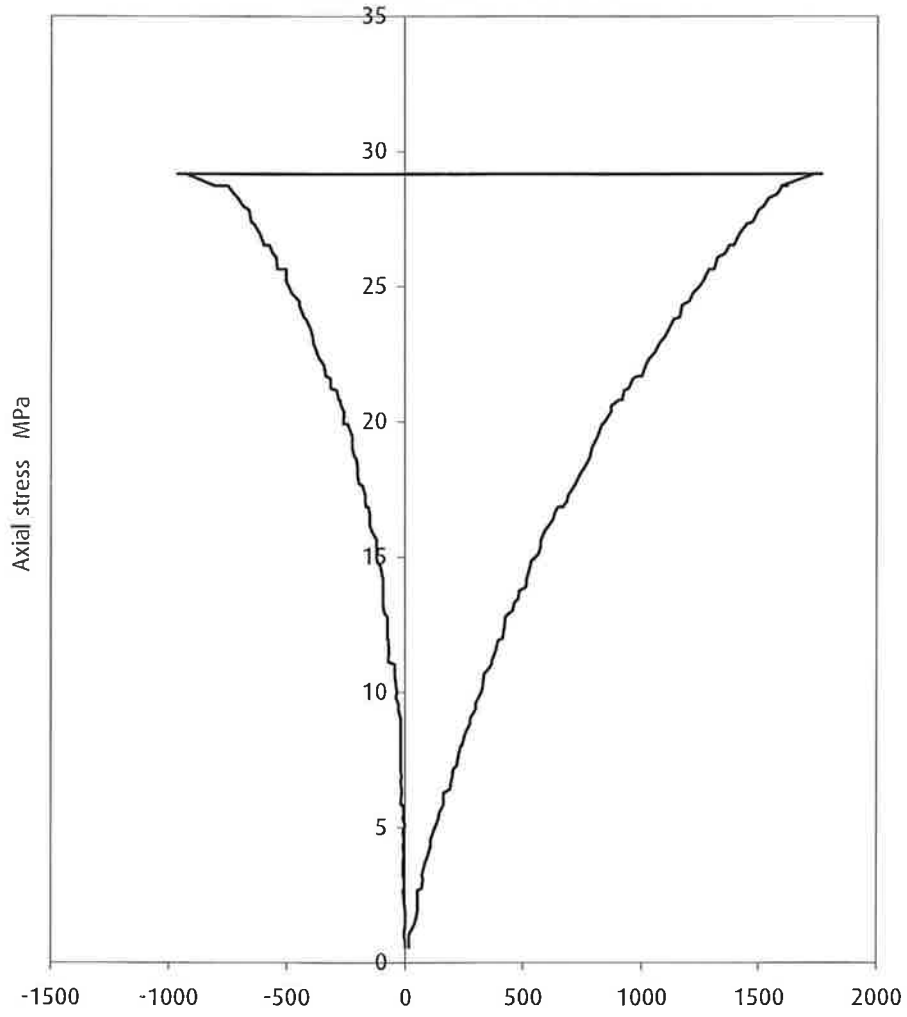
Moisture content	%	2.0	Stress rate	MPa/s	0.11	Tangent modulus	E_t	9.29	GPa
Length	mm	139.28	Test duration	min	02:22	Average modulus	E_{ave}	6.91	GPa
Diameter	mm	51.86	U.C.S.	MPa	15.1	Secant modulus	E_{sec}	9.55	GPa
Mass	g	704.67	Type of machine	Controls 1300/Automax 5		Poissons ratio	v	0.146	
Bulk density	kg/m^3	2400				(Determined using E_{ave})			
Dry density	kg/m^3	2350							
Date		26/06/2008							

Test remarks

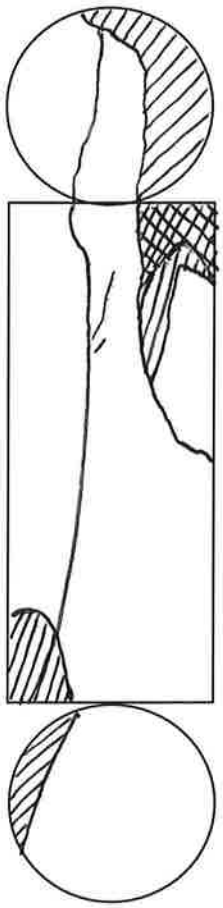
Specimen remarks: Top and bottom of specimen fails ISRM criteria for perpendicularity and/or flatness. Top of specimen is flat and perpendicular to 0.513mm. Bottom of specimen is flat and perpendicular to 0.488mm. Sides of specimen are not smooth and straight to within ISRM tolerance, the largest irregularity measured as 0.50mm.

Project Name	#2 Duynefontein	**Unconfined Compressive Strength With Youngs Modulus And Poissons Ratio**	Hole ID KB30
Project No.	LT1064		Sample Depth 19.70m
Engineer	SRK Consulting		Sample Number 001
Client	SRK Consulting	I.S.R.M. Suggested methods 1981	Sample Type C
Description	Light grey MUDSTONE.		Specimen Depth 19.70m
			Specimen Number 1

Graph of stress strain curves



Failure sketch



Failure type: Axial

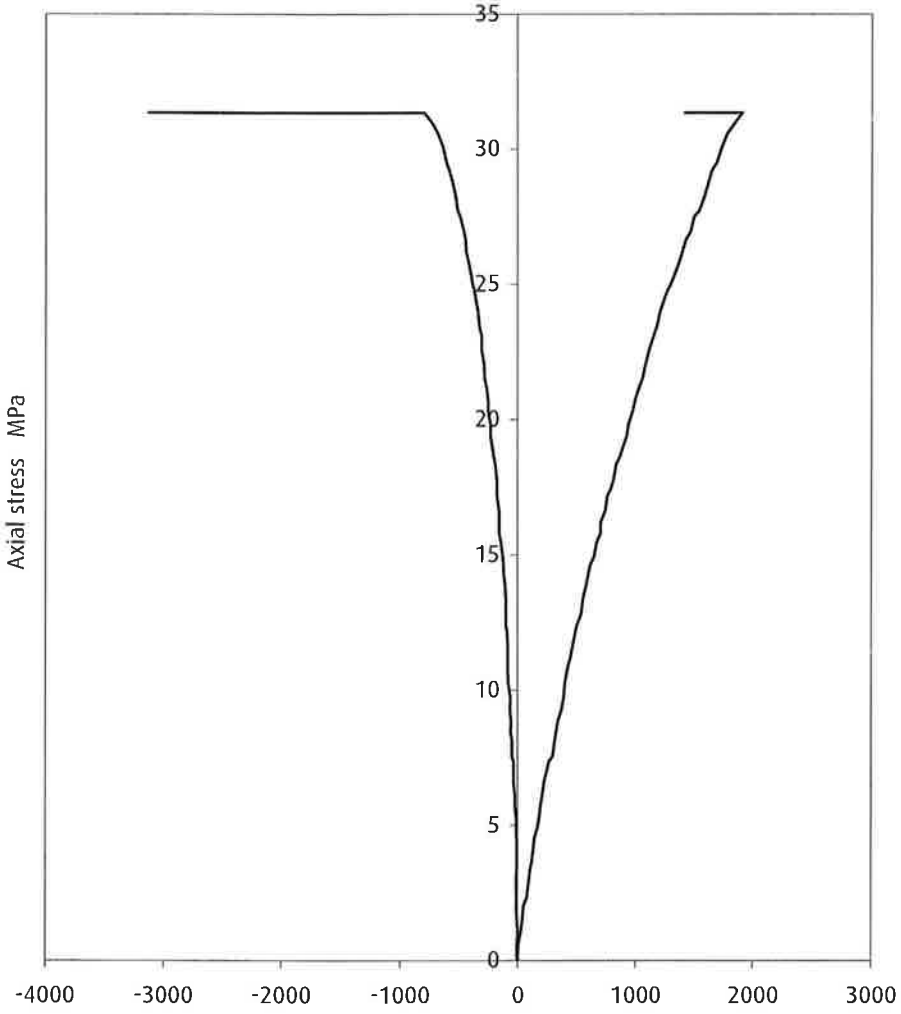
Moisture content	%	2.9	Stress rate	MPa/s	0.05	Tangent modulus	E_t	22.7 GPa
Length	mm	138.72	Test duration	min	10:18	Average modulus	E_{ave}	19.2 GPa
Diameter	mm	50.82	U.C.S.	MPa	29.6	Secant modulus	E_{sec}	27.3 GPa
Mass	g	698.88	Type of machine	Controls 1300/Automax 5		Poissons ratio (Determined using E_{ave})	v	0.297
Bulk density	kg/m^3	2480						
Dry density	kg/m^3	2410						
Date		11/07/2008						

Test remarks

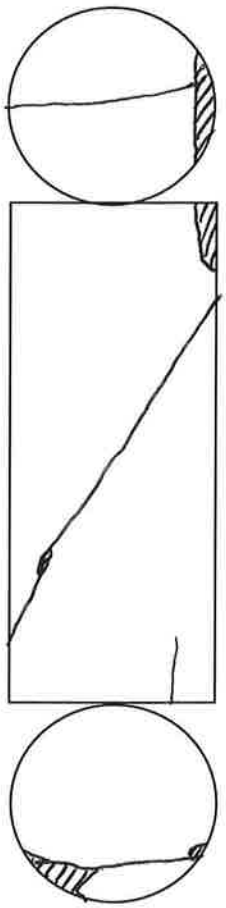
Specimen remarks: Top and bottom of specimen fails ISRM criteria for perpendicularity and/or flatness. Top of specimen is flat and perpendicular to 0.328mm. Bottom of specimen is flat and perpendicular to 0.217mm.

Project Name	#2 Duynefontein	**Unconfined Compressive Strength With Youngs Modulus And Poissons Ratio**	Hole ID KB31
Project No.	LT1064		Sample Depth 29.54m
Engineer	SRK Consulting		Sample Number 001
Client	SRK Consulting	I.S.R.M. Suggested methods 1981	Sample Type C
Description	Grey fractured metamorphosed SANDSTONE.		Specimen Depth 29.54m
			Specimen Number 1

Graph of stress strain curves



Failure sketch



Failure type: Cleavage

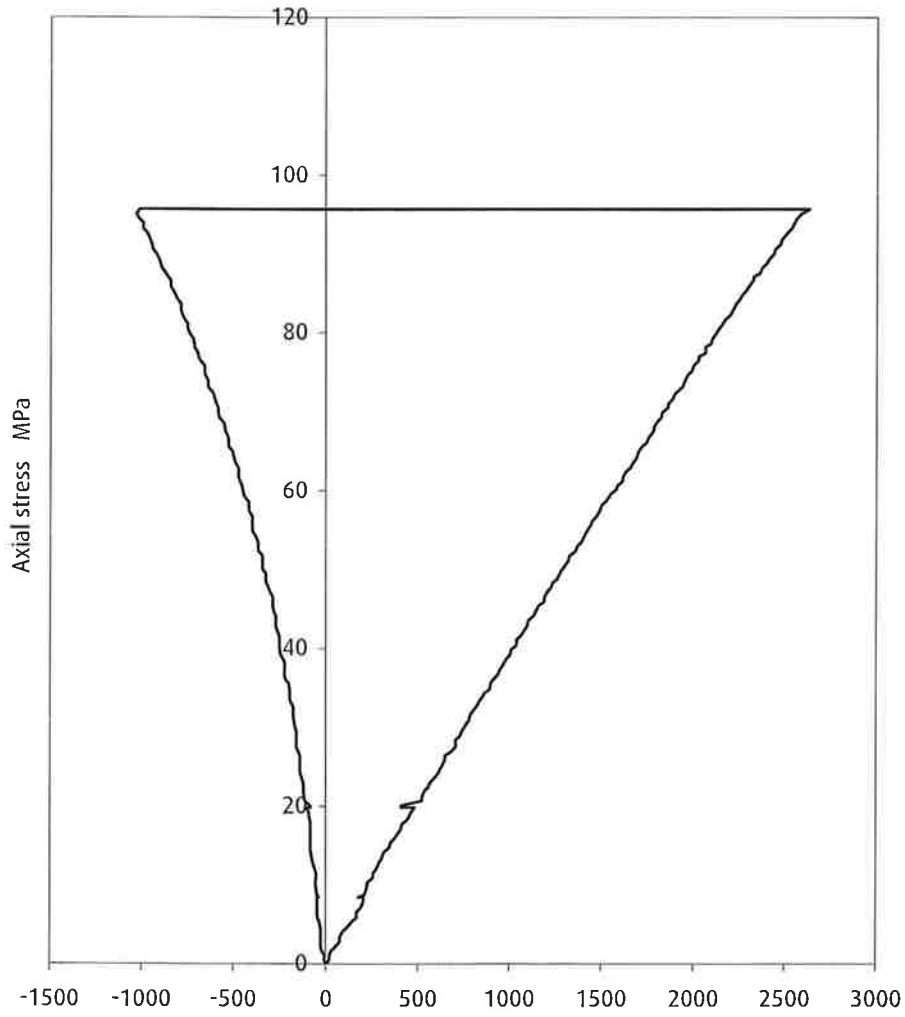
Moisture content	%	0.4	Stress rate	MPa/s	0.08	Tangent modulus	E_t	16.4	GPa
Length	mm	139.01	Test duration	min	06:22	Average modulus	E_{ave}	16.3	GPa
Diameter	mm	51.65	U.C.S.	MPa	31.7	Secant modulus	E_{sec}	22.3	GPa
Mass	g	734.82	Type of machine	Controls 1300/Automax 5		Poissons ratio	v	0.334	
Bulk density	kg/m^3	2520				(Determined using E_{ave})			
Dry density	kg/m^3	2510							
Date		26/06/2008							

Test remarks

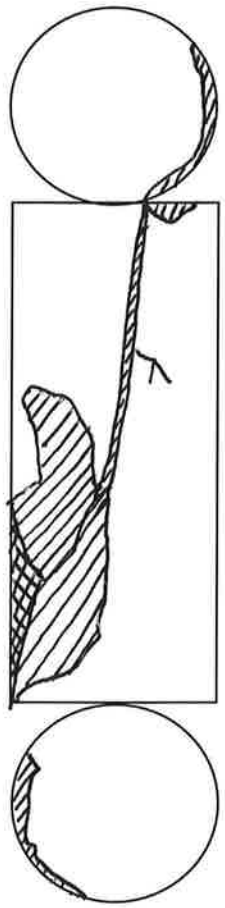
Specimen remarks: Top and bottom of specimen fails ISRM criteria for perpendicularity and/or flatness. Top of specimen is flat and perpendicular to 0.097mm. Bottom of specimen is flat and perpendicular to 0.352mm.

Project Name	#2 Duynefontein	**Unconfined Compressive Strength With Youngs Modulus And Poissons Ratio**	Hole ID KB33
Project No.	LT1064		Sample Depth 14.74m
Engineer	SRK Consulting		Sample Number 001
Client	SRK Consulting	I.S.R.M. Suggested methods 1981	Sample Type C
Description	Grey metamorphosed LIMESTONE.		Specimen Depth 14.74m
			Specimen Number 1

Graph of stress strain curves



Failure sketch



Failure type: Axial

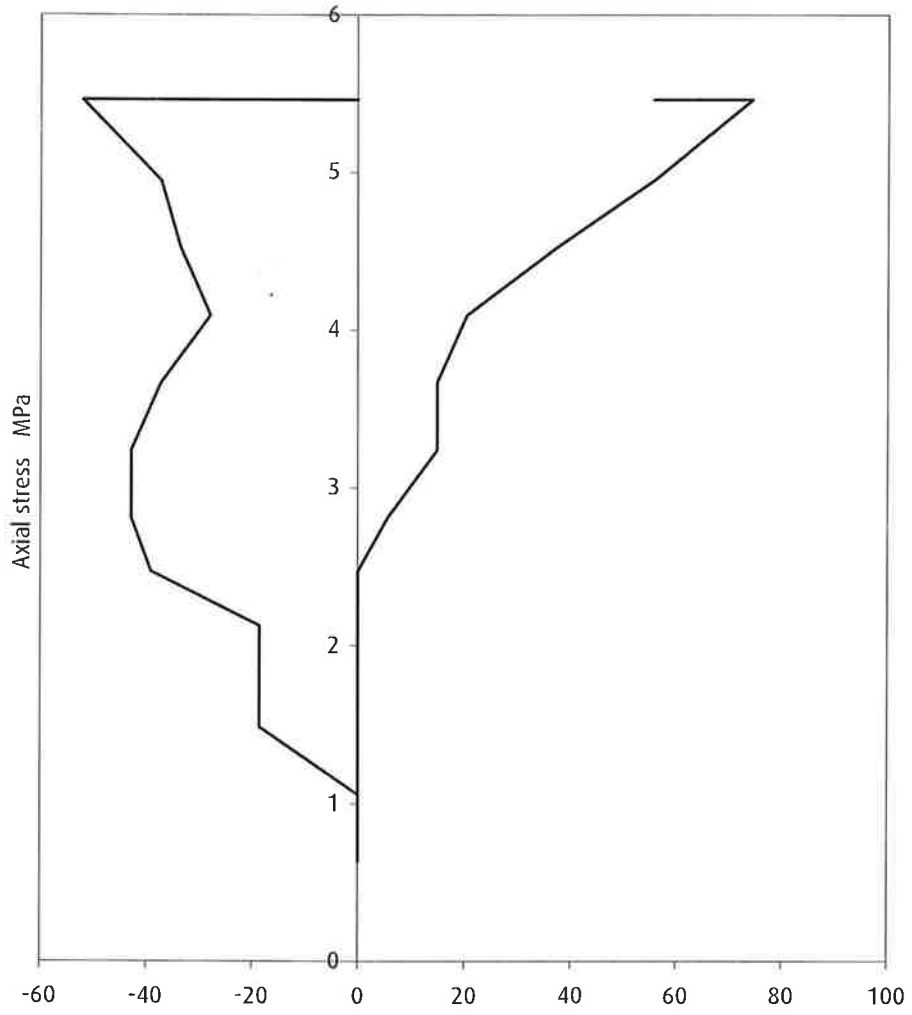
Moisture content	%	0.2	Stress rate	MPa/s	0.11	Tangent modulus	E_t	36.0 GPa
Length	mm	140.09	Test duration	min	14:31	Average modulus	E_{ave}	36.6 GPa
Diameter	mm	51.66	U.C.S.	MPa	95.4	Secant modulus	E_{sec}	39.0 GPa
Mass	g	762.63	Type of machine	Controls 1300/Automax 5		Poissons ratio (Determined using E_{ave})	v	0.336
Bulk density	kg/m^3	2600						
Dry density	kg/m^3	2590						
Date		26/06/2008						

Test remarks

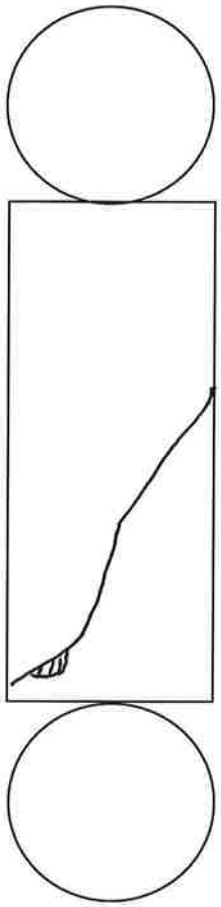
Specimen remarks: Top and bottom of specimen fails ISRM criteria for perpendicularity and/or flatness. Top of specimen is flat and perpendicular to 0.823mm. Bottom of specimen is flat and perpendicular to 0.622mm. Sides of specimen are not smooth and straight to within ISRM tolerance, the largest irregularity measured as 0.60mm.

Project Name	#2 Duynefontein	**Unconfined Compressive Strength With Youngs Modulus And Poissons Ratio**	Hole ID: KB33
Project No.	LT1064		Sample Depth: 25.91m
Engineer	SRK Consulting		Sample Number: 002
Client	SRK Consulting	I.S.R.M. Suggested methods 1981	Sample Type: C
Description	Grey fractured metamorphosed SANDSTONE.		Specimen Depth: 25.91m
			Specimen Number: 1

Graph of stress strain curves



Failure sketch



Failure type: Shear

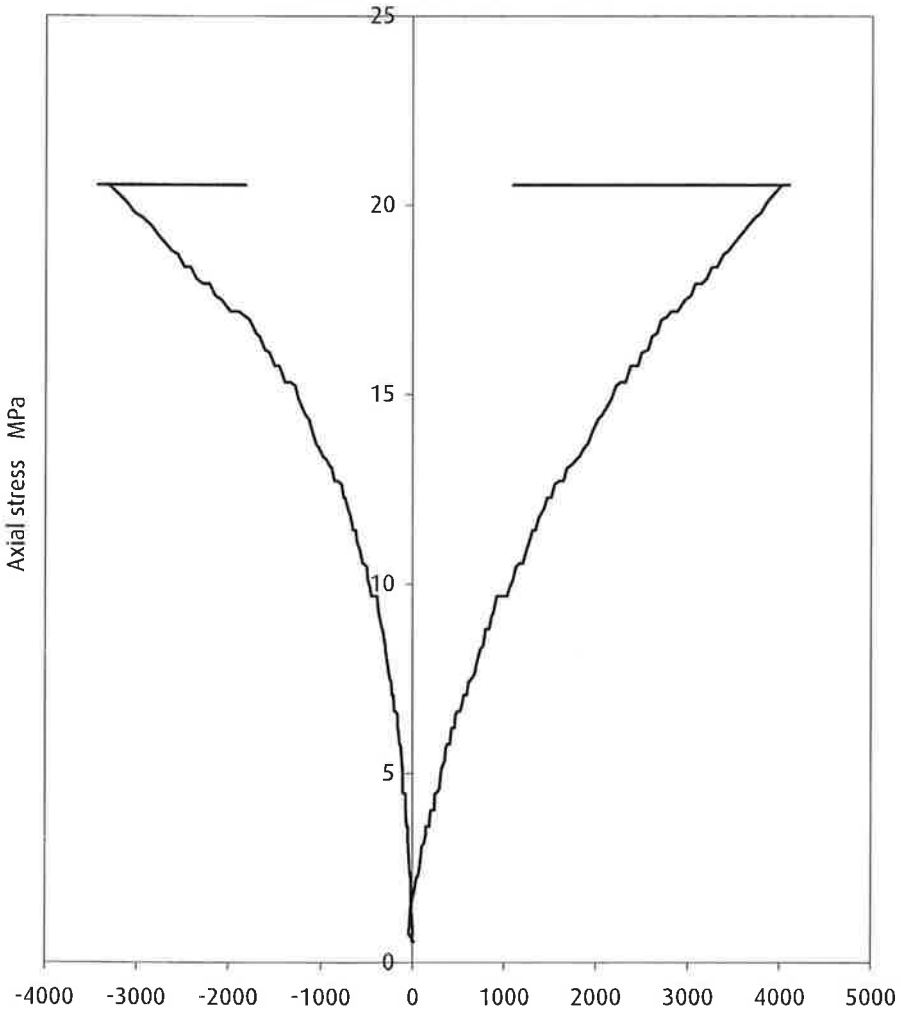
Moisture content	%	0.4	Stress rate	MPa/s	0.09	Tangent modulus	E_t	54.0 GPa
Length	mm	140.40	Test duration	min	01:10	Average modulus	E_{ave}	51.7 GPa
Diameter	mm	51.57	U.C.S.	MPa	6.23	Secant modulus	E_{sec}	204 GPa
Mass	g	760.06	Type of machine	Controls 1300/Automax 5		Poissons ratio	v	0.184
Bulk density	kg/m^3	2590				(Determined using E_{ave})		
Dry density	kg/m^3	2580						
Date		26/06/2008						

Test remarks

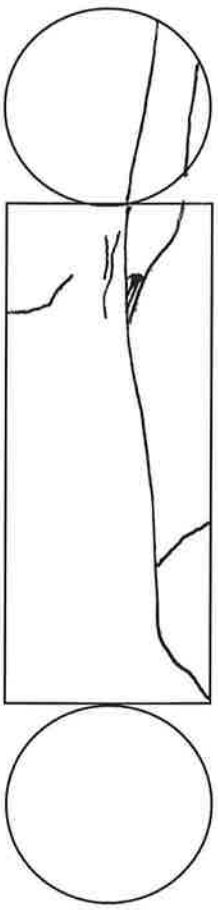
Specimen remarks: Top and bottom of specimen fails ISRM criteria for perpendicularity and/or flatness. Top of specimen is flat and perpendicular to 0.707mm. Bottom of specimen is flat and perpendicular to 0.667mm.

Project Name	#2 Duynefontein	**Unconfined Compressive Strength With Youngs Modulus And Poissons Ratio**	Hole ID KB40
Project No.	LT1064		Sample Depth 27.21m
Engineer	SRK Consulting		Sample Number 001
Client	SRK Consulting	I.S.R.M. Suggested methods 1981	Sample Type C
Description	Grey MUDSTONE.		Specimen Depth 27.21m
			Specimen Number 1

Graph of stress strain curves



Failure sketch



Failure type: Axial

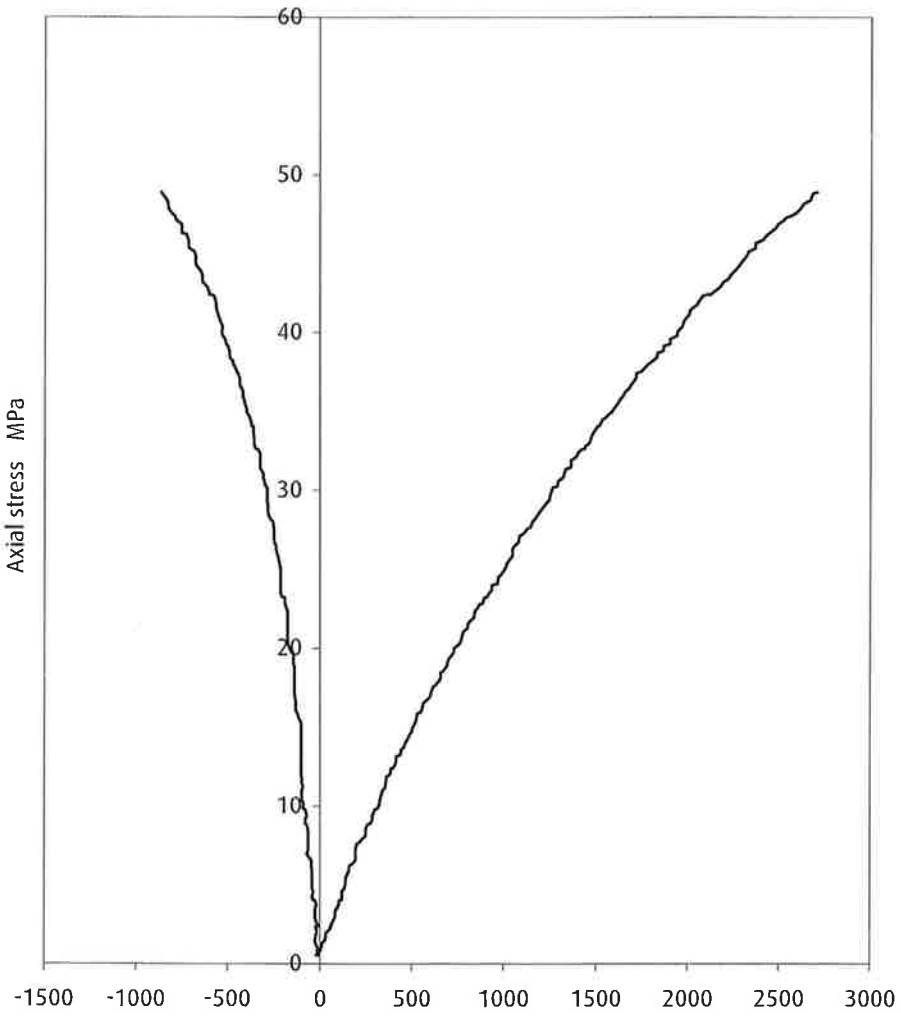
Moisture content	%	4.9	Stress rate	MPa/s	0.04	Tangent modulus	E_t	4.22	GPa
Length	mm	137.95	Test duration	min	09:11	Average modulus	E_{ave}	5.61	GPa
Diameter	mm	51.16	U.C.S.	MPa	20.8	Secant modulus	E_{sec}	8.82	GPa
Mass	g	694.47	Type of machine	Controls 1300/Automax 5		Poissons ratio (Determined using E_{ave})	v	0.324	
Bulk density	kg/m^3	2450							
Dry density	kg/m^3	2340							
Date		27/06/2008							

Test remarks

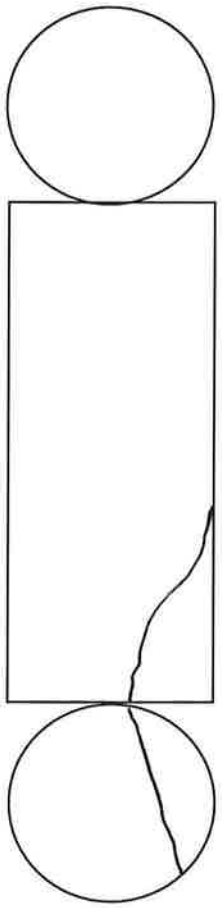
Specimen remarks: Top and bottom of specimen fails ISRM criteria for perpendicularity and/or flatness. Top of specimen is flat and perpendicular to 0.461mm. Bottom of specimen is flat and perpendicular to 0.439mm.

Project Name	#2 Duynefontein	**Unconfined Compressive Strength With Youngs Modulus And Poissons Ratio**	Hole ID KB41
Project No.	LT1064		Sample Depth 19.90m
Engineer	SRK Consulting		Sample Number 001
Client	SRK Consulting	I.S.R.M. Suggested methods 1981	Sample Type C
Description	Grey SANDSTONE.		Specimen Depth 19.90m
			Specimen Number 1

Graph of stress strain curves



Failure sketch



Failure type: Shear

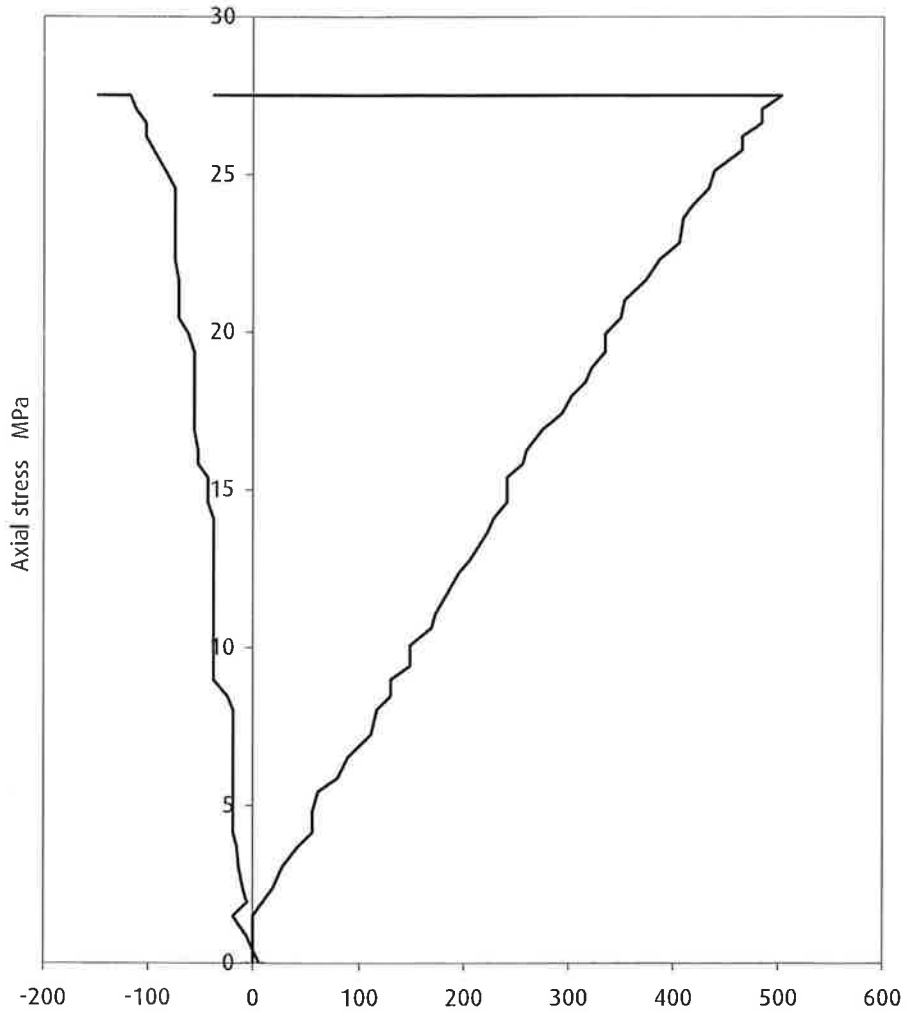
Moisture content	%	1.2	Stress rate	MPa/s	0.05	Tangent modulus	E_t	19.4 GPa
Length	mm	138.42	Test duration	min	18:02	Average modulus	E_{ave}	19.5 GPa
Diameter	mm	51.20	U.C.S.	MPa	53.1	Secant modulus	E_{sec}	24.3 GPa
Mass	g	705.70	Type of machine	Controls 1300/Automax 5		Poissons ratio (Determined using E_{ave})	v	0.202
Bulk density	kg/m^3	2480						
Dry density	kg/m^3	2450						
Date		20/06/2008						

Test remarks

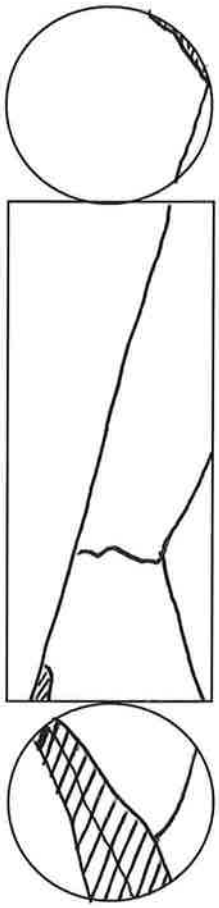
Specimen remarks: Top and bottom of specimen fails ISRM criteria for perpendicularity and/or flatness. Top of specimen is flat and perpendicular to 0.134mm. Bottom of specimen is flat and perpendicular to 0.303mm.

Project Name	#2 Duynefontein	**Unconfined Compressive Strength With Youngs Modulus And Poissons Ratio**	Hole ID KB41
Project No.	LT1064		Sample Depth 22.79m
Engineer	SRK Consulting		Sample Number 002
Client	SRK Consulting	I.S.R.M. Suggested methods 1981	Sample Type C
Description	Grey metamorphosed SANDSTONE.		Specimen Depth 22.79m
			Specimen Number 1

Graph of stress strain curves



Failure sketch



Failure type: Shear

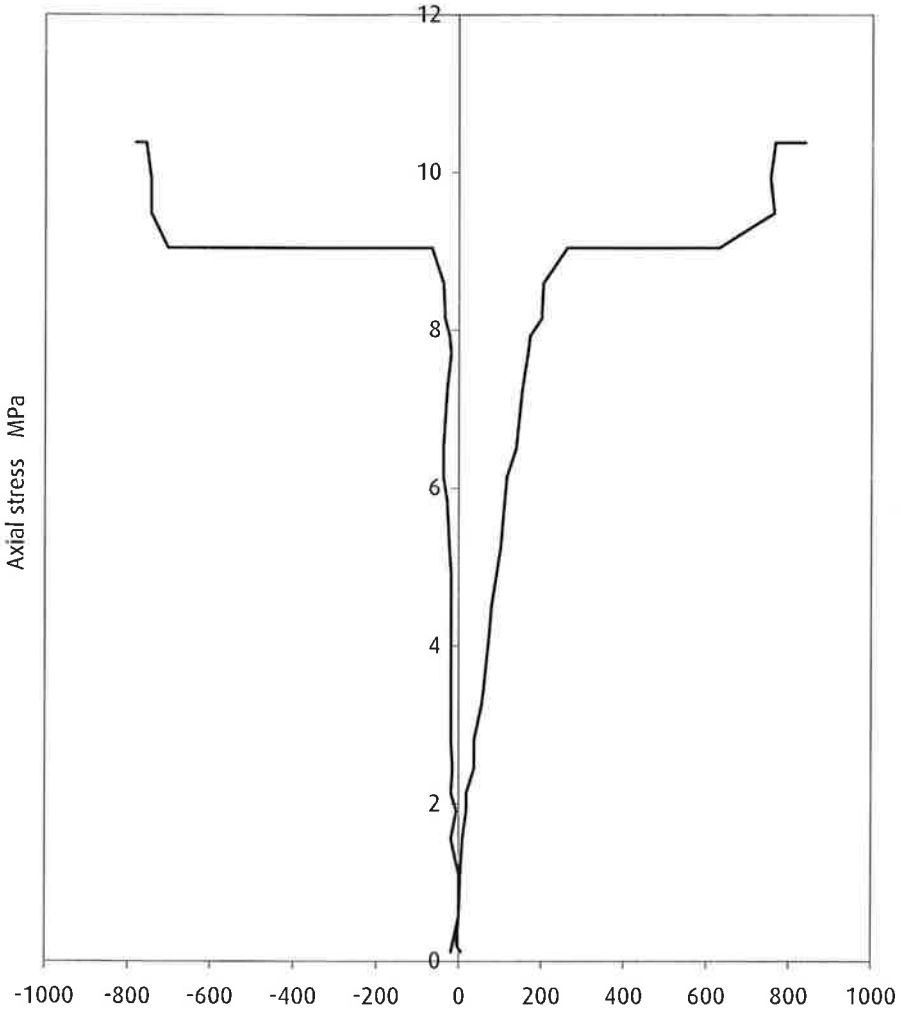
Moisture content	%	0.6	Stress rate	MPa/s	0.10	Tangent modulus	E_t	56.8 GPa
Length	mm	135.88	Test duration	min	04:34	Average modulus	E_{ave}	53.0 GPa
Diameter	mm	51.25	U.C.S.	MPa	28.0	Secant modulus	E_{sec}	59.7 GPa
Mass	g	735.83	Type of machine	Controls 1300/Automax 5		Poissons ratio (Determined using E_{ave})	v	0.176
Bulk density	kg/m^3	2620						
Dry density	kg/m^3	2610						
Date		26/06/2008						

Test remarks

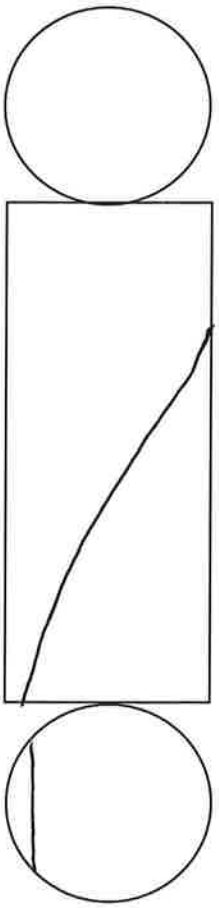
Specimen remarks: Top and bottom of specimen fails ISRM criteria for perpendicularity and/or flatness. Top of specimen is flat and perpendicular to 0.300mm. Bottom of specimen is flat and perpendicular to 0.571mm. Sides of specimen are not smooth and straight to within ISRM tolerance, the largest irregularity measured as 0.40mm.

Project Name	#2 Duynefontein	**Unconfined Compressive Strength With Youngs Modulus And Poissons Ratio**	Hole ID KB42
Project No.	LT1064		Sample Depth 29.68m
Engineer	SRK Consulting		Sample Number 001
Client	SRK Consulting	I.S.R.M. Suggested methods 1981	Sample Type C
Description	Grey SANDSTONE.		Specimen Depth 29.68m
			Specimen Number 1

Graph of stress strain curves



Failure sketch



Failure type: Shear

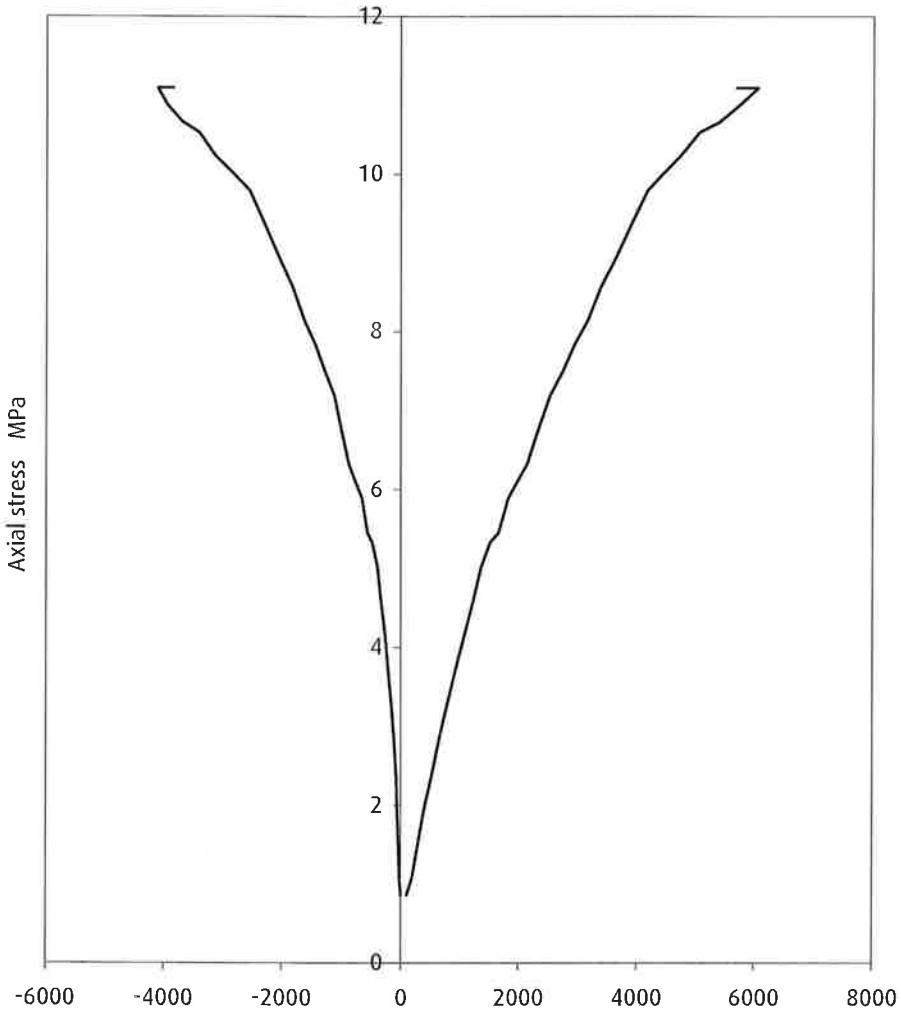
Moisture content	%	0.6	Stress rate	MPa/s	0.05	Tangent modulus	E_t	40.7 GPa
Length	mm	136.98	Test duration	min	03:22	Average modulus	E_{ave}	40.3 GPa
Diameter	mm	50.49	U.C.S.	MPa	10.7	Secant modulus	E_{sec}	42.4 GPa
Mass	g	682.99	Type of machine	Controls 1300/Automax 5		Poissons ratio	v	0.132
Bulk density	kg/m^3	2490				(Determined using E_{ave})		
Dry density	kg/m^3	2480						
Date		27/06/2008						

Test remarks

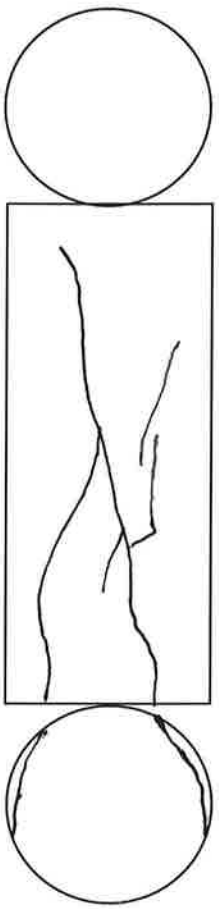
Specimen remarks: Top and bottom of specimen fails ISRM criteria for perpendicularity and/or flatness. Top of specimen is flat and perpendicular to 0.783mm. Bottom of specimen is flat and perpendicular to 0.626mm. Sides of specimen are not smooth and straight to within ISRM tolerance, the largest irregularity measured as 0.40mm.

Project Name	#2 Duynefontein	**Unconfined Compressive Strength With Youngs Modulus And Poissons Ratio**	Hole ID: KB43
Project No.	LT1064		Sample Depth: 30.71m
Engineer	SRK Consulting		Sample Number: 001
Client	SRK Consulting	I.S.R.M. Suggested methods 1981	Sample Type: C
Description	Light grey SANDSTONE.		Specimen Depth: 30.71m
			Specimen Number: 1

Graph of stress strain curves



Failure sketch



Failure type: Axial

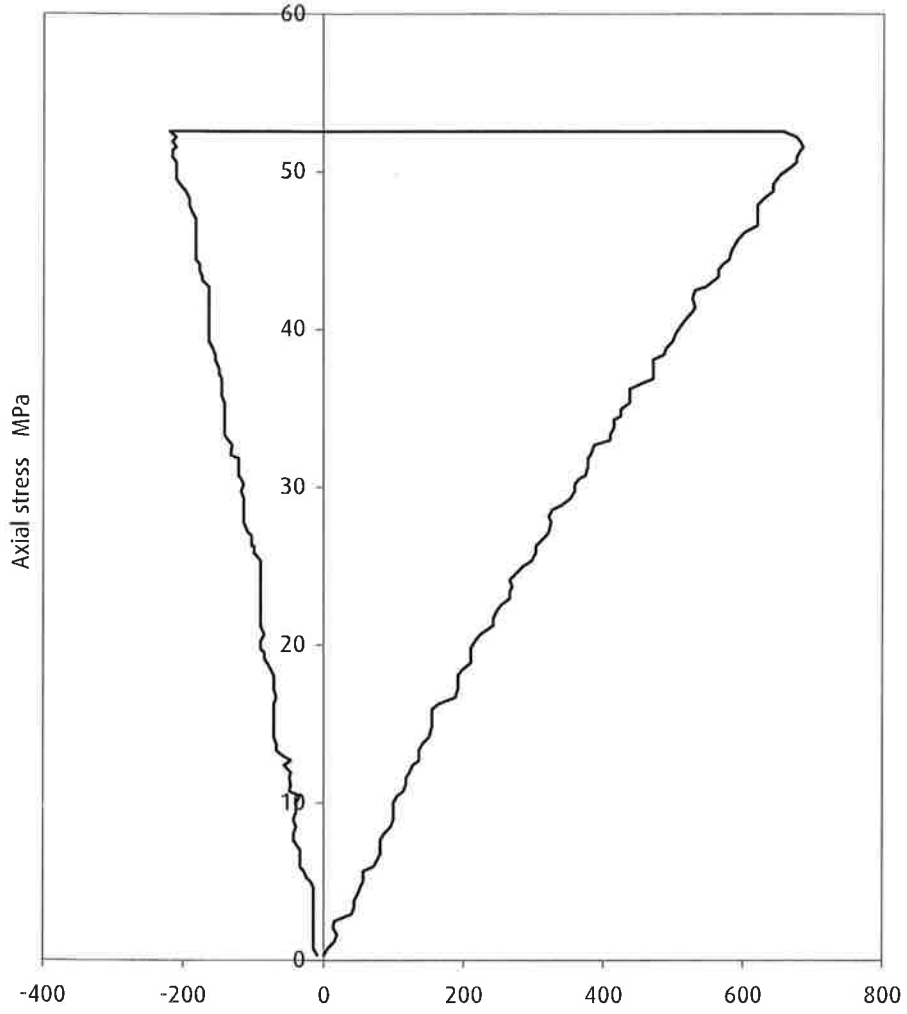
Moisture content	%	3.9	Stress rate	MPa/s	0.07	Tangent modulus	E_t	2.07 GPa
Length	mm	138.48	Test duration	min	02:52	Average modulus	E_{ave}	1.68 GPa
Diameter	mm	51.20	U.C.S.	MPa	11.2	Secant modulus	E_{sec}	2.94 GPa
Mass	g	667.83	Type of machine	Controls 1300/Automax 5		Poissons ratio	v	0.661
Bulk density	kg/m^3	2340				(Determined using E_{ave})		
Dry density	kg/m^3	2250						
Date		11/07/2008						

Test remarks

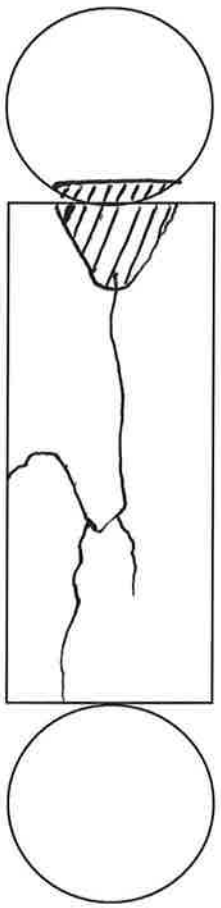
Specimen remarks: Top and bottom of specimen fails ISRM criteria for perpendicularity and/or flatness. Top of specimen is flat and perpendicular to 0.652mm. Bottom of specimen is flat and perpendicular to 0.334mm.

Project Name	#2 Duynefontein	**Unconfined Compressive Strength With Youngs Modulus And Poissons Ratio**	Hole ID: KB45
Project No.	LT1064		Sample Depth: 28.73m
Engineer	SRK Consulting		Sample Number: 001
Client	SRK Consulting	I.S.R.M. Suggested methods 1981	Sample Type: C
Description	Grey SANDSTONE with infilled fractures.		Specimen Depth: 28.73m
			Specimen Number: 1

Graph of stress strain curves



Failure sketch



Failure type: Axial

Moisture content	%	0.8	Stress rate	MPa/s	0.08	Tangent modulus	E_t	64.5	GPa
Length	mm	138.68	Test duration	min	11:04	Average modulus	E_{ave}	67.7	GPa
Diameter	mm	51.28	U.C.S.	MPa	53.1	Secant modulus	E_{sec}	85.5	GPa
Mass	g	750.69	Type of machine	Controls 1300/Automax 5		Poissons ratio	v	0.250	
Bulk density	kg/m^3	2620				(Determined using E_{ave})			
Dry density	kg/m^3	2600							
Date		20/06/2008							

Test remarks

Specimen remarks: Top and bottom of specimen fails ISRM criteria for perpendicularity and/or flatness. Top of specimen is flat and perpendicular to 0.559mm. Bottom of specimen is flat and perpendicular to 0.259mm. Sides of specimen are not smooth and straight to within ISRM tolerance, the largest irregularity measured as 0.40mm.

Project Name	#2 Duynefontein	Photographic Record	Hole ID
Project No.	LT 1064		KB5
Engineer	SRK Consulting		Fig no.
Client	SRK Consulting		

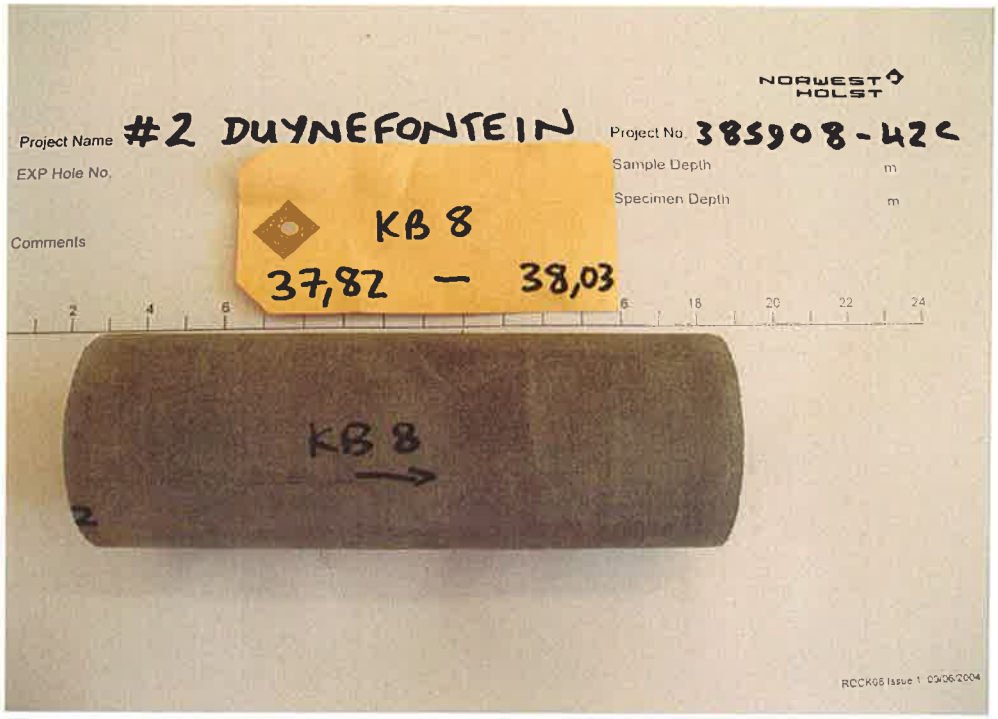
Before test

After test

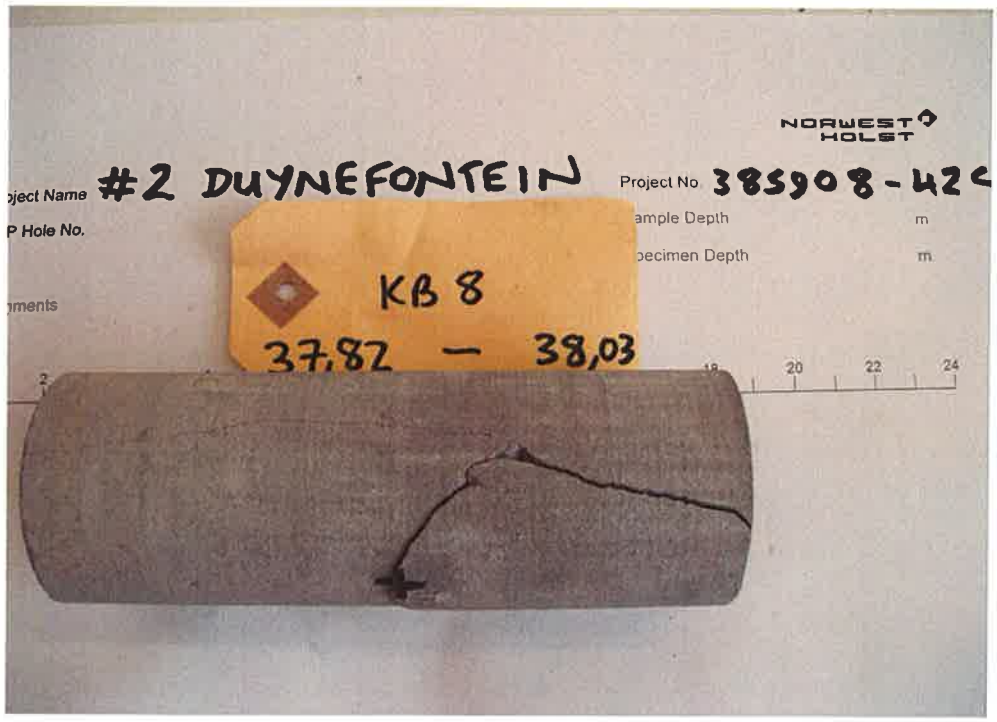
Photographed by	Date photographed	Filename 1
KW	20/06/2008	Filename 2
Form No. SI PMPA4	Revision No. 2.02	Issue Date 26/02/2007

NORWEST HOLST
SOIL ENGINEERING

Project Name #2 Duynefontein	Photographic Record	Hole ID
Project No. LT 1064		KB8
Engineer SRK Consulting		Fig no.
Client SRK Consulting		



Before test



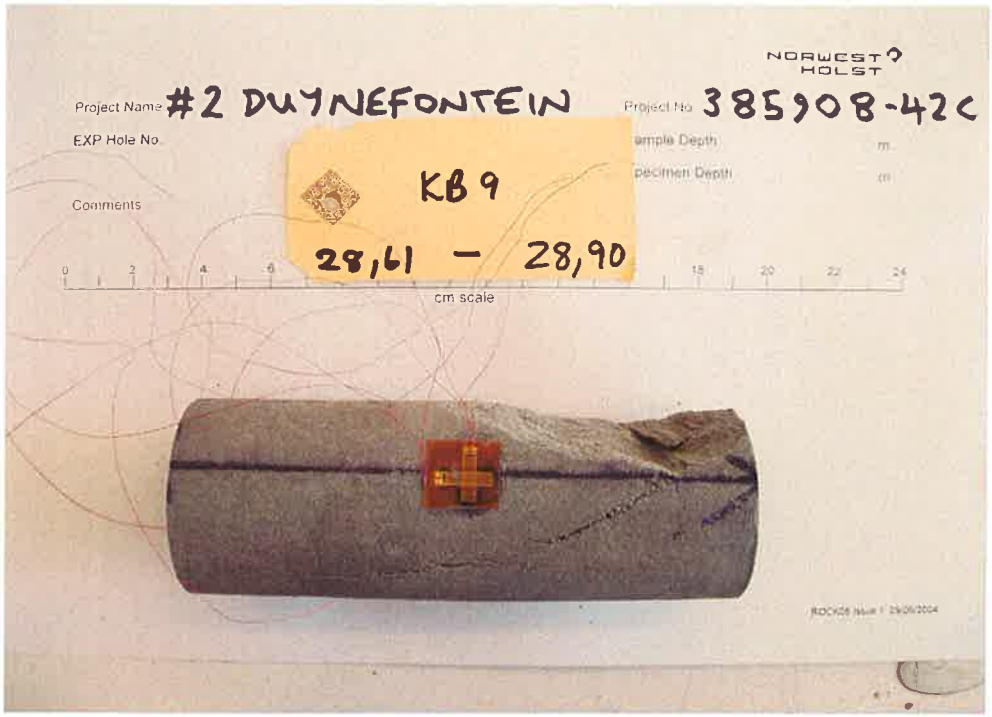
After test

Photographed by	Date photographed	Filename 1
KW	23/06/2008	Filename 2
Form No. SI PMPA4	Revision No. 2.02	Issue Date 26/02/2007

NORWEST HOLST
SOIL ENGINEERING

Project Name #2 Duynefontein	Photographic Record	Hole ID
Project No. LT 1064		KB9
Engineer SRK Consulting		Fig no.
Client SRK Consulting		

Before test

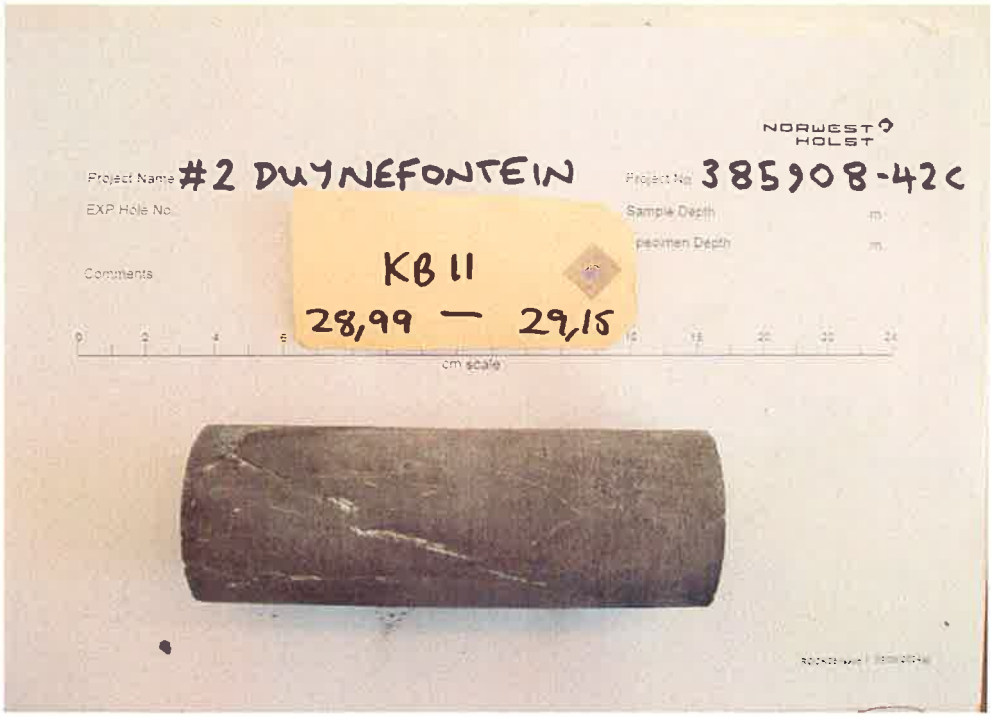


After test

Photographed by	Date photographed	Filename 1
KW	20/06/2008	Filename 2
Form No. SI PMPA4	Revision No. 2.02	Issue Date 26/02/2007

NORWEST HOLST SOIL ENGINEERING

Project Name #2 Duynefontein	Photographic Record	Hole ID
Project No. LT 1064		KB11
Engineer SRK Consulting		Fig no.
Client SRK Consulting		



Before test

After test

Photographed by	Date photographed	Filename 1
KW	20/06/2008	Filename 2
Form No. SI PMPA4	Revision No. 2.02	Issue Date 26/02/2007

NORWEST HOLST SOIL ENGINEERING

Project Name #2 Duynefontein	Photographic Record	Hole ID
Project No. LT 1064		KB18
Engineer SRK Consulting		Fig no.
Client SRK Consulting		

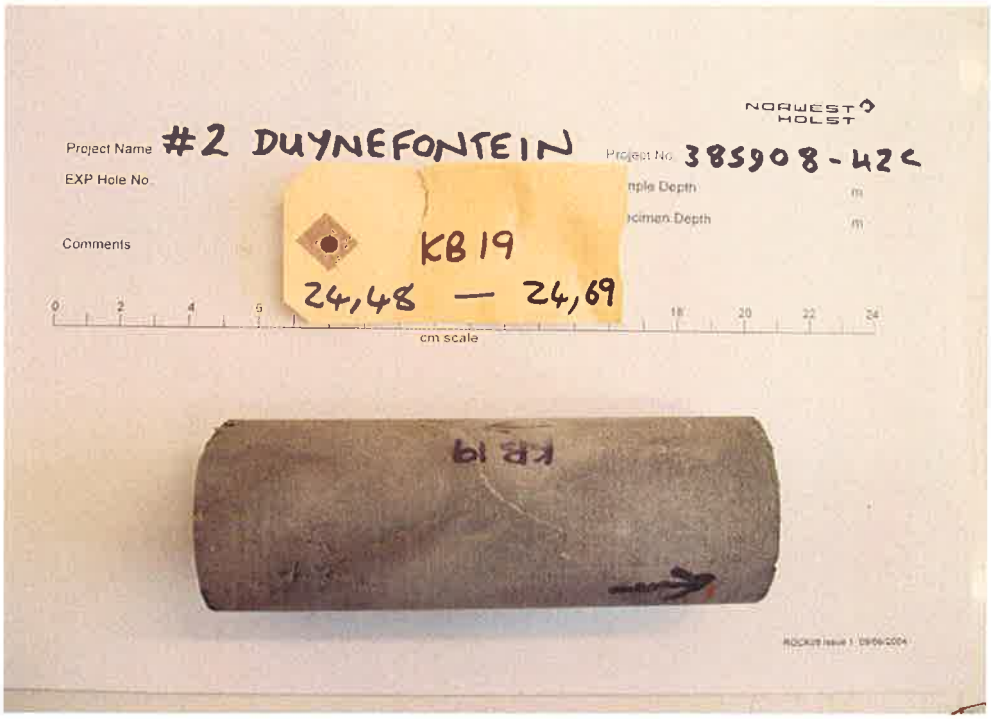
Before test

After test

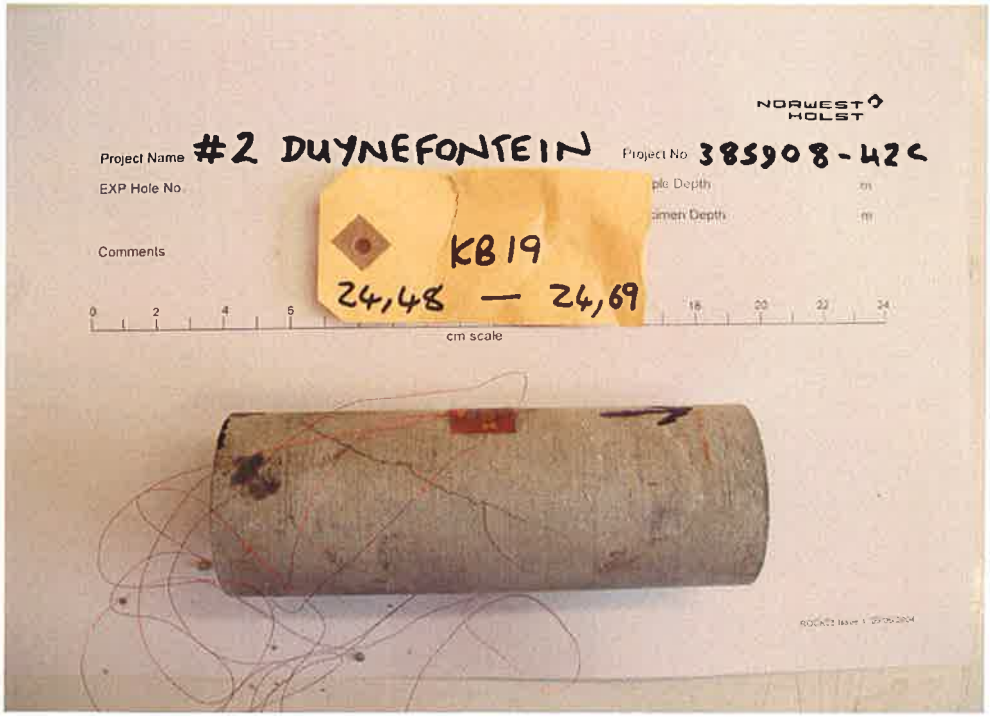
Photographed by	Date photographed	Filename 1
PA	23/06/2008	Filename 2
Form No. SI PMPA4	Revision No. 2.02	Issue Date 26/02/2007

NORWEST HOLST
SOIL ENGINEERING

Project Name #2 Duynefontein	Photographic Record	Hole ID
Project No. LT 1064		KB19
Engineer SRK Consulting		Fig no.
Client SRK Consulting		



Before test

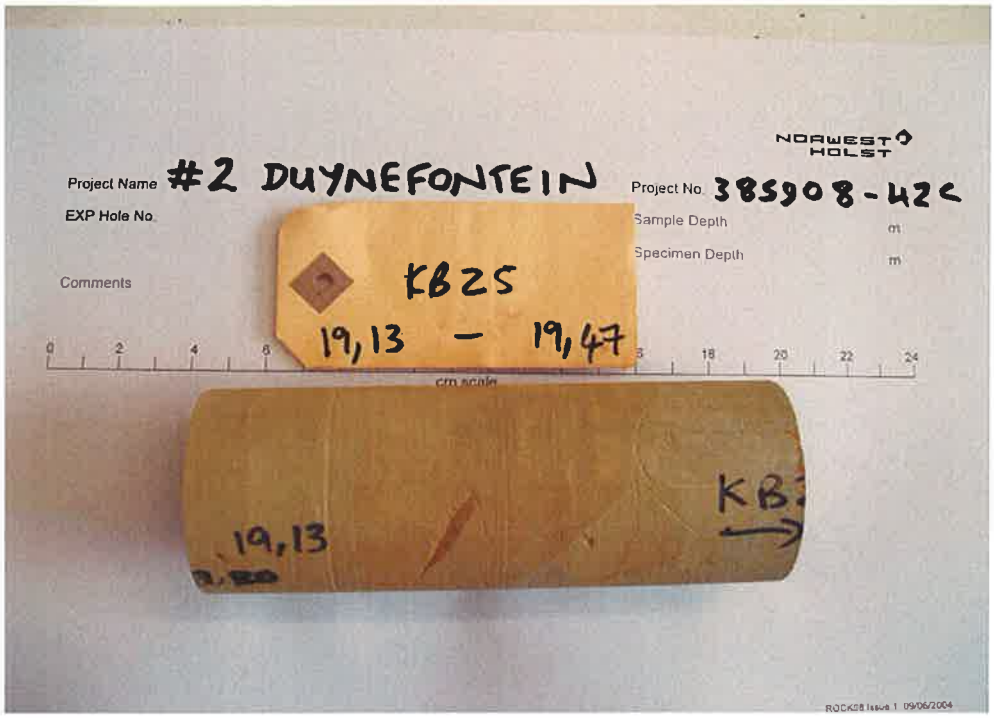


After test

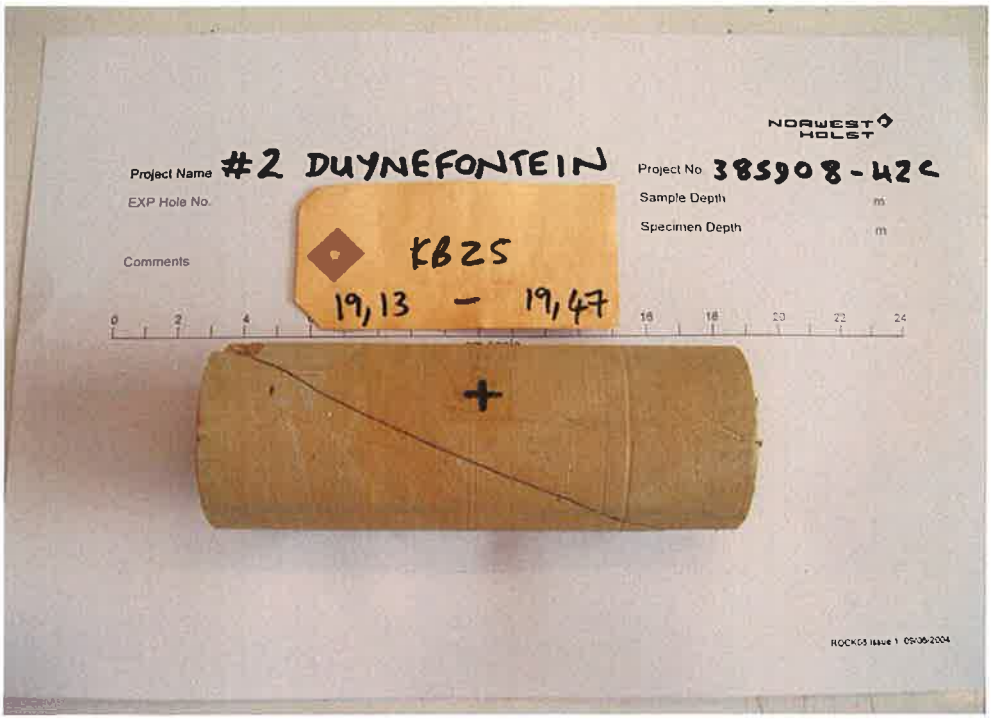
Photographed by	Date photographed	Filename 1
KW	21/06/2008	Filename 2
Form No. SI PMPA4	Revision No. 2.02	Issue Date 26/02/2007

NORWEST HOLST SOIL ENGINEERING

Project Name	#2 Duynefontein	Photographic Record	Hole ID
Project No.	LT 1064		KB25
Engineer	SRK Consulting		Fig no.
Client	SRK Consulting		



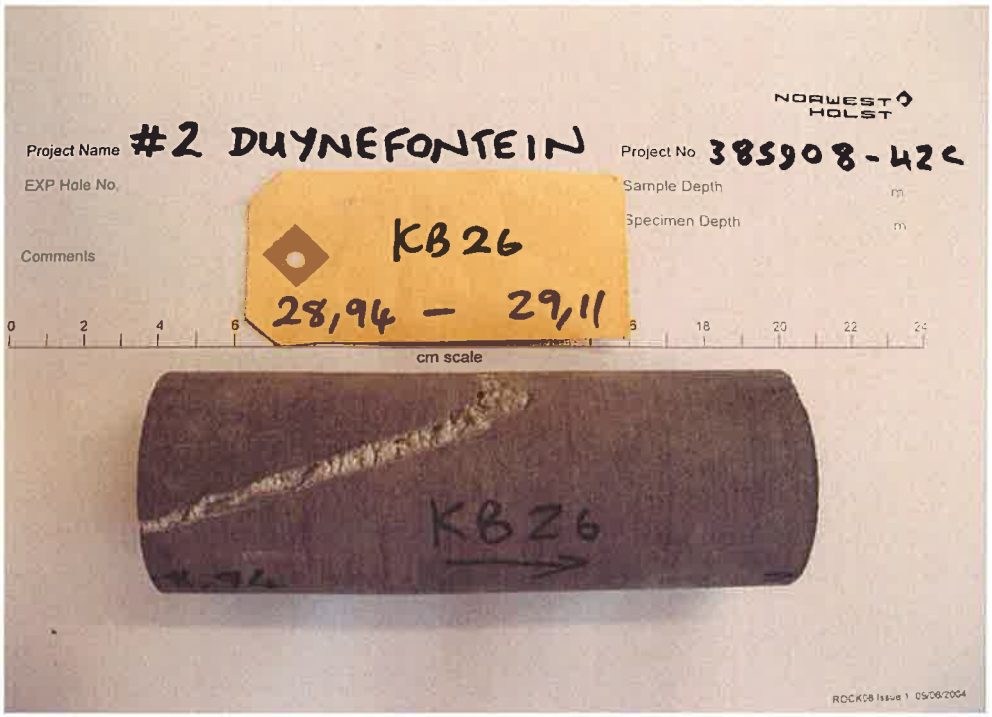
Before test



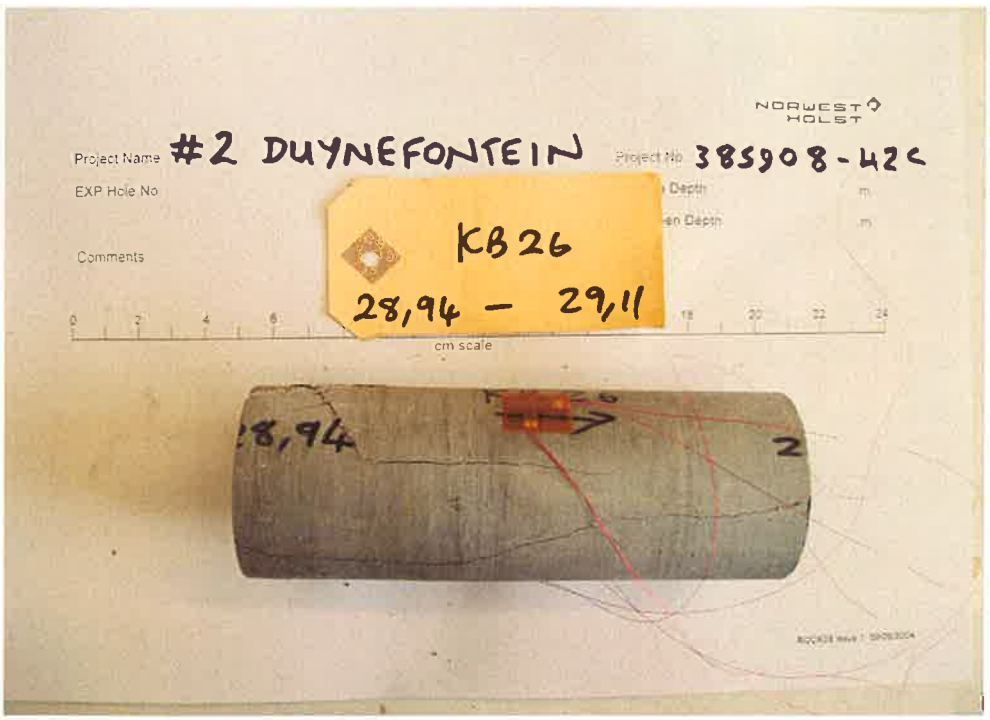
After test

Photographed by	Date photographed	Filename 1	NORWEST HOLST SOIL ENGINEERING
KW	23/06/2008	Filename 2	
Form No. SI PMPA4	Revision No. 2.02	Issue Date 26/02/2007	

Project Name	#2 Duynefontein	Photographic Record	Hole ID
Project No.	LT 1064		KB26
Engineer	SRK Consulting		Fig no.
Client	SRK Consulting		



Before test

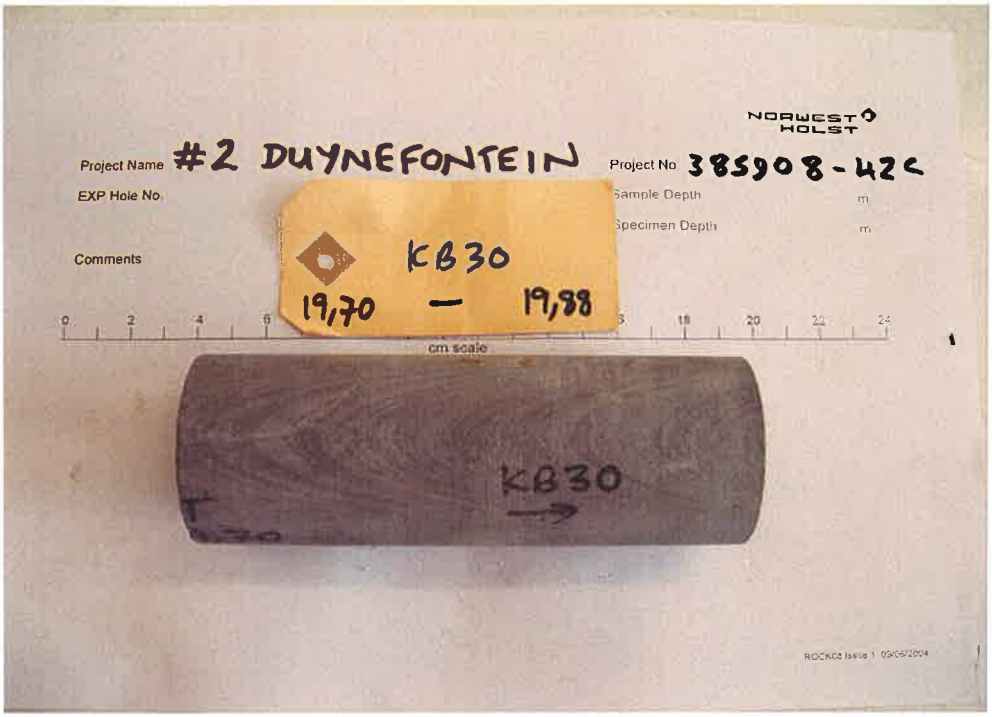


After test

Photographed by	Date photographed	Filename 1
KW	26/06/2008	Filename 2
Form No. SI PMPA4	Revision No. 2.02	Issue Date 26/02/2007

NORWEST HOLST
SOIL ENGINEERING

Project Name	#2 Duynefontein	Photographic Record	Hole ID
Project No.	LT 1064		KB30
Engineer	SRK Consulting		Fig no.
Client	SRK Consulting		



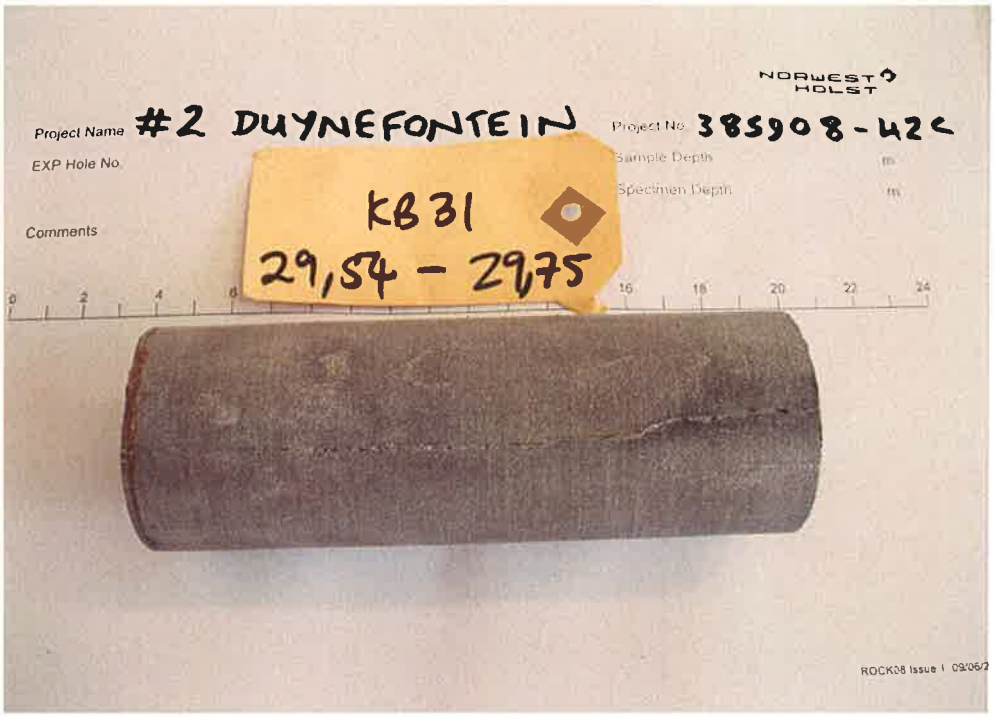
Before test

After test

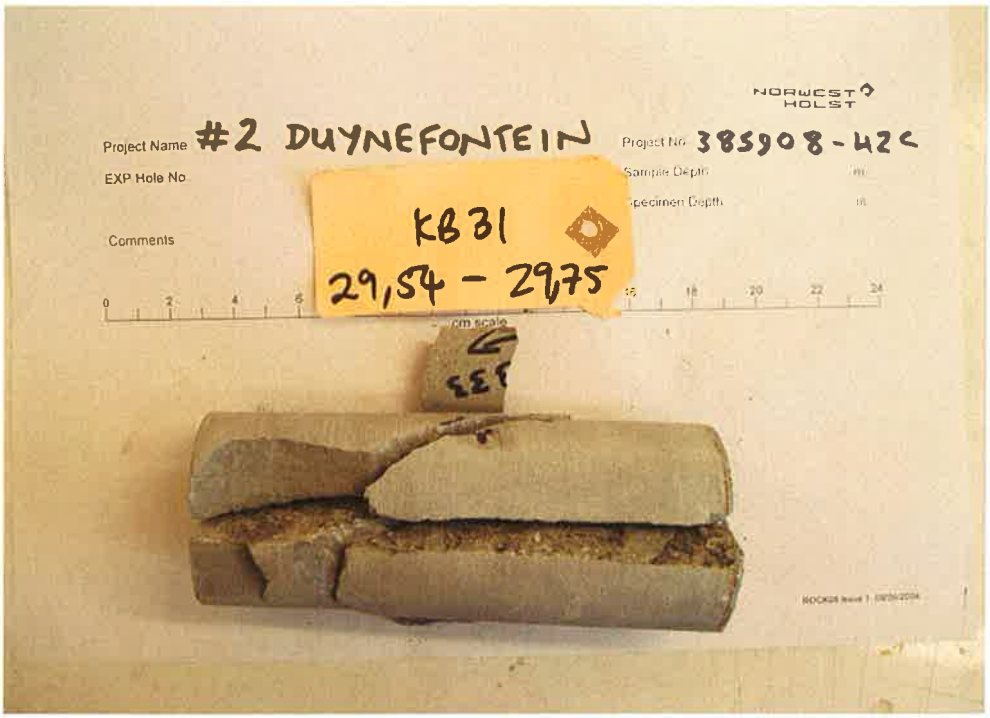
Photographed by	Date photographed	Filename 1
PA	02/08/2008	Filename 2
Form No. SI PMPA4	Revision No. 2.02	Issue Date 26/02/2007

NORWEST HOLST
SOIL ENGINEERING

Project Name	#2 Duynefontein	Photographic Record	Hole ID
Project No.	LT1064		KB31
Engineer	SRK Consulting		Fig no.
Client	SRK Consulting		



Before test

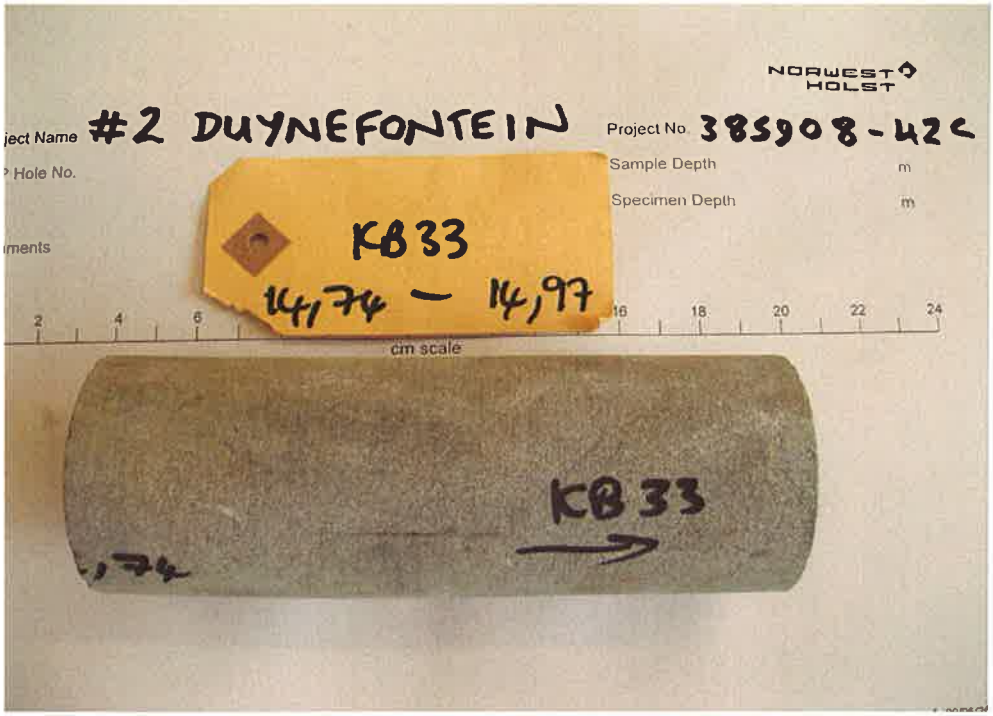


After test

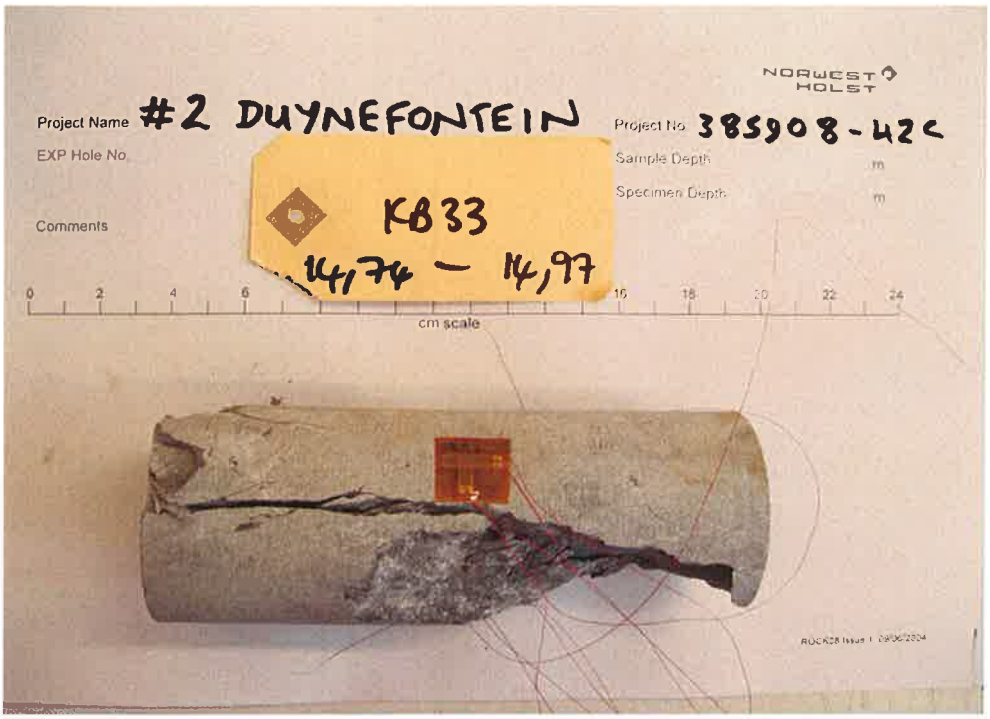
Photographed by	Date photographed	Filename 1
KW	26/06/2008	Filename 2
Form No. SI PMPA4	Revision No. 2.02	Issue Date 26/02/2007

NORWEST HOLST
SOIL ENGINEERING

Project Name	#2 Duynefontein	Photographic Record	Hole ID
Project No.	LT1064		KB33
Engineer	SRK Consulting		Fig no.
Client	SRK Consulting		



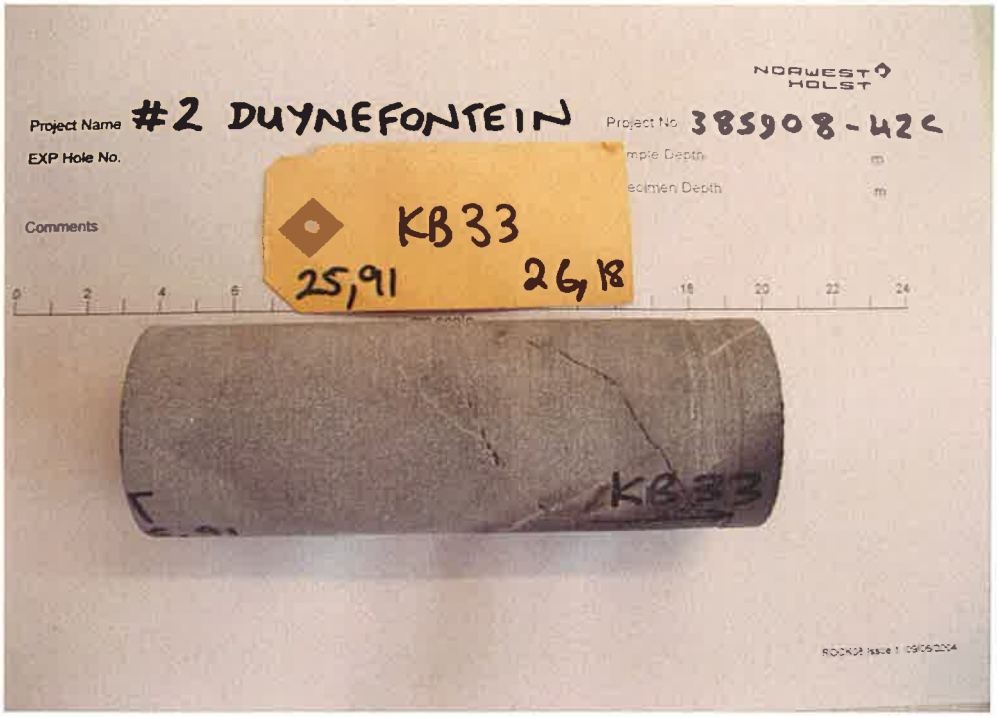
Before test



After test

Photographed by	Date photographed	Filename 1	NORWEST HOLST SOIL ENGINEERING
KW	26/06/2008	Filename 2	
Form No. SI PMPA4	Revision No. 2.02	Issue Date 26/02/2007	

Project Name #2 Duynefontein	Photographic Record	Hole ID
Project No. LT1064		KB33
Engineer SRK Consulting		Fig no.
Client SRK Consulting		



Before test

After test

Photographed by	Date photographed	Filename 1
KW	26/06/2008	Filename 2
Form No. SI PMPA4	Revision No. 2.02	Issue Date 26/02/2007

NORWEST HOLST
SOIL ENGINEERING

Project Name	#2 Duynefontein	Photographic Record	Hole ID
Project No.	LT1064		KB40
Engineer	SRK Consulting		Fig no.
Client	SRK Consulting		

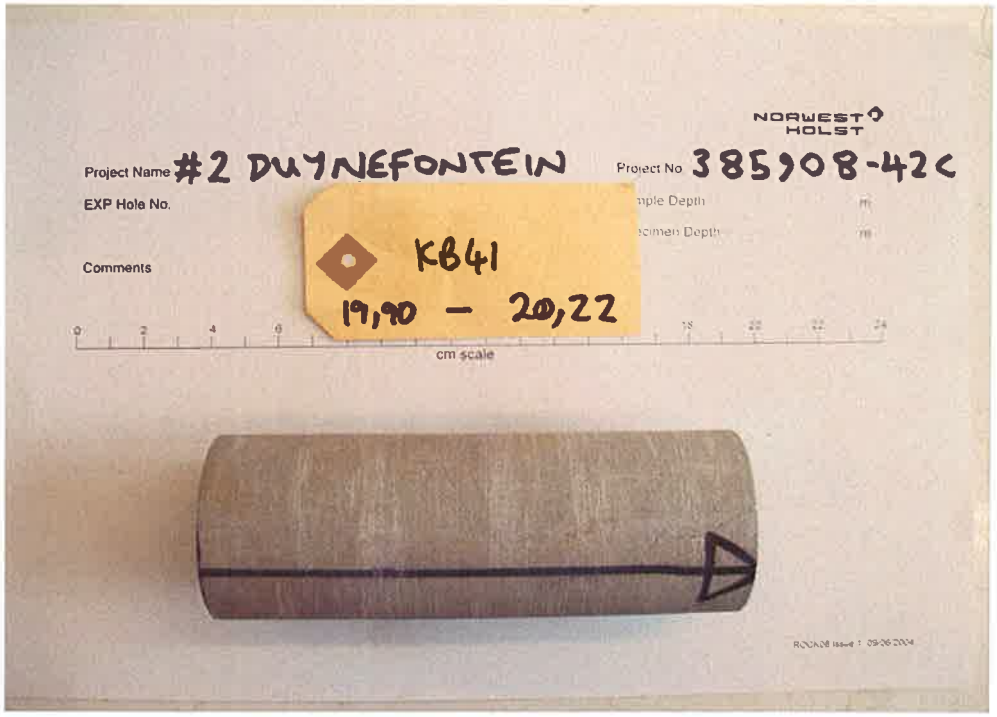
Before test

After test

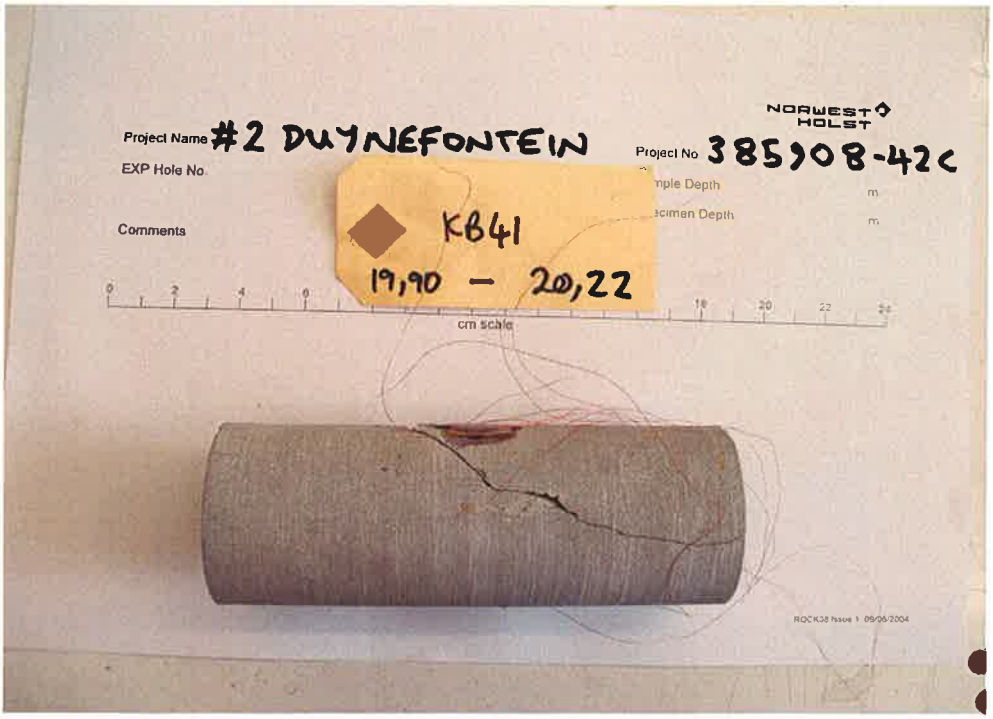
Photographed by	Date photographed	Filename 1
PA	26/06/2008	Filename 2
Form No. SI PMPA4	Revision No. 2.02	Issue Date 26/02/2007

NORWEST HOLST
SOIL ENGINEERING

Project Name	#2 Duynefontein	Photographic Record	Hole ID
Project No.	LT1064		KB41
Engineer	SRK Consulting		Fig no.
Client	SRK Consulting		



Before test

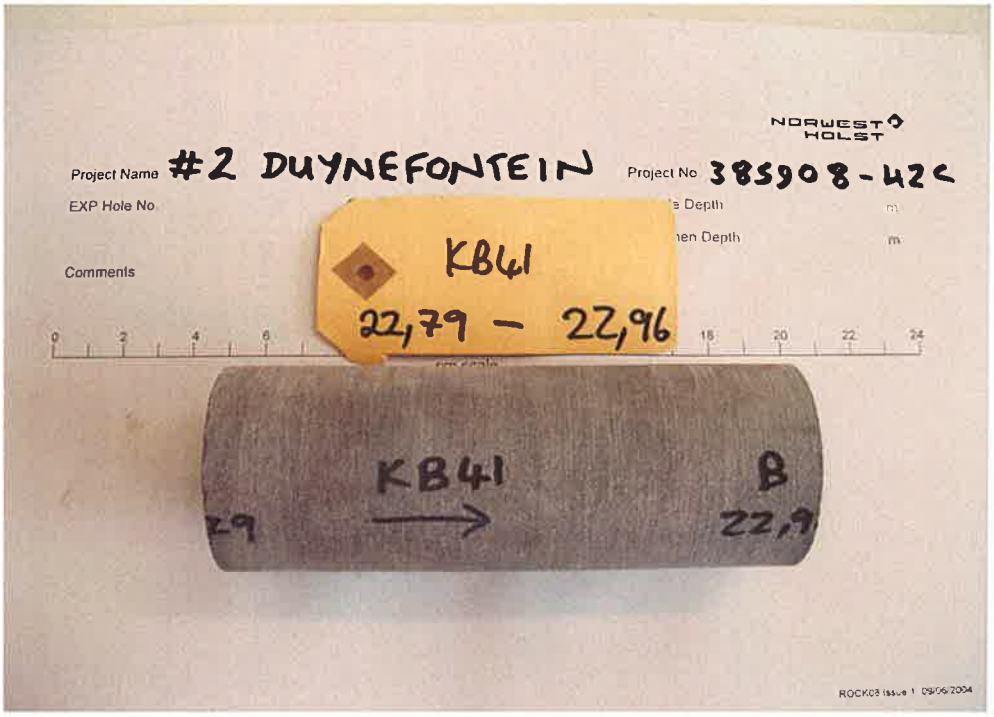


After test

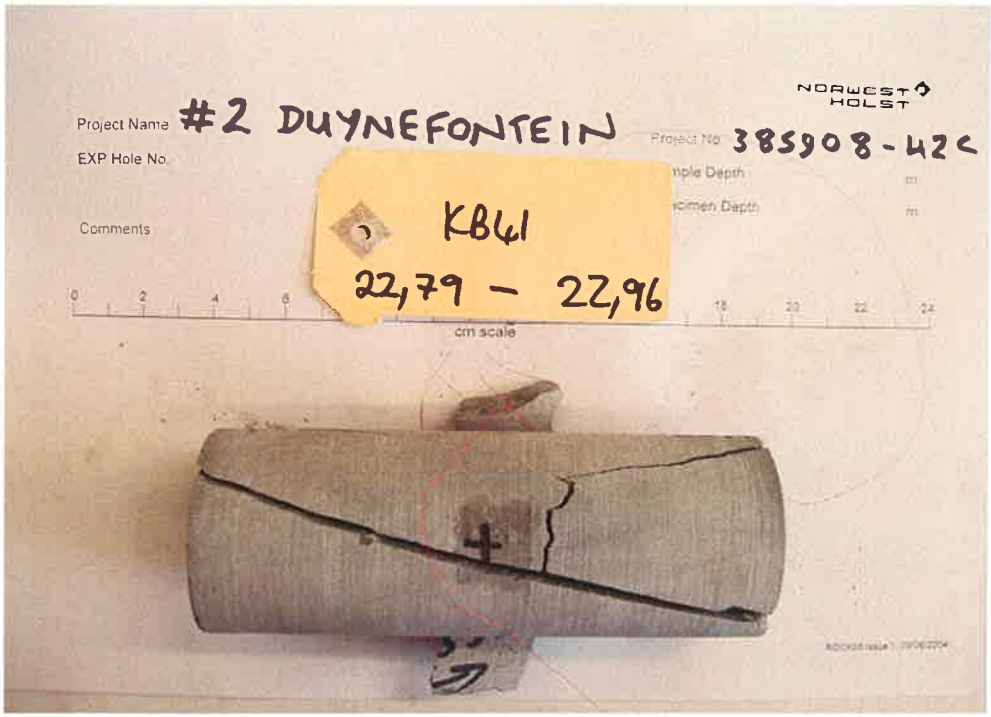
Photographed by	Date photographed	Filename 1
KW	20/06/2008	Filename 2
Form No. SI PMPA4	Revision No. 2.02	Issue Date 26/02/2007

NORWEST HOLST
SOIL ENGINEERING

Project Name	#2 Duynefontein	Photographic Record	Hole ID
Project No.	LT1064		KB41
Engineer	SRK Consulting		Fig no.
Client	SRK Consulting		



Before test

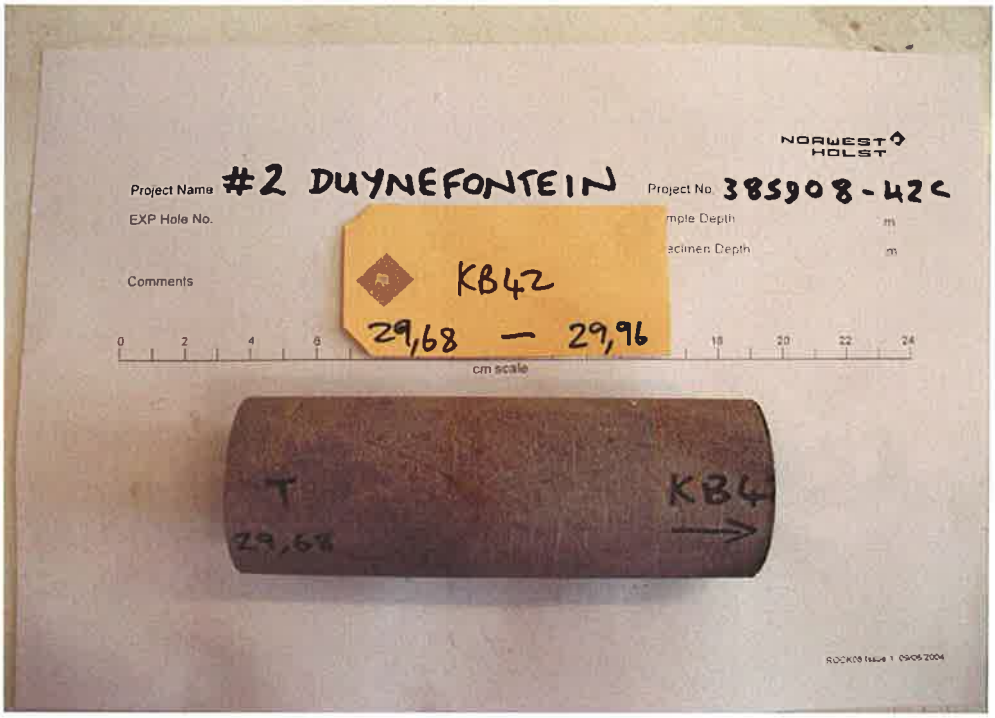


After test

Photographed by	Date photographed	Filename 1
KW	26/06/2008	Filename 2
Form No. SI PMPA4	Revision No. 2.02	Issue Date 26/02/2007

NORWEST HOLST SOIL ENGINEERING

Project Name	#2 Duynefontein	Photographic Record	Hole ID
Project No.	LT1064		KB42
Engineer	SRK Consulting		Fig no.
Client	SRK Consulting		



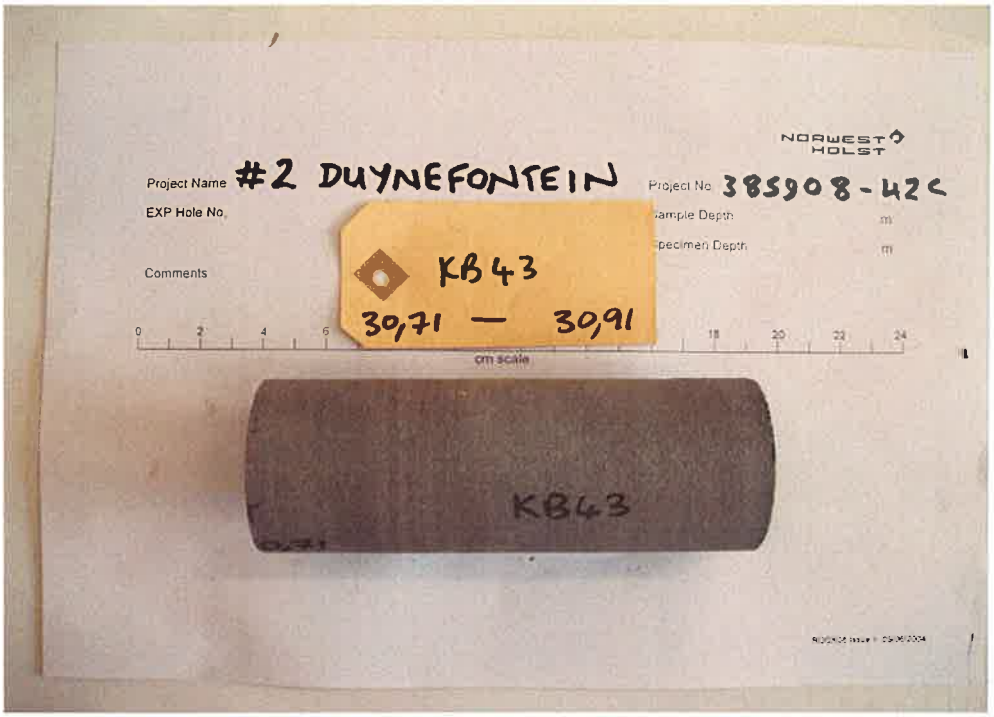
Before test

After test

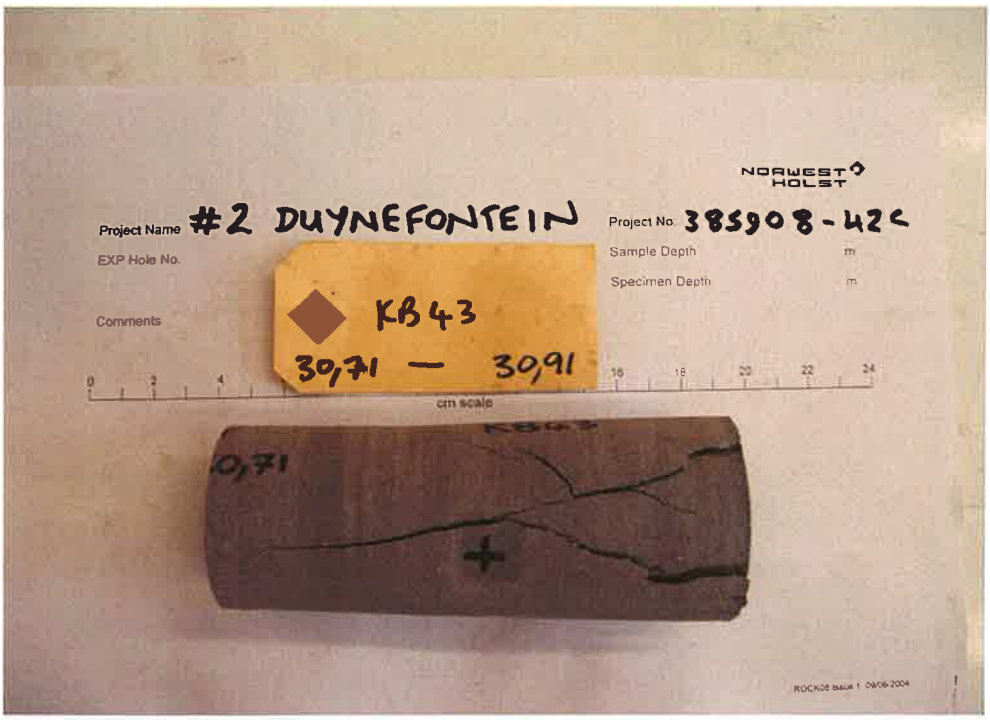
Photographed by	Date photographed	Filename 1
PA	27/06/2008	Filename 2
Form No. SI PMPA4	Revision No. 2.02	Issue Date 26/02/2007

NORWEST HOLST
SOIL ENGINEERING

Project Name	#2 Duynefontein	Photographic Record	Hole ID
Project No.	LT1064		KB43
Engineer	SRK Consulting		Fig no.
Client	SRK Consulting		



Before test

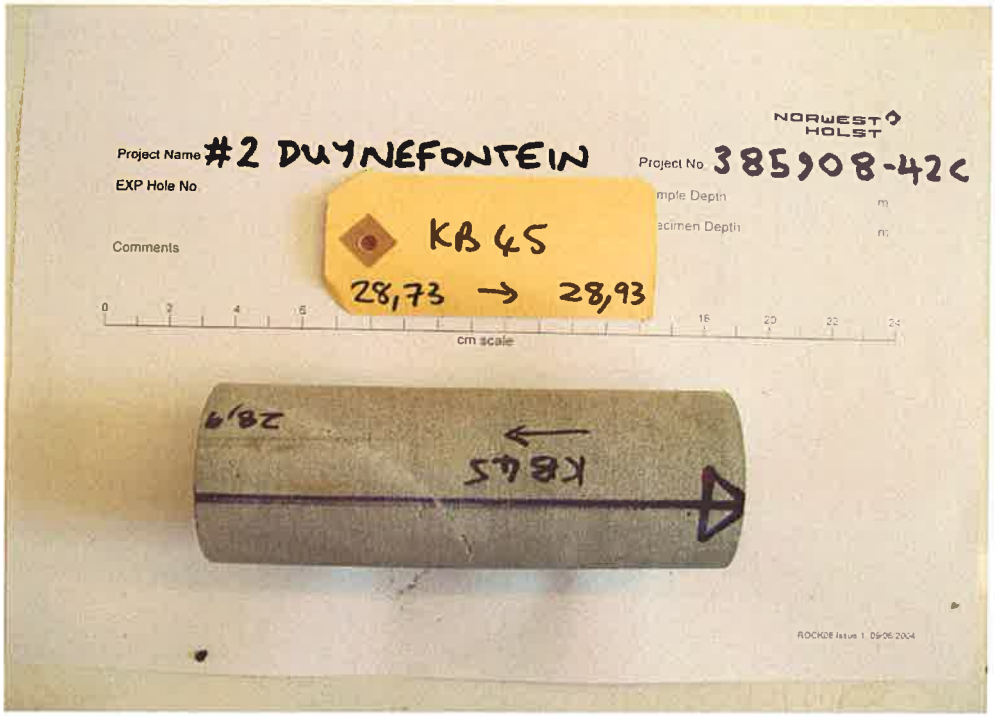


After test

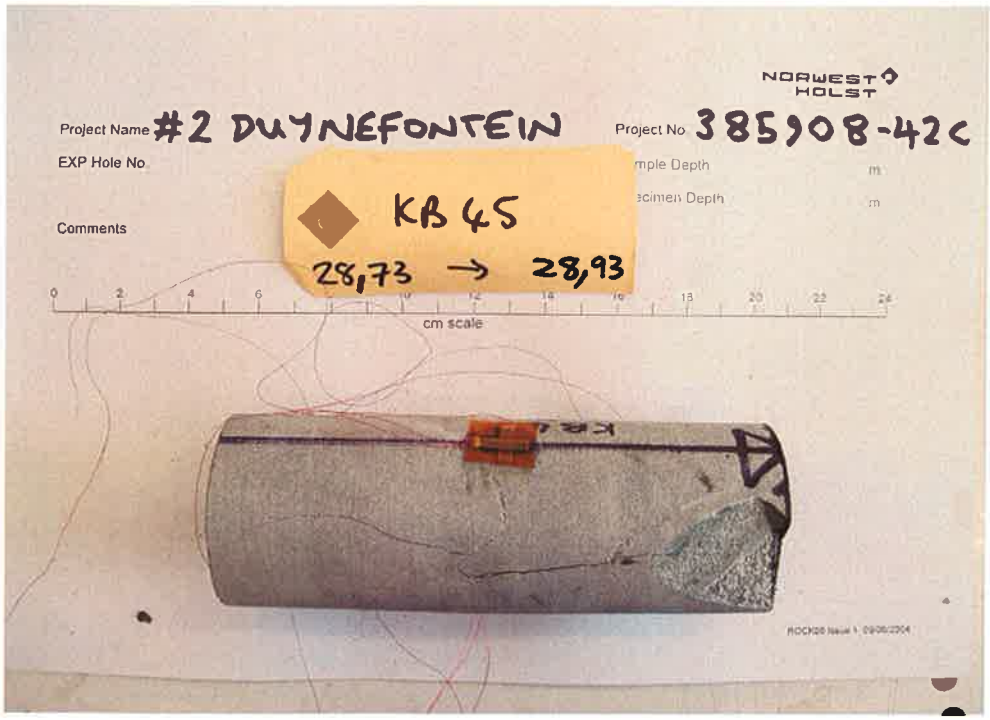
Photographed by	Date photographed	Filename 1
PA	02/08/2008	Filename 2
Form No. SI PMPA4	Revision No. 2.02	Issue Date 26/02/2007

NORWEST HOLST
SOIL ENGINEERING

Project Name #2 Duynefontein	Photographic Record	Hole ID
Project No. LT1064		KB45
Engineer SRK Consulting		Fig no.
Client SRK Consulting		



Before test



After test

Photographed by	Date photographed	Filename 1
KW	20/06/2008	Filename 2
Form No. SI PMPA4	Revision No. 2.02	Issue Date 26/02/2007

NORWEST HOLST
SOIL ENGINEERING

NORWEST HOLST
SOIL ENGINEERING

TEST REPORT

UKAS TESTING
1265

Serial number: LT1067 Date of issue: 12/09/2008

Issued by Norwest Holst Limited - Soil Engineering Division,
Parkside Lane,
Dewsbury Road,
Leeds
LS11 5SX.
Tel: 0113 2711111
Fax: 0113 2760472
Email: soils@norwest.co.uk

Authorised signatory

M. J. Baldwin (Technical Manager)
R. J. Rogers (Principal Engineer)
S. Kirk (Laboratory Manager)
S. K. Sharda (Assistant Laboratory Manager)

Customer name SRK Consulting Ltd
Address Postnet Suite #206
Private Bag X18
Rondebosch
7701 South Africa

Contract name #3 Duynefontein
Your reference 385908 - 42C

Dates of receipt of samples 13/06/2008

Dates of testing 01/09/2008 to 12/09/2008

Testing was performed to the standard named on individual test results.

Sampling was not performed by the Laboratory of Norwest Holst Soil Engineering.

Testing was performed on 12 number of samples received in good condition.

Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation.

Results reported relate only to the samples tested.

Tests marked 'Not UKAS' in this report are not included in the UKAS accreditation schedule for our laboratory. These results will appear in italics on any summary of tests.

Samples will be retained for 28 days from date of issue of this report and then be disposed of, unless we receive written instruction to the contrary

Quality Control Check performed by K. A. Walker (Laboratory Quality Manager)

Key to Laboratory Summary Sheets

Common to all summaries				
Sample Type	U	Undisturbed sample	D	Small disturbed sample
	P	Piston sample	B	Bulk disturbed sample
	TW	Thin walled sample	BLK	Block sample
	L	Liner sample	C	Rock core
	AMAL	Amalgamated sample		
Test status	Any result in *italics* indicates a test that is not within the scope of the UKAS accreditation for this laboratory.			
Summary of Laboratory Soil Tests: Index / Classification Tests				
Particle density	p	Small pyknometer method	g	Gas jar method
Plastic index	N/P	Non plastic, although liquid limit will have been determined if requested		
Particle size (PSD)	1	Following value in silt column denotes combined clay and silt fraction		
	p	Following value in clay column denotes sedimentation by pipette, else sedimentation is by hydrometer.		
Summary of Laboratory Soil Tests: Strength and Permeability Tests				
Triaxial	UU	Single stage unconsolidated quick undrained	UUM	Multi stage unconsolidated quick undrained
	UU3	Set of 3 unconsolidated quick undrained	CU	Single stage consolidated undrained
	CUM	Multi stage consolidated undrained	CU3	Set of 3 consolidated undrained
	CD	Single stage consolidated drained	CDM	Multi stage consolidated drained
	CD3	Set of 3 consolidated drained		
	Note that single stage tests are reported assuming $\phi = 0$ for total stress and $c' = 0$ for effective stress			
Consol	Oed	One-dimensional oedometer	Hyd	Hydraulic cell consolidation
	m_v	coefficient of compressibility quoted for p0 to p0 + 100kPa, where determined		
Permeability	C	Constant head permeability	T	Triaxial permeability
Shearbox	SSB	Small shear box	LSB	Large shear box
	p	Peak value	r	Residual value
	RS	Ring shear		
Summary of Laboratory Soil Re-Use Test				
MCV	s	MCV value at natural or specified moisture content	int	Intercept of calibration line in MCV calibration
Summary of Laboratory Rock Strength Tests				
Point Load Type (Combination of)	D	Diametral	A	Axial
	I	Irregular lump	B	Block
	L	Test performed parallel to planes of weakness		
	P	Test performed perpendicular to planes of weakness		
	X	Invalid failure of point load (not broken between points of load application)		
Summary of Laboratory Rock Materials Tests				
Ten% fines	w	Soaked test	d	Dry test
Point Load Index Result				
Point Load Type (Combination of)	D	Diametral	A	Axial
	I	Irregular lump	B	Block
	L	Parallel to planes of weakness	P	Perpendicular to planes of weakness
	X	Invalid failure of point load (not broken between points of load application)		
Dimensions	W	Diameter of core or average smallest width perpendicular to axis of loading in a block or irregular lump		
	D	Distance between platens when just in contact with specimen		
	D'	Distance between platens at point of failure		
	De	Equivalent core diameter	Is	P/De^2
	Is(50)	F x Is	F	$(De/50)^{0.45}$
	Is(50) point load strength index corrected for a diametral test of core diameter 50mm			
	For Axial/Lump tests $De^2 = (4/Pi) \times (W \times D')$		For Diametral tests $De^2 = D \times D'$	

Important note: summary sheets are provided for convenience and in no way replace individual test result sheets which shall, without exception, be regarded as the definitive result.

Project Name #3 Duynefontein

Project No. LT1067

Engineer SRK Consulting Ltd

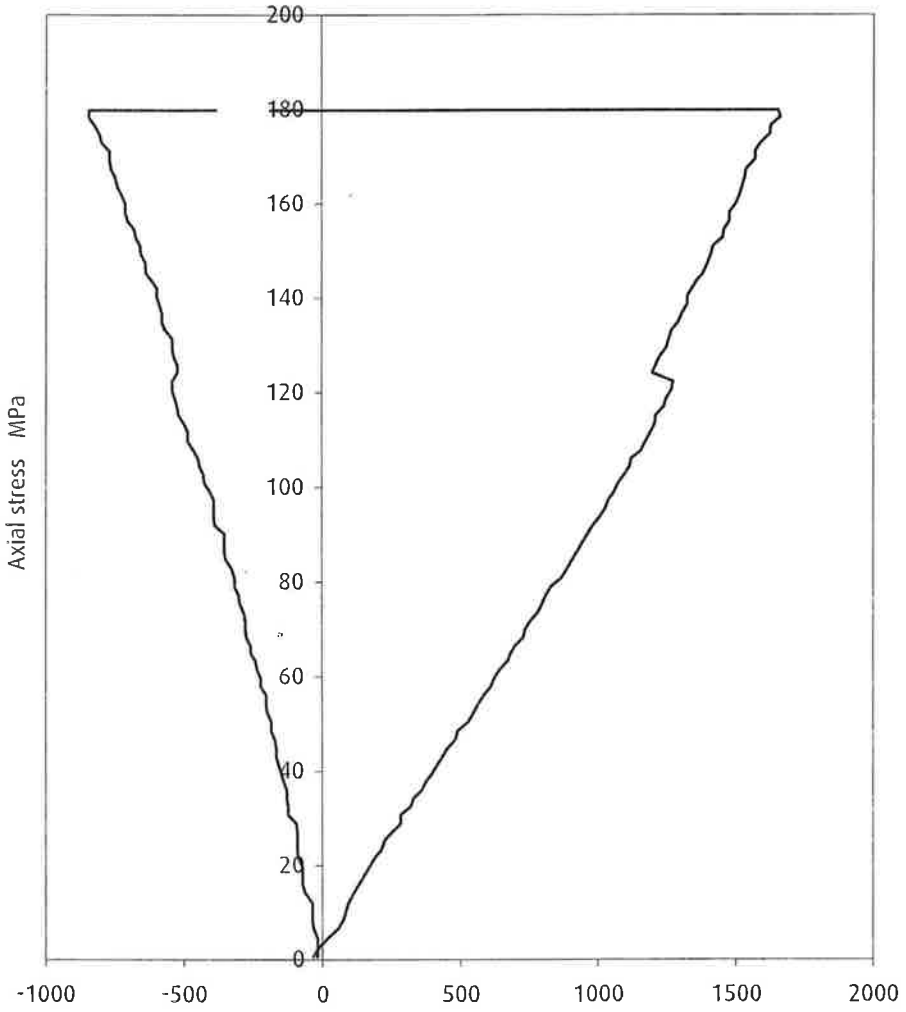
Client SRK Consulting Ltd

Summary Of Laboratory Rock Strength Tests

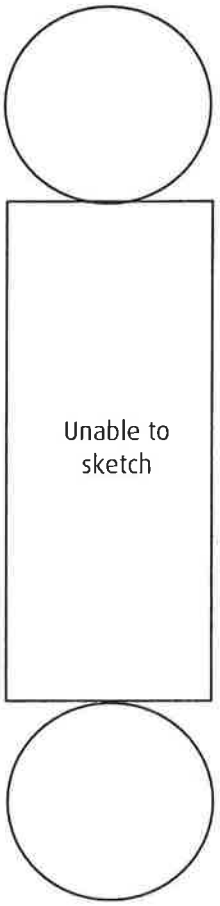
Hole ID	Sample depth m	Sample no.	Sample type	Specimen depth m	Specimen no.	Water Content %	Bulk Density kg/m³	Dry Density kg/m³	Particle density Mg/m³	Point load Type	Point load I_s MN/m²	Point load I_s50 MN/m²	UCS MN/m²	Brazil MN/m²	Porosity %	Elastic Modulus GPa	Posissons Ratio
KB06	21.290	001	C	21.290	01	0.1	2640	2640					*180*			*93.4 Ave*	*0.447*
KB06	39.270	002	C	39.270	01	0.2	2700	2690					*195*			*68.6 Ave*	*0.263*
KB10	24.760	001	C	24.760	01	0.5	2550	2540					*25.3*			*28.4 Ave*	*0.235*
KB14	20.240	001	C	20.240	01	0.2	2620	2610					*63.4*			*55 Ave*	*0.252*
KB17	17.030	001	C	17.030	01	0.7	2480	2460					*14.8*			*21 Ave*	*0.177*
KB21	24.730	001	C	24.730	01	0.7	2560	2540					*50.9*			*29.4 Ave*	*0.553*
KB21	42.250	002	C	42.250	01	0.5	2670	2650					*69.5*			*37.9 Ave*	*0.255*
KB21	51.900	003	C	51.900	01	0.1	2710	2710					*87.2*			*83.7 Ave*	*0.233*
KB29	29.770	001	C	29.770	01	1.1	2320	2300					*16.9*			*11 Ave*	*0.373*
KB30	24.930	001	C	24.930	01	2.9	2370	2300					*8.22*			*35 Ave*	*0.291*
KB34	21.570	001	C	21.570	01	9.8	2120	1930					*1.21*			*6.1 Ave*	*0.576*
KB37	27.880	001	C	27.880	01	0.4	2620	2610					*67.8*			*56.8 Ave*	*0.236*
								End									

Project Name	#3 Duynefontein	**Unconfined Compressive Strength With Youngs Modulus And Poissons Ratio**	Hole ID KB06
Project No.	LT1067		Sample Depth 21.29m
Engineer	SRK Consulting Ltd		Sample Number 001
Client	SRK Consulting Ltd	I.S.R.M. Suggested methods 1981	Sample Type C
Description	Grey metamorphic SANDSTONE.		Specimen Depth 21.29m
			Specimen Number 1

Graph of stress strain curves



Failure sketch



Failure type: Explosive

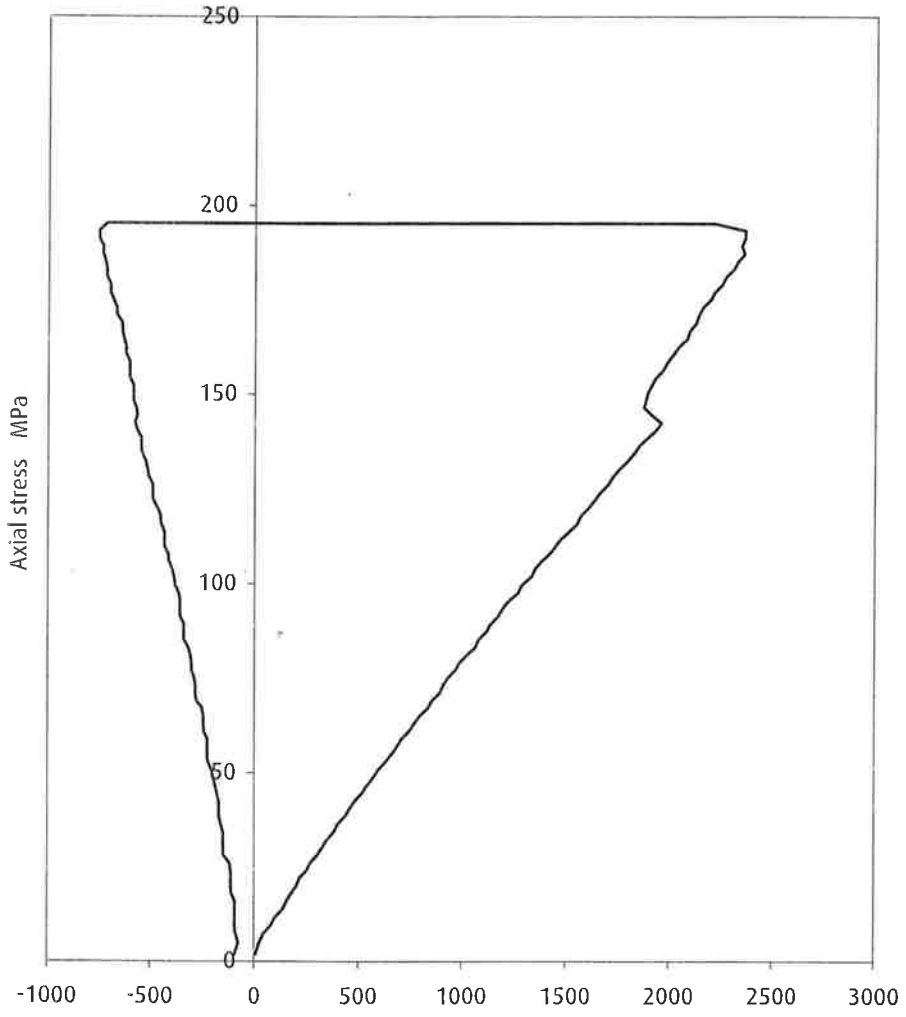
Moisture content	%	0.1	Stress rate	MPa/s	0.36	Tangent modulus	E_t	96.7	GPa
Length	mm	139.85	Test duration	min	08:24	Average modulus	E_{ave}	93.4	GPa
Diameter	mm	51.58	U.C.S.	MPa	180	Secant modulus	E_{sec}	91.2	GPa
Mass	g	772.49	Type of machine	Controls 1300/Automax 5		Poissons ratio	v	0.447	
Bulk density	kg/m^3	2640				(Determined using E_{ave})			
Dry density	kg/m^3	2640							
Date		01/09/2008							

Test remarks

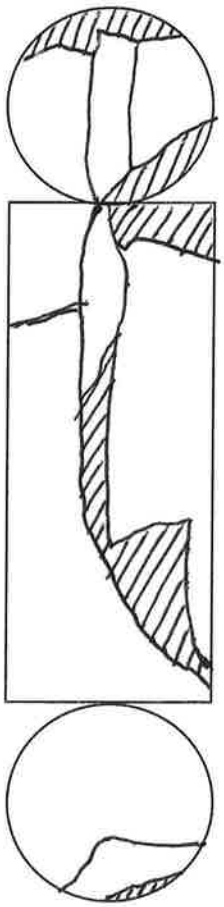
Specimen remarks: Top and bottom of specimen fails ISRM criteria for perpendicularity and/or flatness. Top of specimen is flat and perpendicular to 0.237mm. Bottom of specimen is flat and perpendicular to 0.124mm.

Project Name	#3 Duynefontein	**Unconfined Compressive Strength With Youngs Modulus And Poissons Ratio**	Hole ID KB06
Project No.	LT1067		Sample Depth 39.27m
Engineer	SRK Consulting Ltd		Sample Number 002
Client	SRK Consulting Ltd	I.S.R.M. Suggested methods 1981	Sample Type C
Description	Grey metamorphic SANDSTONE.		Specimen Depth 39.27m
			Specimen Number 1

Graph of stress strain curves



Failure sketch



Failure type: Axial

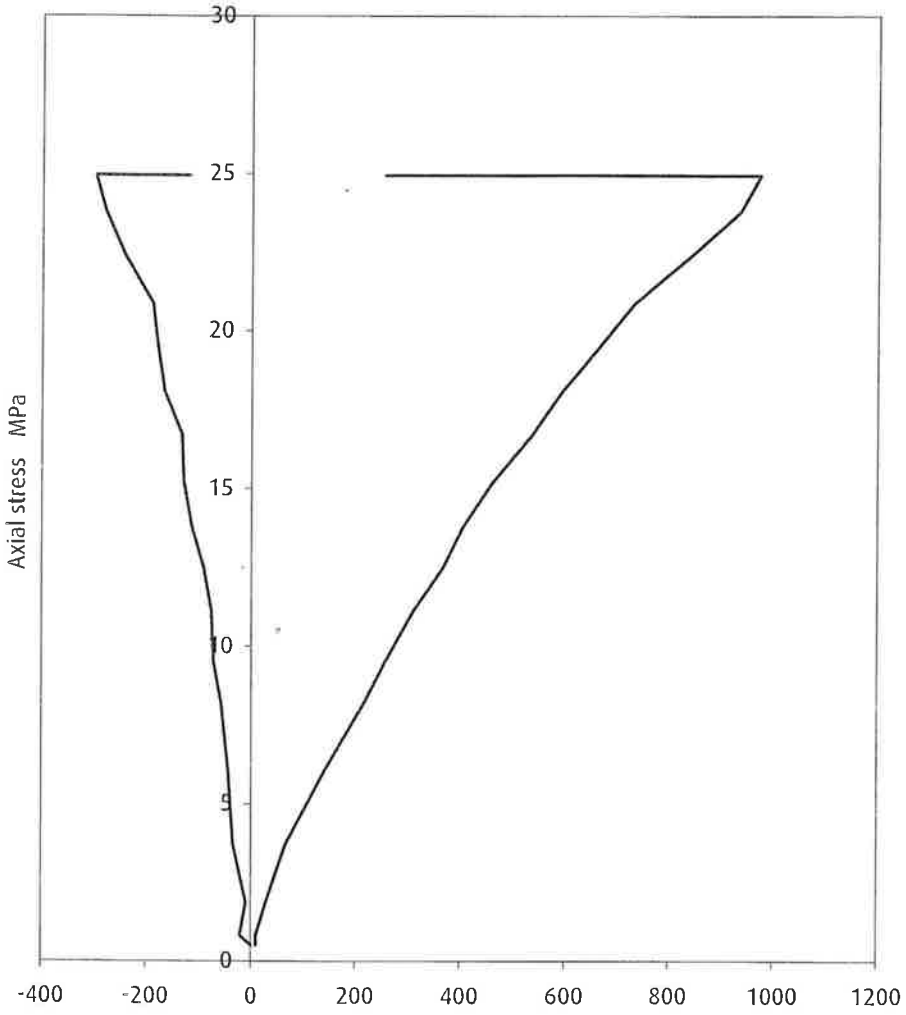
Moisture content	%	0.2	Stress rate	MPa/s	0.41	Tangent modulus	E_t	67.8	GPa
Length	mm	140.94	Test duration	min	08:00	Average modulus	E_{ave}	68.6	GPa
Diameter	mm	51.61	U.C.S.	MPa	195	Secant modulus	E_{sec}	75.6	GPa
Mass	g	795.65	Type of machine	Controls 1300/Automax 5		Poissons ratio	v	0.263	
Bulk density	kg/m^3	2700				(Determined using E_{ave})			
Dry density	kg/m^3	2690							
Date		02/09/2008							

Test remarks

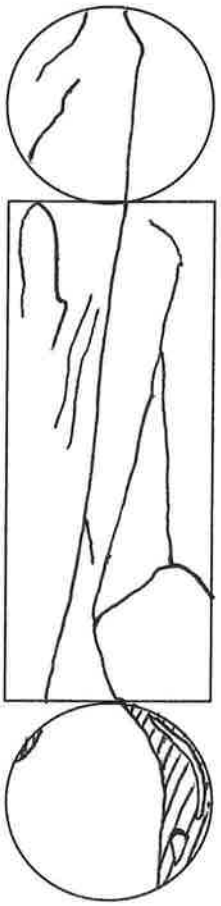
Specimen remarks: Top and bottom of specimen fails ISRM criteria for perpendicularity and/or flatness. Top of specimen is flat and perpendicular to 0.406mm. Bottom of specimen is flat and perpendicular to 0.322mm. Sides of specimen are not smooth and straight to within ISRM tolerance, the largest irregularity measured as 0.60mm.

Project Name	#3 Duynefontein	**Unconfined Compressive Strength With Youngs Modulus And Poissons Ratio**	Hole ID KB10
Project No.	LT1067		Sample Depth 24.76m
Engineer	SRK Consulting Ltd		Sample Number 001
Client	SRK Consulting Ltd	I.S.R.M. Suggested methods 1981	Sample Type C
Description	Grey SANDSTONE.		Specimen Depth 24.76m
			Specimen Number 1

Graph of stress strain curves



Failure sketch



Failure type: Axial

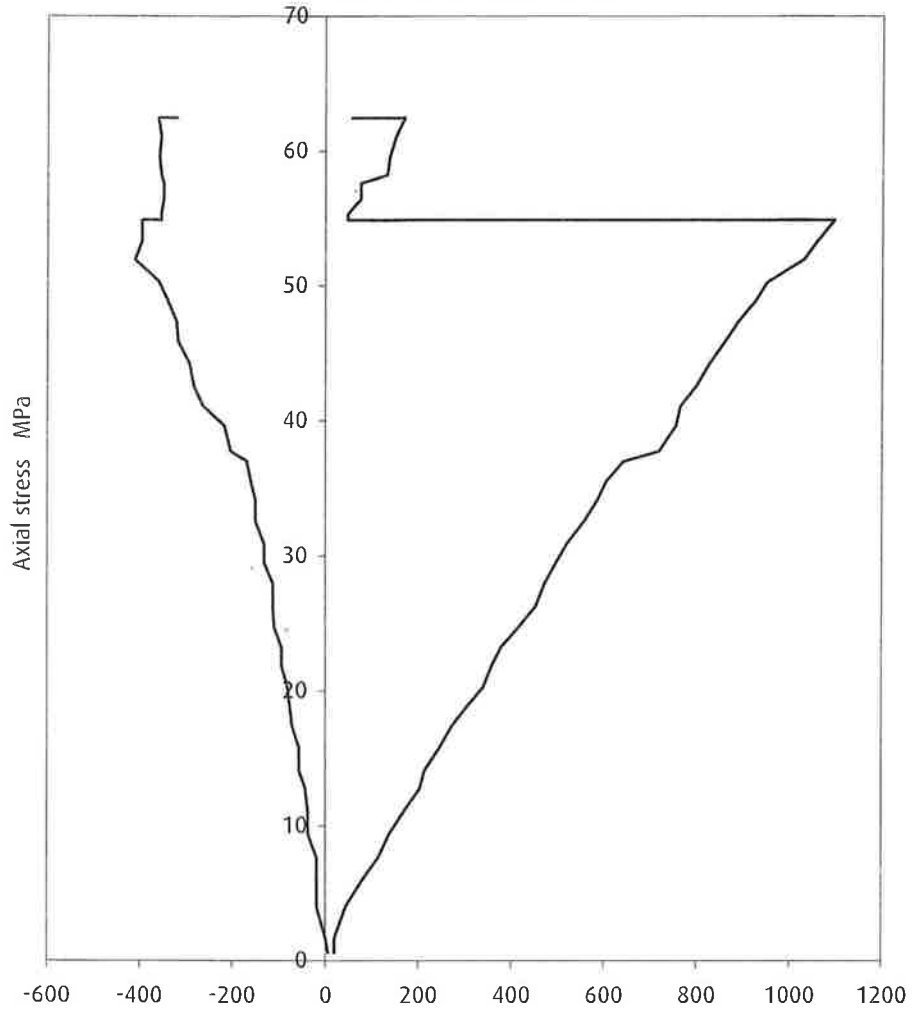
Moisture content	%	0.5	Stress rate	MPa/s	0.24	Tangent modulus	E_t	27.7 GPa
Length	mm	135.09	Test duration	min	01:46	Average modulus	E_{ave}	28.4 GPa
Diameter	mm	51.51	U.C.S.	MPa	25.3	Secant modulus	E_{sec}	33.4 GPa
Mass	g	717.54	Type of machine	Controls 1300/Automax 5		Poissons ratio	v	0.235
Bulk density	kg/m^3	2550				(Determined using E_{ave})		
Dry density	kg/m^3	2540						
Date		04/09/2008						

Test remarks

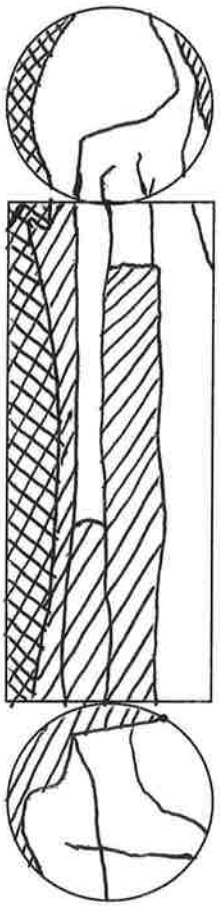
Specimen remarks: Top and bottom of specimen fails ISRM criteria for perpendicularity and/or flatness. Top of specimen is flat and perpendicular to 0.154mm. Bottom of specimen is flat and perpendicular to 0.204mm.

Project Name	#3 Duynefontein	**Unconfined Compressive Strength With Youngs Modulus And Poissons Ratio**	Hole ID KB14
Project No.	LT1067		Sample Depth 20.24m
Engineer	SRK Consulting Ltd		Sample Number 001
Client	SRK Consulting Ltd	I.S.R.M. Suggested methods 1981	Sample Type C
Description	Grey metamorphic SANDSTONE.		Specimen Depth 20.24m
			Specimen Number 1

Graph of stress strain curves



Failure sketch



Failure type: Axial

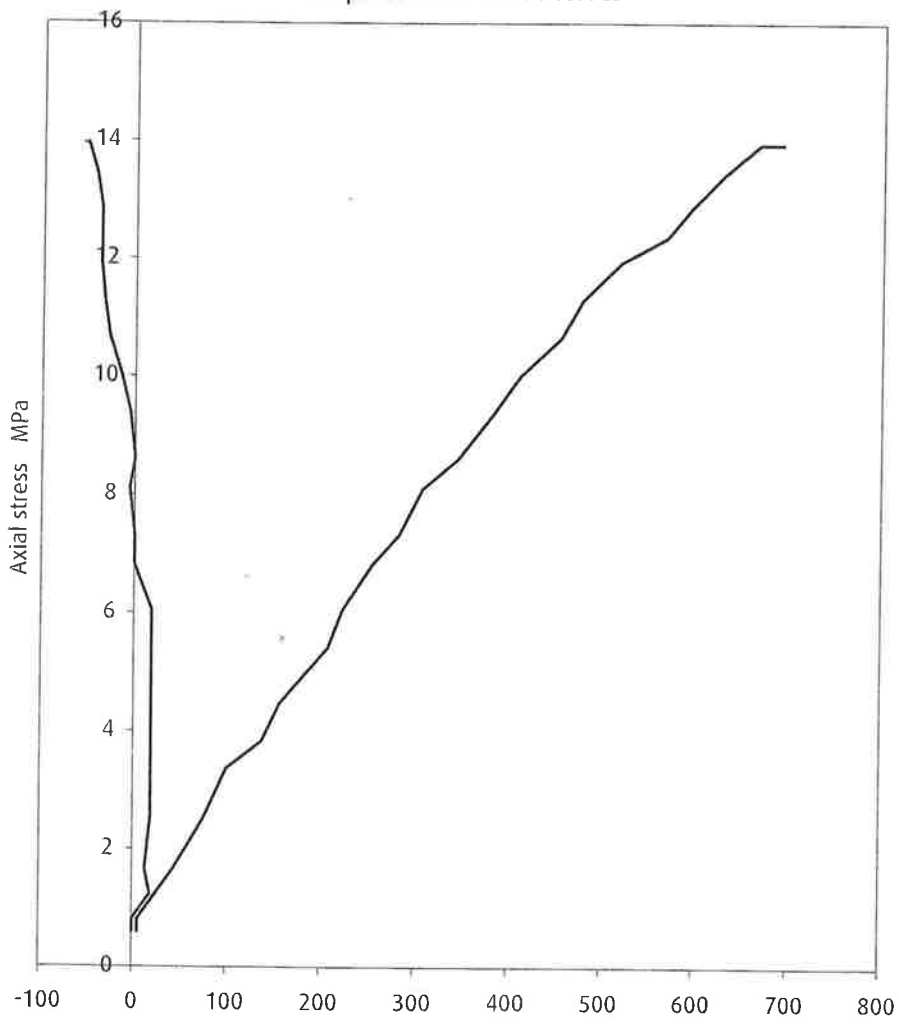
Moisture content	%	0.2	Stress rate	MPa/s	0.27	Tangent modulus	E_t	61.2	GPa
Length	mm	114.86	Test duration	min	03:58	Average modulus	E_{ave}	55.0	GPa
Diameter	mm	52.00	U.C.S.	MPa	63.4	Secant modulus	E_{sec}	60.6	GPa
Mass	g	638.31	Type of machine	Controls 1300/Automax 5		Poissons ratio	v	0.252	
Bulk density	kg/m^3	2620				(Determined using E_{ave})			
Dry density	kg/m^3	2610							
Date		04/09/2008							

Test remarks: Tested on specimen with length to diameter ratio outside 2.5-3.0 recommendation.

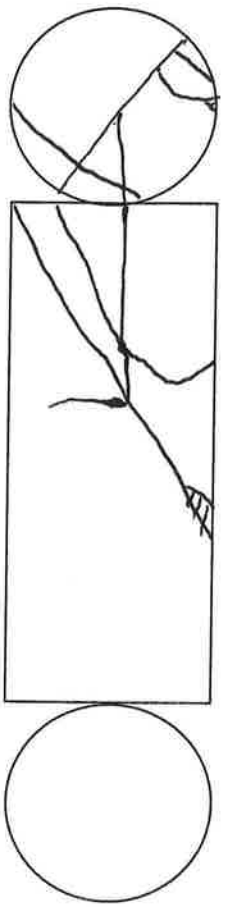
Specimen remarks: Top and bottom of specimen fails ISRM criteria for perpendicularity and/or flatness. Top of specimen is flat and perpendicular to 0.459mm. Bottom of specimen is flat and perpendicular to 0.247mm.

Project Name	#3 Duynefontein	**Unconfined Compressive Strength With Youngs Modulus And Poissons Ratio**	Hole ID KB17
Project No.	LT1067		Sample Depth 17.03m
Engineer	SRK Consulting Ltd		Sample Number 001
Client	SRK Consulting Ltd	I.S.R.M. Suggested methods 1981	Sample Type C
Description	Grey fine grained SANDSTONE.		Specimen Depth 17.03m
			Specimen Number 1

Graph of stress strain curves



Failure sketch



Failure type: Shear

Moisture content	%	0.7	Stress rate	MPa/s	0.09	Tangent modulus	E_t	25.1 GPa
Length	mm	140.59	Test duration	min	02:44	Average modulus	E_{ave}	21.0 GPa
Diameter	mm	51.62	U.C.S.	MPa	14.8	Secant modulus	E_{sec}	25.2 GPa
Mass	g	729.90	Type of machine	Controls 1300/Automax 5		Poissons ratio	v	0.177
Bulk density	kg/m^3	2480				(Determined using E_{ave})		
Dry density	kg/m^3	2460						
Date		03/09/2008						

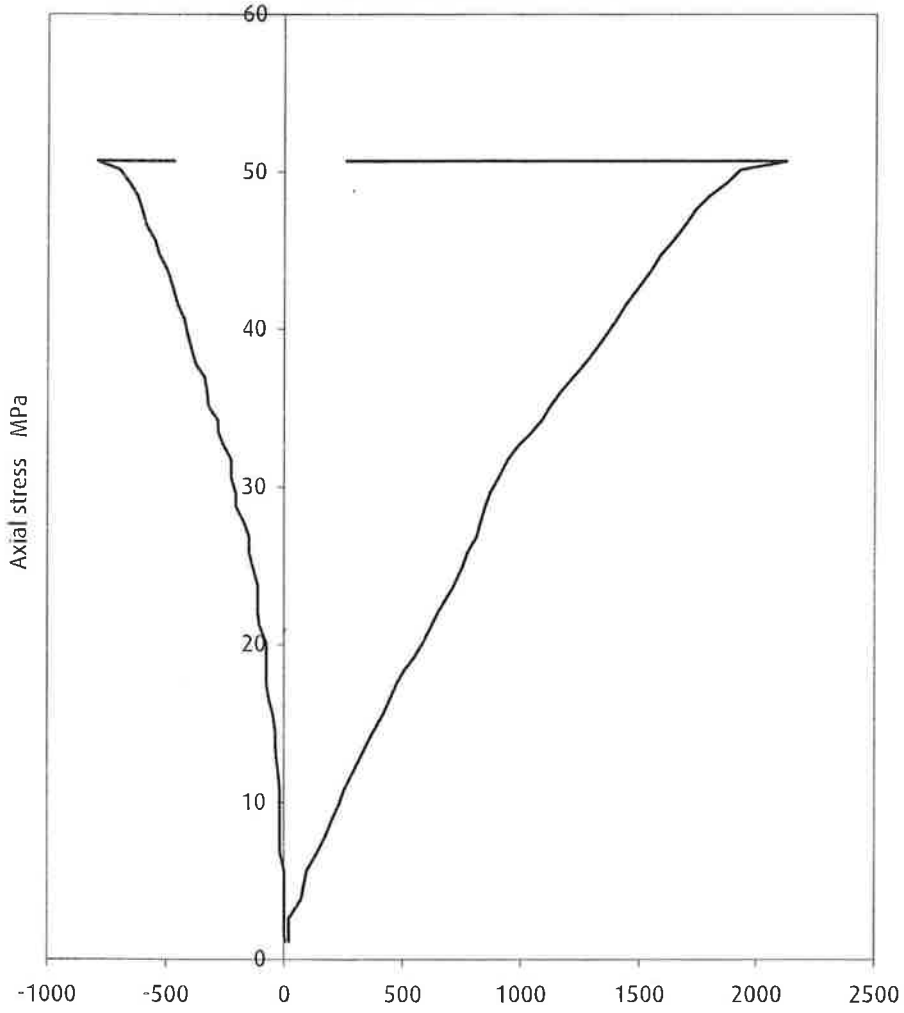
Test remarks

Specimen remarks: Top and bottom of specimen fails ISRM criteria for perpendicularity and/or flatness. Top of specimen is flat and perpendicular to 0.240mm. Bottom of specimen is flat and perpendicular to 0.124mm.

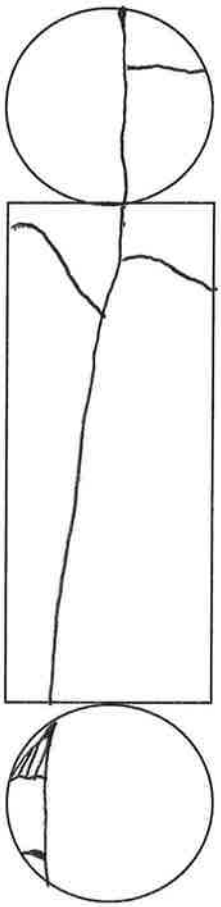
NORWEST HOLST SOIL ENGINEERING

Project Name	#3 Duynefontein	**Unconfined Compressive Strength With Youngs Modulus And Poissons Ratio**	Hole ID KB21
Project No.	LT1067		Sample Depth 24.73m
Engineer	SRK Consulting Ltd		Sample Number 001
Client	SRK Consulting Ltd	I.S.R.M. Suggested methods 1981	Sample Type C
Description	Grey metamorphic SANDSTONE.		Specimen Depth 24.73m
			Specimen Number 1

Graph of stress strain curves



Failure sketch



Failure type: Axial

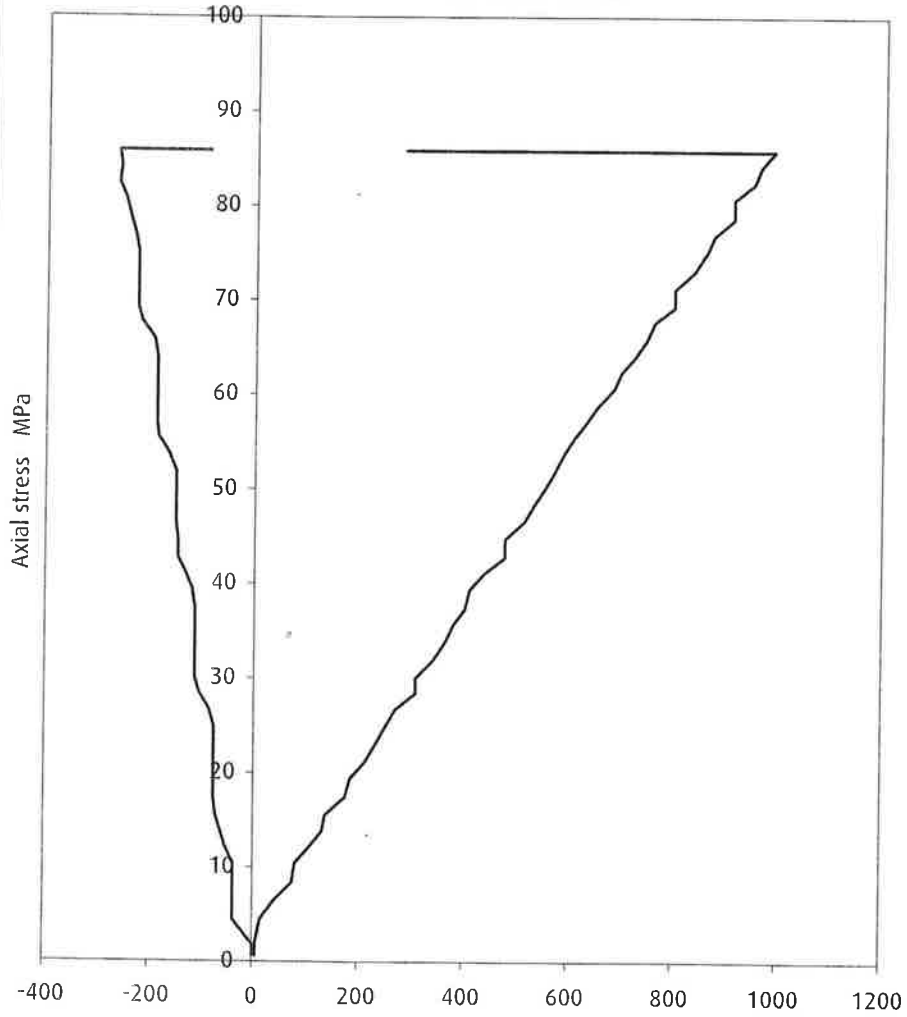
Moisture content	%	0.7	Stress rate	MPa/s	0.19	Tangent modulus	E_t	33.3	GPa
Length	mm	141.87	Test duration	min	04:33	Average modulus	E_{ave}	29.4	GPa
Diameter	mm	52.10	U.C.S.	MPa	50.9	Secant modulus	E_{sec}	32.4	GPa
Mass	g	774.59	Type of machine	Controls 1300/Automax 5		Poissons ratio (Determined using E_{ave})	v	0.553	
Bulk density	kg/m^3	2560							
Dry density	kg/m^3	2540							
Date		02/09/2008							

Test remarks: Sample failed along discontinuity

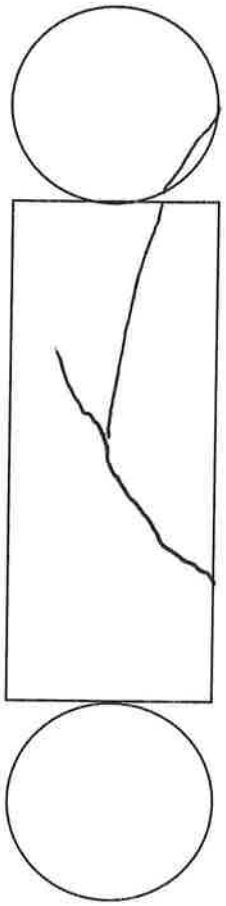
Specimen remarks: Top and bottom of specimen fails ISRM criteria for perpendicularity and/or flatness. Top of specimen is flat and perpendicular to 0.323mm. Bottom of specimen is flat and perpendicular to 0.188mm.

Project Name	#3 Duynefontein	**Unconfined Compressive Strength With Youngs Modulus And Poissons Ratio**	Hole ID KB21
Project No.	LT1067		Sample Depth 51.90m
Engineer	SRK Consulting Ltd		Sample Number 003
Client	SRK Consulting Ltd	I.S.R.M. Suggested methods 1981	Sample Type C
Description	Grey fine grained SANDSTONE.		Specimen Depth 51.90m
			Specimen Number 1

Graph of stress strain curves



Failure sketch



Failure type: Irregular

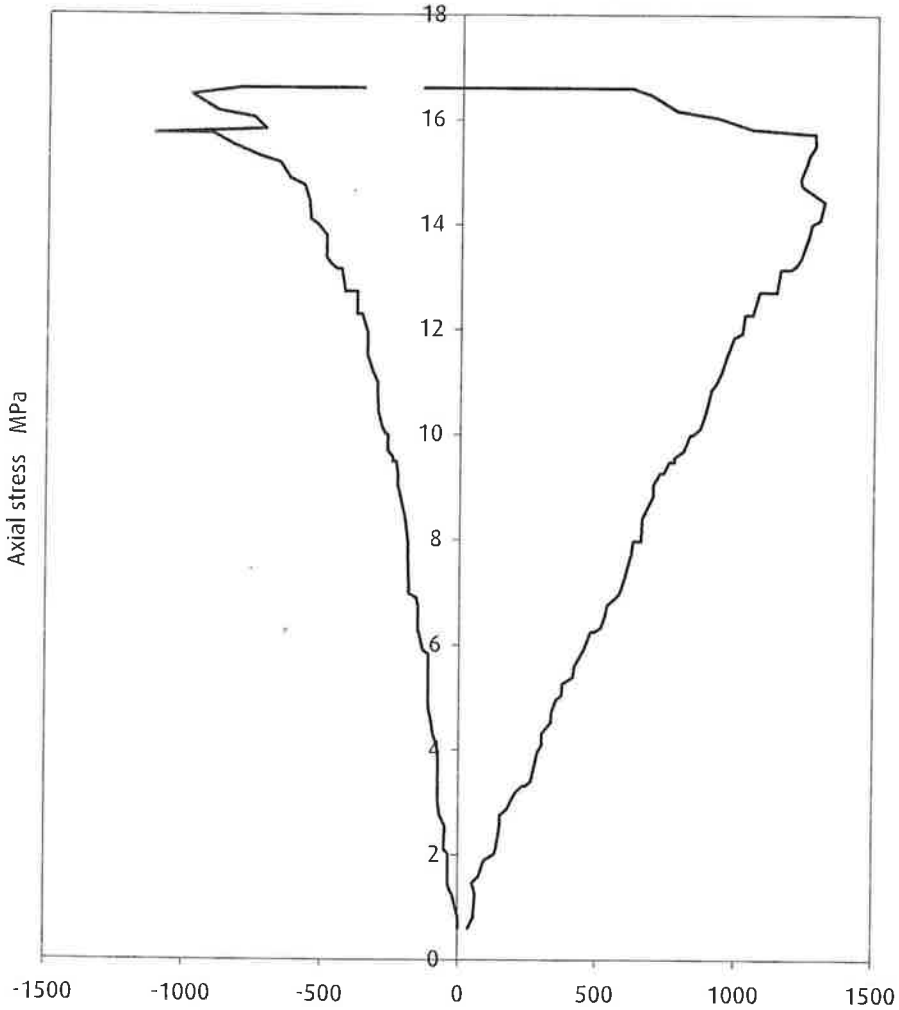
Moisture content	%	0.1	Stress rate	MPa/s	0.36	Tangent modulus	E_t	82.9 GPa
Length	mm	141.14	Test duration	min	04:05	Average modulus	E_{ave}	83.7 GPa
Diameter	mm	51.67	U.C.S.	MPa	87.2	Secant modulus	E_{sec}	89.4 GPa
Mass	g	802.47	Type of machine	Controls 1300/Automax 5		Poissons ratio (Determined using E_{ave})	v	0.233
Bulk density	kg/m^3	2710						
Dry density	kg/m^3	2710						
Date		03/09/2008						

Test remarks

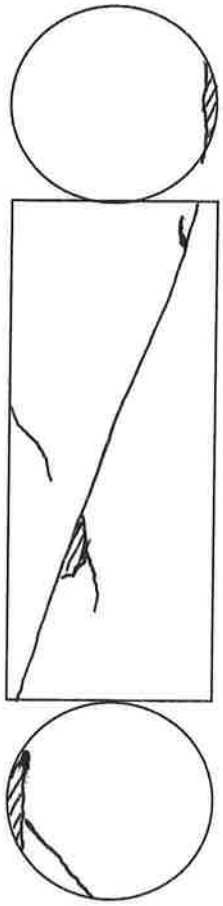
Specimen remarks: Top and bottom of specimen fails ISRM criteria for perpendicularity and/or flatness. Top of specimen is flat and perpendicular to 0.417mm. Bottom of specimen is flat and perpendicular to 0.100mm. Sides of specimen are not smooth and straight to within ISRM tolerance, the largest irregularity measured as 0.70mm.

Project Name	#3 Duynefontein	**Unconfined Compressive Strength With Youngs Modulus And Poissons Ratio**	Hole ID KB29
Project No.	LT1067		Sample Depth 29.77m
Engineer	SRK Consulting Ltd		Sample Number 001
Client	SRK Consulting Ltd	I.S.R.M. Suggested methods 1981	Sample Type C
Description	Light grey fine grained SANDSTONE.		Specimen Depth 29.77m
			Specimen Number 1

Graph of stress strain curves



Failure sketch



Failure type: Axial

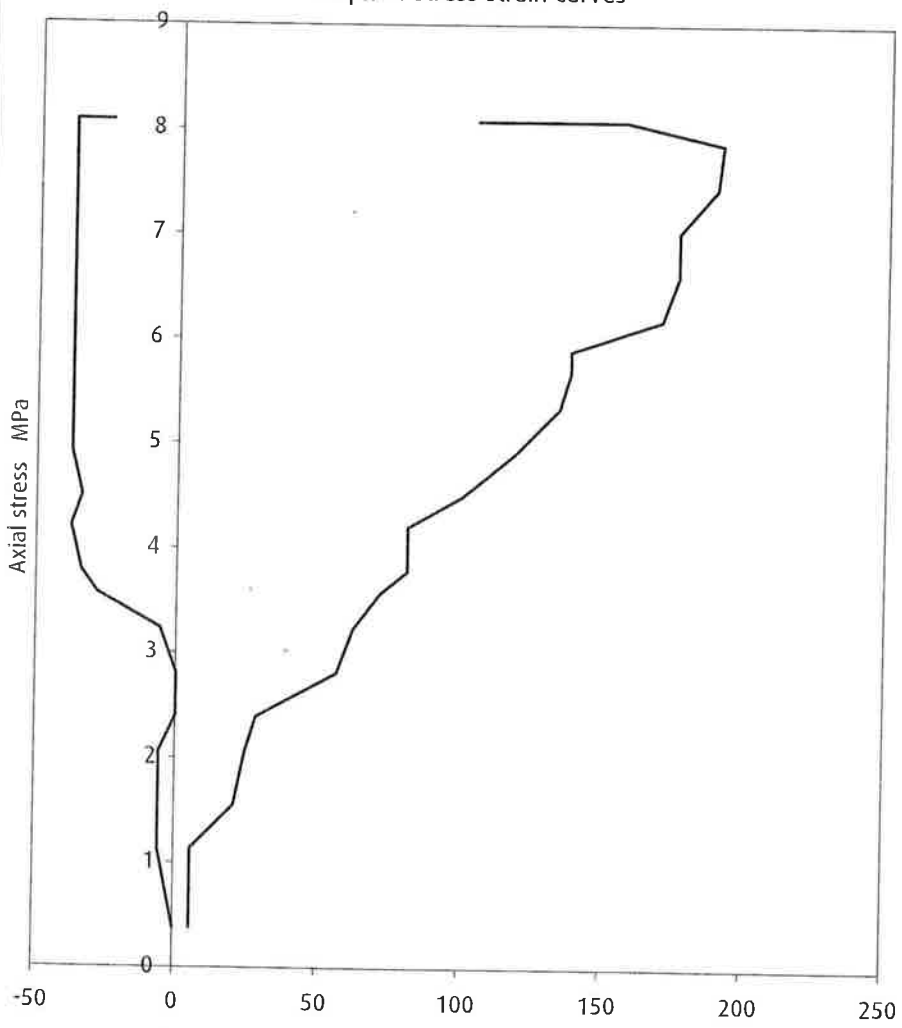
Moisture content	%	1.1	Stress rate	MPa/s	0.04	Tangent modulus	E_t	14.6 GPa
Length	mm	135.10	Test duration	min	07:24	Average modulus	E_{ave}	11.0 GPa
Diameter	mm	51.34	U.C.S.	MPa	16.9	Secant modulus	E_{sec}	12.5 GPa
Mass	g	649.98	Type of machine	Controls 1300/Automax 5		Poissons ratio	v	0.373
Bulk density	kg/m^3	2320				(Determined using E_{ave})		
Dry density	kg/m^3	2300						
Date		04/09/2008						

Test remarks

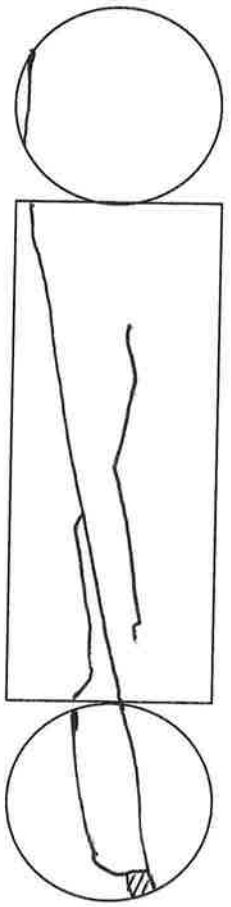
Specimen remarks: Top and bottom of specimen fails ISRM criteria for perpendicularity and/or flatness. Top of specimen is flat and perpendicular to 0.176mm. Bottom of specimen is flat and perpendicular to 0.415mm.

Project Name	#3 Duynefontein	**Unconfined Compressive Strength With Youngs Modulus And Poissons Ratio**	Hole ID KB30
Project No.	LT1067		Sample Depth 24.93m
Engineer	SRK Consulting Ltd		Sample Number 001
Client	SRK Consulting Ltd	I.S.R.M. Suggested methods 1981	Sample Type C
Description	Thinly laminated grey MUDSTONE.		Specimen Depth 24.93m
			Specimen Number 1

Graph of stress strain curves



Failure sketch



Failure type: Axial

Moisture content	%	2.9	Stress rate	MPa/s	0.05	Tangent modulus	E_t	28.5	GPa
Length	mm	140.78	Test duration	min	03:00	Average modulus	E_{ave}	35.0	GPa
Diameter	mm	51.97	U.C.S.	MPa	8.22	Secant modulus	E_{sec}	50.7	GPa
Mass	g	706.59	Type of machine	Controls 1300/Automax 5		Poissons ratio	v	0.291	
Bulk density	kg/m^3	2370				(Determined using E_{ave})			
Dry density	kg/m^3	2300							
Date		05/09/2008							

Test remarks: Loading axis relative to anisotropy: 14deg
Sample failed along laminations

Specimen remarks: Top and bottom of specimen fails ISRM criteria for perpendicularity and/or flatness. Top of specimen is flat and perpendicular to 0.190mm. Bottom of specimen is flat and perpendicular to 0.171mm.

Approved by: Stuart Kirk

Leeds Laboratory

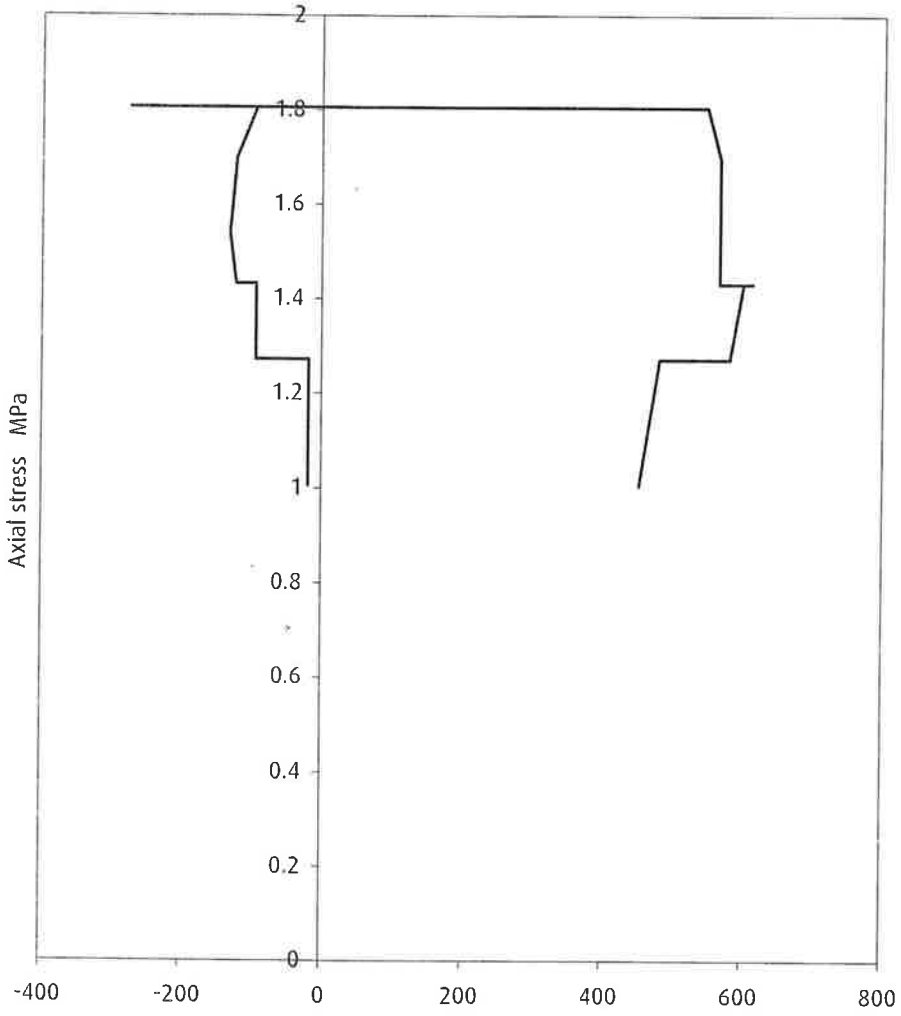
Print date 12/09/2008

Revision No. 2.03 Issue Date 24/04/2007

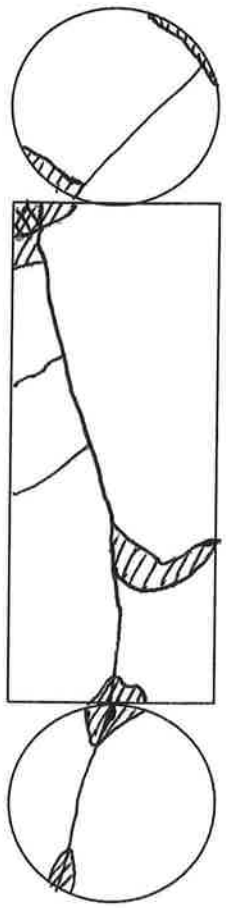
NORWEST HOLST SOIL ENGINEERING

Project Name	#3 Duynefontein	**Unconfined Compressive Strength With Youngs Modulus And Poissons Ratio**	Hole ID KB34
Project No.	LT1067		Sample Depth 21.57m
Engineer	SRK Consulting Ltd		Sample Number 001
Client	SRK Consulting Ltd	I.S.R.M. Suggested methods 1981	Sample Type C
Description	Grey MUDSTONE.		Specimen Depth 21.57m
			Specimen Number 1

Graph of stress strain curves



Failure sketch



Failure type: Axial

Moisture content	%	9.8	Stress rate	MPa/s	0.01	Tangent modulus	E_t	2.82	GPa
Length	mm	121.81	Test duration	min	01:48	Average modulus	E_{ave}	6.10	GPa
Diameter	mm	46.18	U.C.S.	MPa	1.21	Secant modulus	E_{sec}	2.08	GPa
Mass	g	432.06	Type of machine	Controls 1300/Automax 5		Poissons ratio	v	0.576	
Bulk density	kg/m^3	2120				(Determined using E_{ave})			
Dry density	kg/m^3	1930							
Date		04/09/2008							

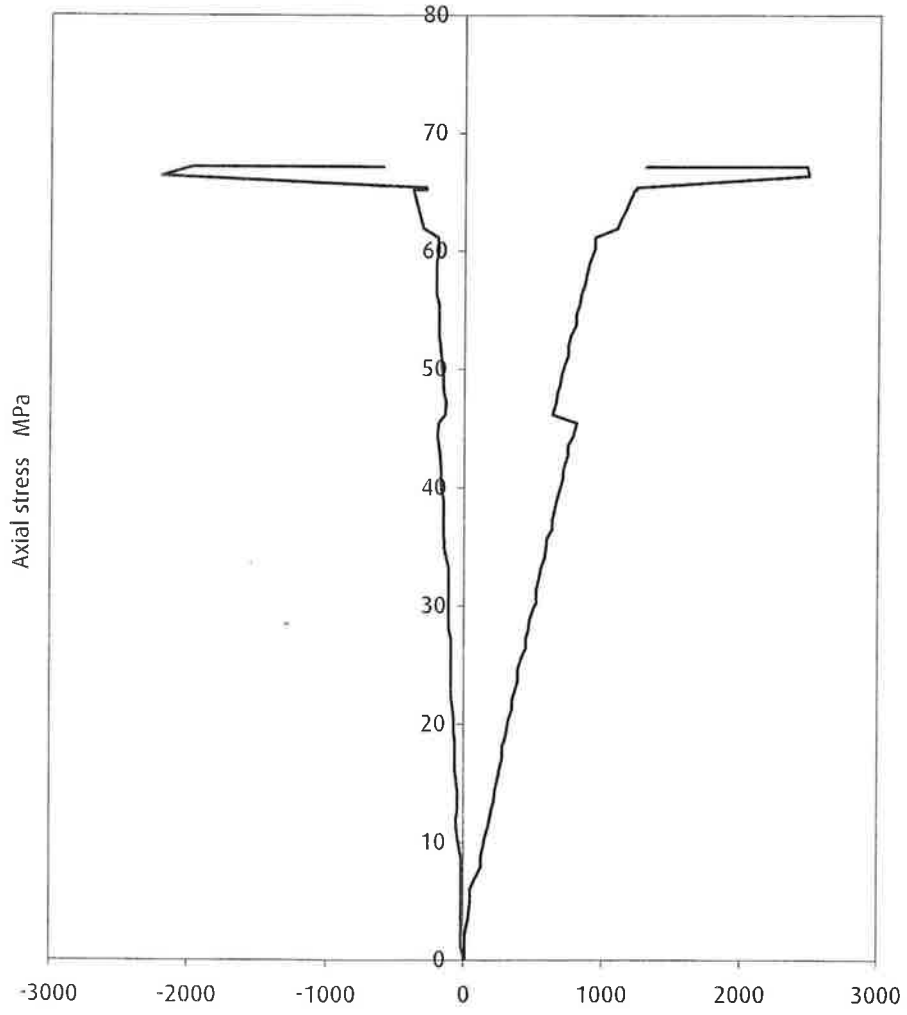
Test remarks: Sample failed alond discontinuity

Specimen remarks: Top and bottom of specimen fails ISRM criteria for perpendicularity and/or flatness. Top of specimen is flat and perpendicular to 0.362mm. Bottom of specimen is flat and perpendicular to 0.101mm.

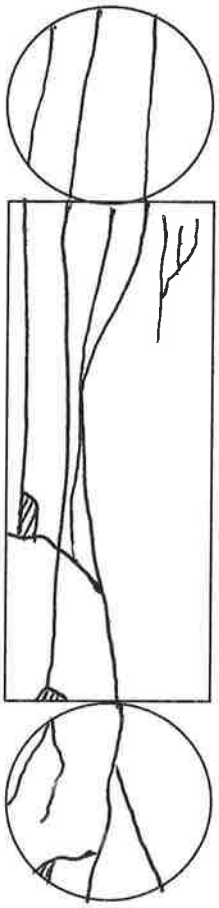
NORWEST HOLST SOIL ENGINEERING

Project Name	#3 Duynefontein	**Unconfined Compressive Strength With Youngs Modulus And Poissons Ratio**	Hole ID KB37
Project No.	LT1067		Sample Depth 27.88m
Engineer	SRK Consulting Ltd		Sample Number 001
Client	SRK Consulting Ltd	I.S.R.M. Suggested methods 1981	Sample Type C
Description	Grey metamorphic SANDSTONE.		Specimen Depth 27.88m
			Specimen Number 1

Graph of stress strain curves



Failure sketch



Failure type: Axial

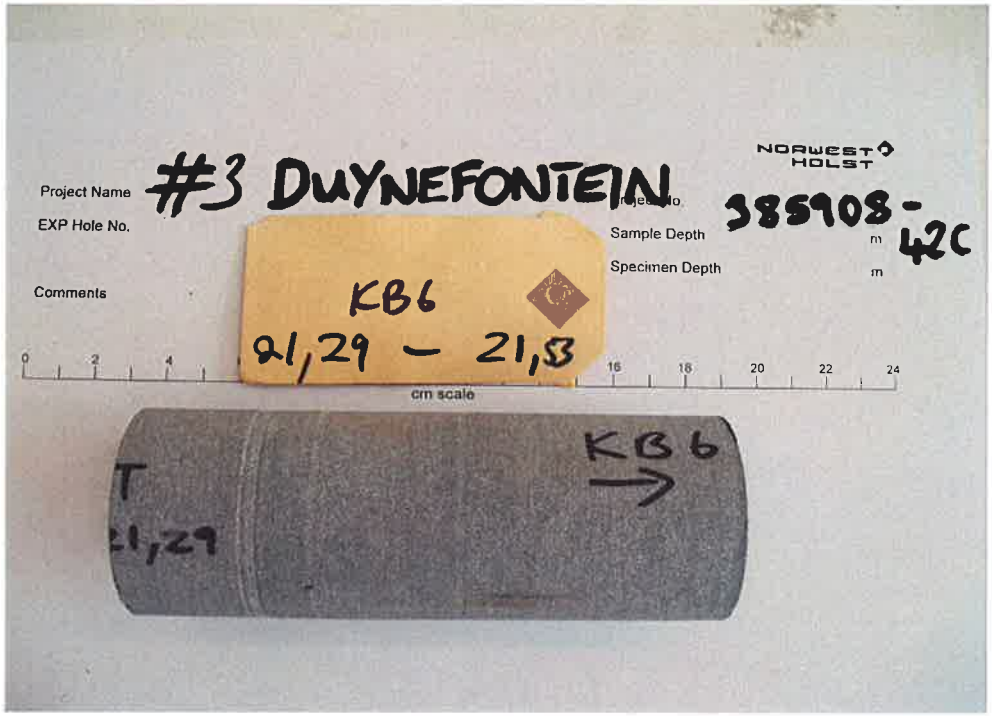
Moisture content	%	0.4	Stress rate		MPa/s	0.15	Tangent modulus	E_t	72.3 GPa
Length	mm	139.05	Test duration		min	07:29	Average modulus	E_{ave}	56.8 GPa
Diameter	mm	51.01	U.C.S.		MPa	67.8	Secant modulus	E_{sec}	60.9 GPa
Mass	g	745.11	Type of machine	Controls 1300/Automax 5			Poissons ratio (Determined using E_{ave})	v	0.236
Bulk density	kg/m^3	2620							
Dry density	kg/m^3	2610							
Date		03/09/2008							

Test remarks: Sample failed along discontinuity

Specimen remarks: Top and bottom of specimen fails ISRM criteria for perpendicularity and/or flatness. Top of specimen is flat and perpendicular to 0.360mm. Bottom of specimen is flat and perpendicular to 0.524mm.

NORWEST HOLST SOIL ENGINEERING

Project Name #3 Duynefontein	Photographic Record	Hole ID
Project No. LT1067		KB6
Engineer SRK Consulting		Fig no.
Client SRK Consulting		

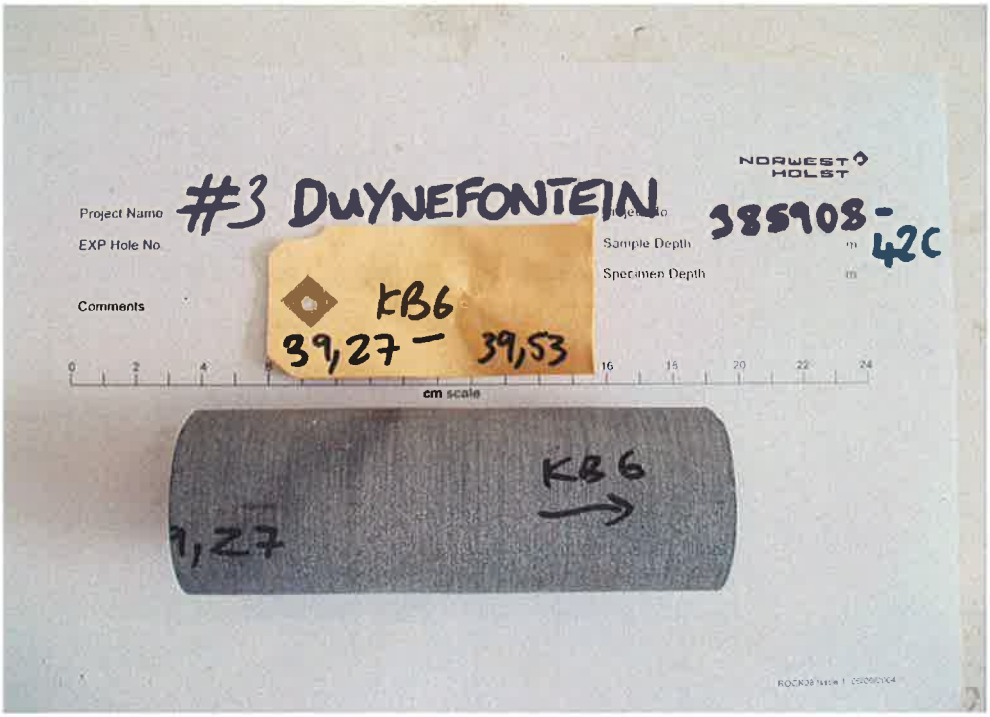


Before test

After test

Photographed by	Date photographed	Filename 1	NORWEST HOLST SOIL ENGINEERING
PA	01/09/2008	Filename 2	
Form No. SI PMPA4	Revision No. 2.02	Issue Date 26/02/2007	

Project Name #3 Duynefontein	Photographic Record	Hole ID
Project No. LT1067		KB6
Engineer SRK Consulting		Fig no.
Client SRK Consulting		



Before test

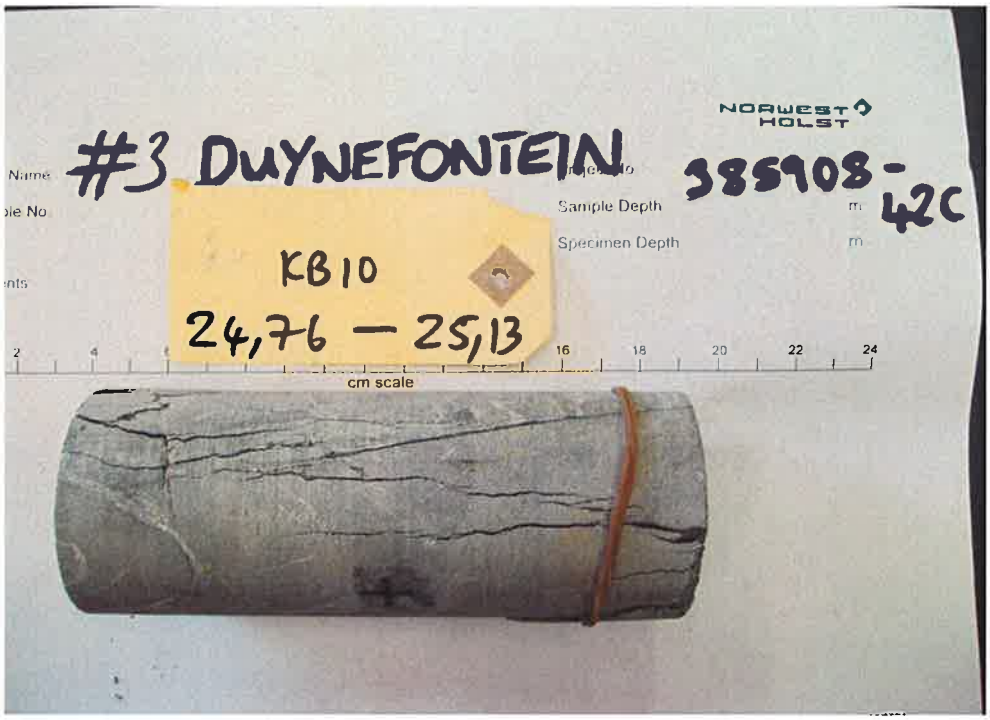
After test

Photographed by	Date photographed	Filename 1
PA	02/09/2008	Filename 2
Form No. SI PMPA4	Revision No. 2.02	Issue Date 26/02/2007

NORWEST HOLST SOIL ENGINEERING

Project Name	#3 Duynefontein	Photographic Record	Hole ID
Project No.	LT1067		KB10
Engineer	SRK Consulting		Fig no.
Client	SRK Consulting		

Before test



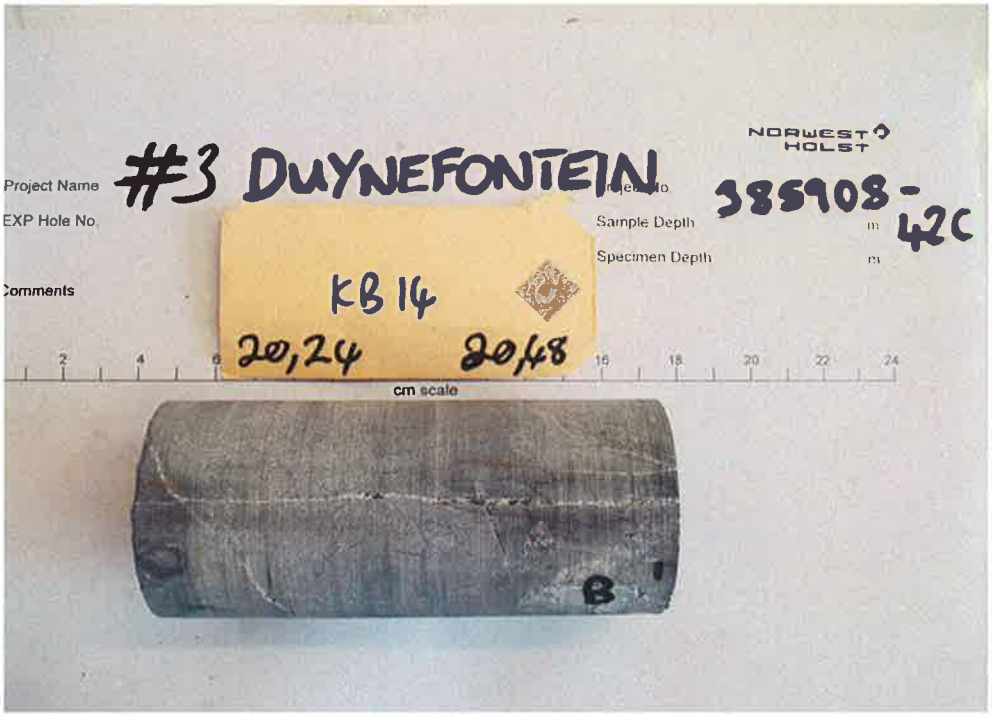
After test

Photographed by	Date photographed	Filename 1
PA	04/09/2008	Filename 2

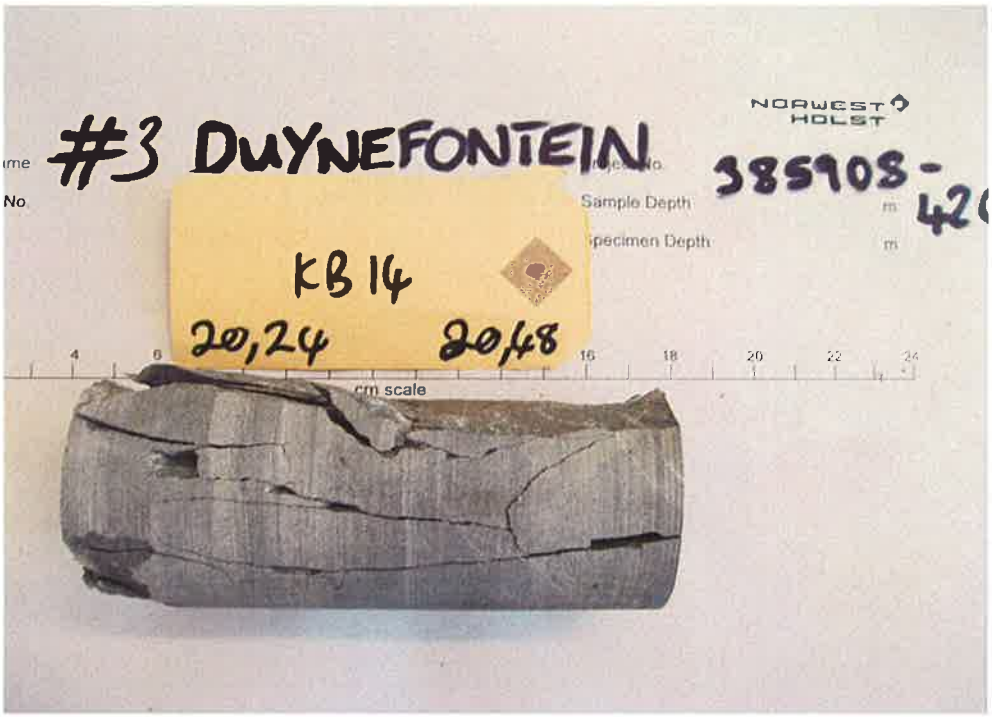
Form No. SI PMPA4	Revision No. 2.02	Issue Date 26/02/2007

NORWEST HOLST SOIL ENGINEERING

Project Name	#3 Duynefontein	Photographic Record	Hole ID
Project No.	LT1067		KB14
Engineer	SRK Consulting		Fig no.
Client	SRK Consulting		



Before test



After test

Photographed by	Date photographed	Filename 1
PA	04/09/2008	Filename 2
Form No. SI PMPA4	Revision No. 2.02	Issue Date 26/02/2007

NORWEST HOLST SOIL ENGINEERING

Project Name #3 Duynefontein	Photographic Record	Hole ID
Project No. LT1067		KB17
Engineer SRK Consulting		Fig no.
Client SRK Consulting		

Before test

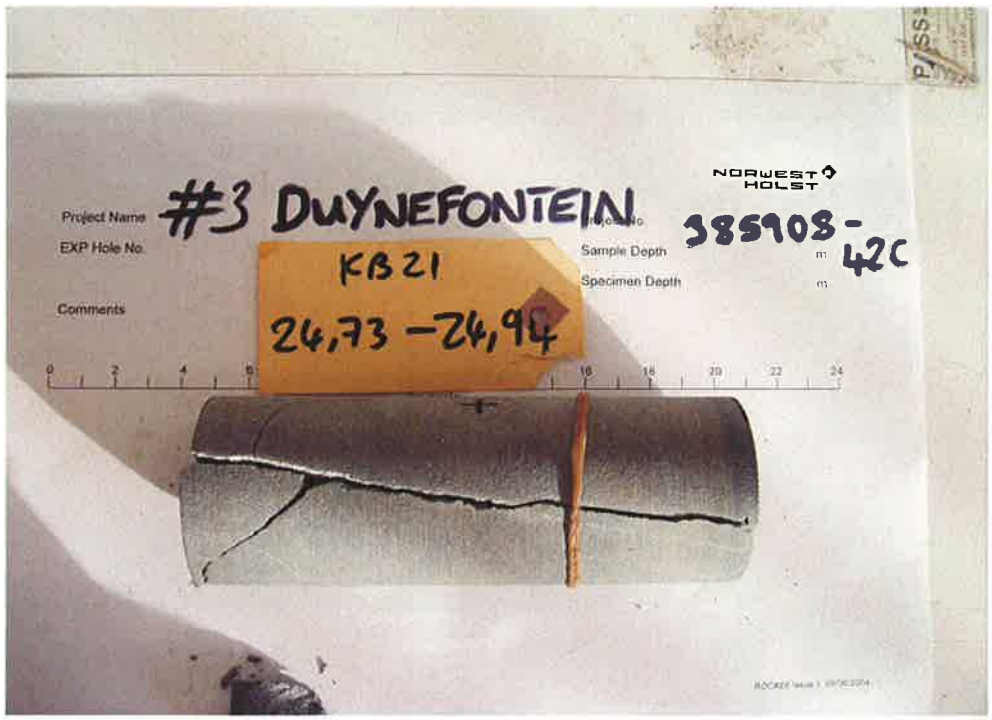
After test

Photographed by	Date photographed	Filename 1
PA	03/09/2008	Filename 2
Form No. SI PMPA4	Revision No. 2.02	Issue Date 26/02/2007

NORWEST HOLST
SOIL ENGINEERING

Project Name #3 Duynefontein	Photographic Record	Hole ID
Project No. LT1067		KB21
Engineer SRK Consulting		Fig no.
Client SRK Consulting		

Before test



After test

Photographed by	Date photographed	Filename 1
PA	02/09/2008	Filename 2
Form No. SI PMPA4	Revision No. 2.02	Issue Date 26/02/2007

NORWEST HOLST
SOIL ENGINEERING

Project Name #3 Duynefontein	Photographic Record	Hole ID
Project No. LT1067		KB21
Engineer SRK Consulting		Fig no.
Client SRK Consulting		

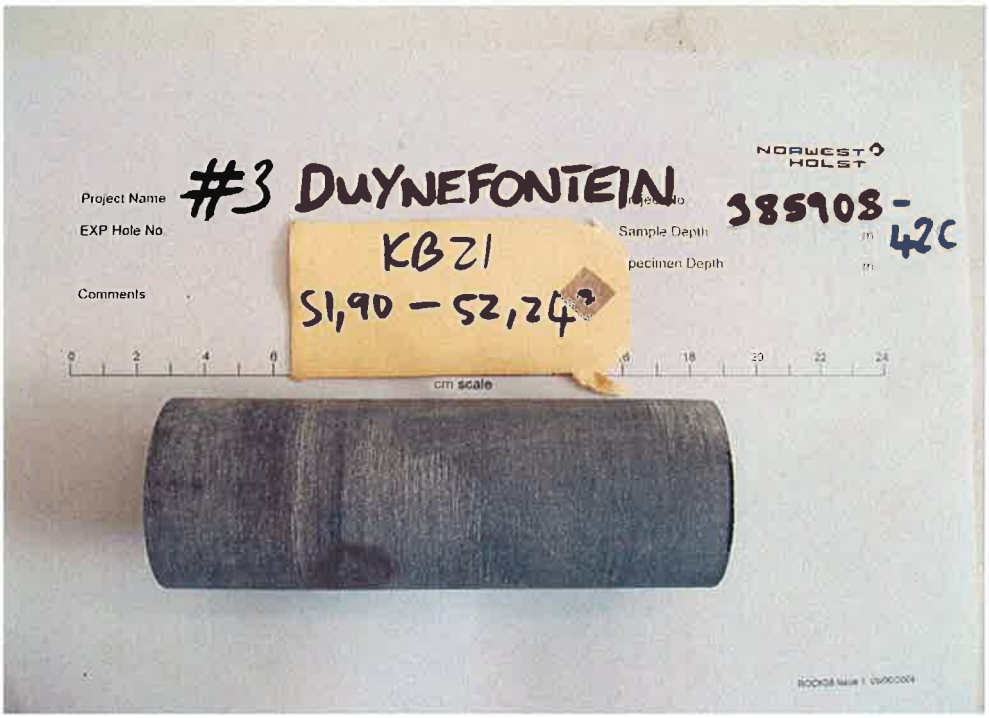
Before test

After test

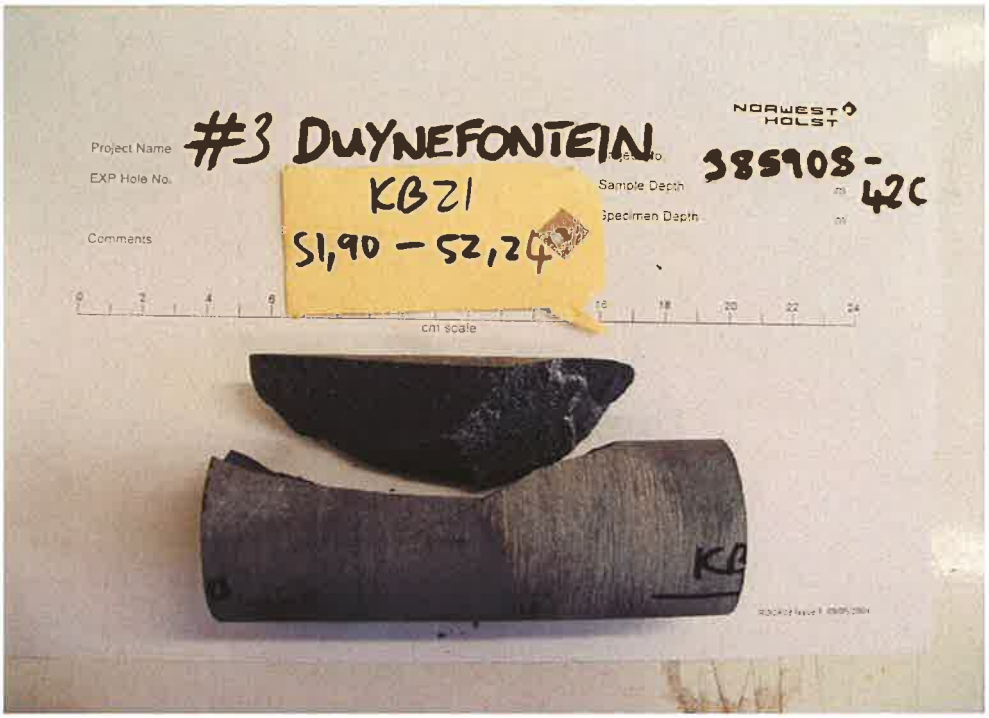
Photographed by	Date photographed	Filename 1
PA	03/09/2008	Filename 2
Form No. SI PMPA4	Revision No. 2.02	Issue Date 26/02/2007

NORWEST HOLST SOIL ENGINEERING

Project Name #3 Duynefontein	Photographic Record	Hole ID
Project No. LT1067		KB21
Engineer SRK Consulting		Fig no.
Client SRK Consulting		



Before test

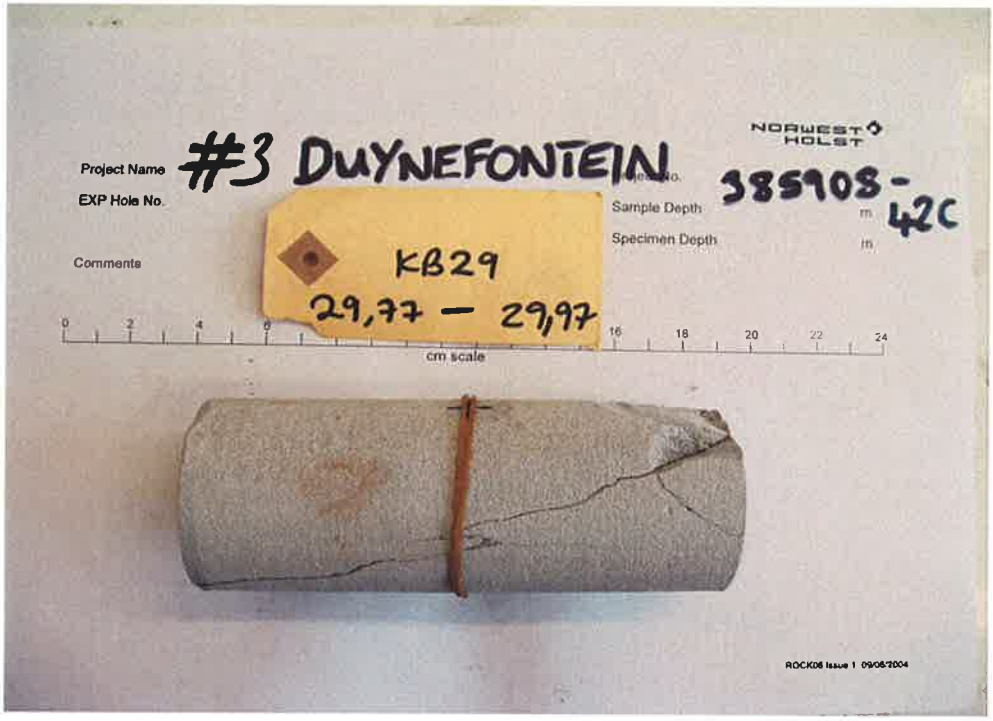


After test

Photographed by	Date photographed	Filename 1	NORWEST HOLST SOIL ENGINEERING
PA	03/09/2008	Filename 2	
Form No. SI PMPA4	Revision No. 2.02	Issue Date 26/02/2007	

Project Name #3 Duynefontein	Photographic Record	Hole ID
Project No. LT1067		KB29
Engineer SRK Consulting		Fig no.
Client SRK Consulting		

Before test



After test

Photographed by	Date photographed	Filename 1	NORWEST HOLST SOIL ENGINEERING
PA	04/09/2008	Filename 2	
Form No. SI PMPA4	Revision No. 2.02	Issue Date 26/02/2007	

Project Name #3 Duynefontein	Photographic Record	Hole ID
Project No. LT1067		KB30
Engineer SRK Consulting		Fig no.
Client SRK Consulting		

Before test

After test

Photographed by	Date photographed	Filename 1
PA	05/09/2008	Filename 2
Form No. SI PMPA4	Revision No. 2.02	Issue Date 26/02/2007

NORWEST HOLST
SOIL ENGINEERING

Project Name #3 Duynefontein	Photographic Record	Hole ID
Project No. LT1067		KB34
Engineer SRK Consulting		Fig no.
Client SRK Consulting		

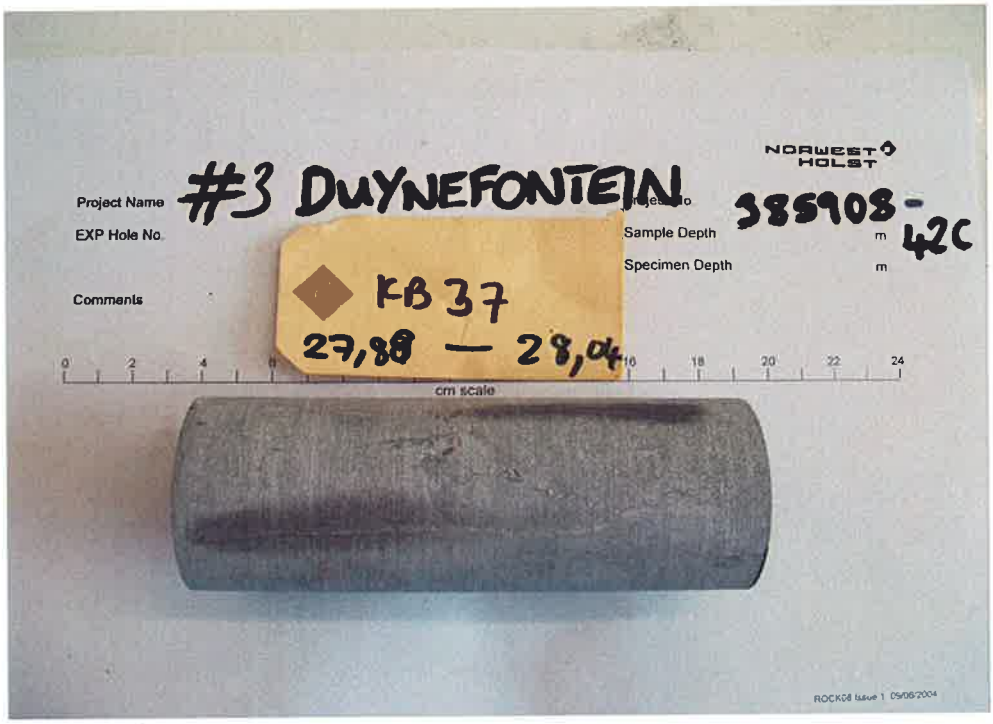
Before test

After test

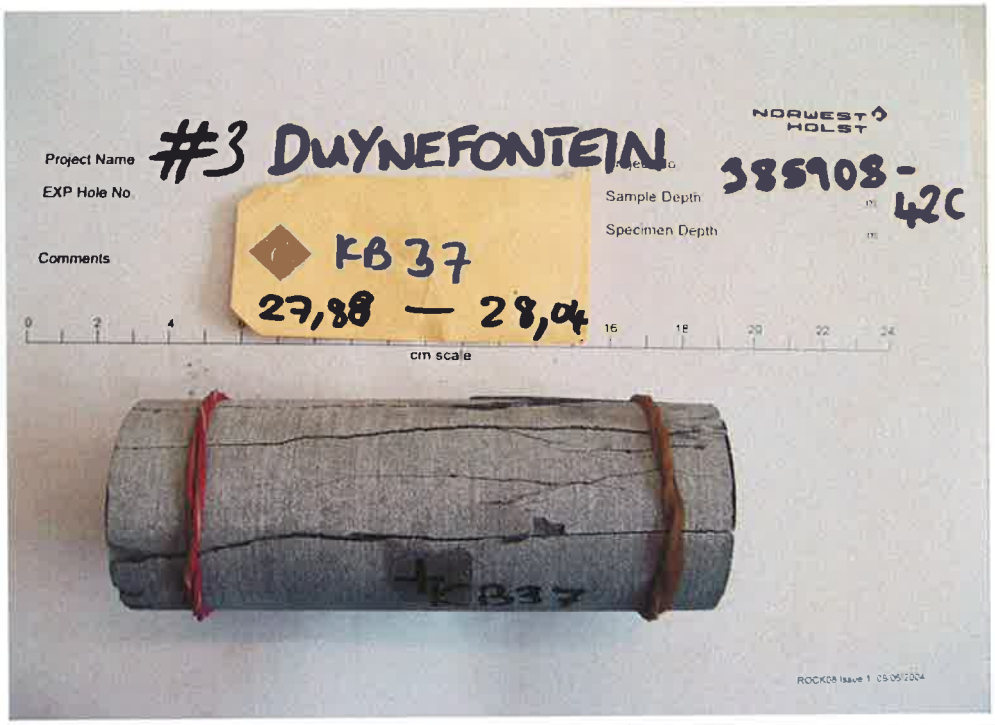
Photographed by	Date photographed	Filename 1
PA	04/09/2008	Filename 2
Form No. SI PMPA4	Revision No. 2.02	Issue Date 26/02/2007

NORWEST HOLST
SOIL ENGINEERING

Project Name #3 Duynefontein	Photographic Record	Hole ID
Project No. LT1067		KB37
Engineer SRK Consulting		Fig no.
Client SRK Consulting		



Before test



After test

Photographed by	Date photographed	Filename 1	NORWEST HOLST SOIL ENGINEERING
PA	03/09/2008	Filename 2	
Form No. SI PMPA4	Revision No. 2.02	Issue Date 26/02/2007	

NORWEST HOLST
SOIL ENGINEERING

TEST REPORT

UKAS TESTING
1265

Serial number: LT1072 Date of issue: 22/09/2008 Page 1 of 5

Issued by Norwest Holst Limited - Soil Engineering Division,
Parkside Lane,
Dewsbury Road,
Leeds
LS11 5SX.
Tel: 0113 2711111
Fax: 0113 2760472
Email: soils@norwest.co.uk

Authorised signatory

M. J. Baldwin (Technical Manager)
R. J. Rogers (Principal Engineer)
S. Kirk (Laboratory Manager)
S. K. Sharda (Assistant Laboratory Manager)

Customer name	SRK Consulting
Address	Postnet Suite #206 Private Bag X18 Rondebosch 7701 South Africa
Contract name	#7 Duynefontein
Your reference	385908 - 42C
Dates of receipt of samples	11/08/2008
Dates of testing	18/09/2008 to 22/09/2008

Testing was performed to the standard named on individual test results.

Sampling was not performed by the Laboratory of Norwest Holst Soil Engineering.

Testing was performed on 2 number of samples received in good condition.

Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation.

Results reported relate only to the samples tested.

Tests marked 'Not UKAS' in this report are not included in the UKAS accreditation schedule for our laboratory. These results will appear in italics on any summary of tests.

Samples will be retained for 28 days from date of issue of this report and then be disposed of, unless we receive written instruction to the contrary

Quality Control Check performed by K. A. Walker (Laboratory Quality Manager)

Key to Laboratory Summary Sheets

Common to all summaries				
Sample Type	U	Undisturbed sample	D	Small disturbed sample
	P	Piston sample	B	Bulk disturbed sample
	TW	Thin walled sample	BLK	Block sample
	L	Liner sample	C	Rock core
	AMAL	Amalgamated sample		
Test status	Any result in *italics* indicates a test that is not within the scope of the UKAS accreditation for this laboratory.			
Summary of Laboratory Soil Tests: Index / Classification Tests				
Particle density	p	Small pyknometer method	g	Gas jar method
Plastic index	N/P	Non plastic, although liquid limit will have been determined if requested		
Particle size (PSD)	1	Following value in silt column denotes combined clay and silt fraction		
	p	Following value in clay column denotes sedimentation by pipette, else sedimentation is by hydrometer.		
Summary of Laboratory Soil Tests: Strength and Permeability Tests				
Triaxial	UU	Single stage unconsolidated quick undrained	UUM	Multi stage unconsolidated quick undrained
	UU3	Set of 3 unconsolidated quick undrained	CU	Single stage consolidated undrained
	CUM	Multi stage consolidated undrained	CU3	Set of 3 consolidated undrained
	CD	Single stage consolidated drained	CDM	Multi stage consolidated drained
	CD3	Set of 3 consolidated drained		
	Note that single stage tests are reported assuming $\phi = 0$ for total stress and $c' = 0$ for effective stress			
Consol	Oed	One-dimensional oedometer	Hyd	Hydraulic cell consolidation
	m_v	coefficient of compressibility quoted for p0 to p0 + 100kPa, where determined		
Permeability	C	Constant head permeability	T	Triaxial permeability
Shearbox	SSB	Small shear box	LSB	Large shear box
	p	Peak value	r	Residual value
	RS	Ring shear		
Summary of Laboratory Soil Re-Use Test				
MCV	s	MCV value at natural or specified moisture content	int	Intercept of calibration line in MCV calibration
Summary of Laboratory Rock Strength Tests				
Point Load Type (Combination of)	D	Diametral	A	Axial
	I	Irregular lump	B	Block
	L	Test performed parallel to planes of weakness		
	P	Test performed perpendicular to planes of weakness		
	X	Invalid failure of point load (not broken between points of load application)		
Summary of Laboratory Rock Materials Tests				
Ten% fines	w	Soaked test	d	Dry test
Point Load Index Result				
Point Load Type (Combination of)	D	Diametral	A	Axial
	I	Irregular lump	B	Block
	L	Parallel to planes of weakness	P	Perpendicular to planes of weakness
	X	Invalid failure of point load (not broken between points of load application)		
Dimensions	W	Diameter of core or average smallest width perpendicular to axis of loading in a block or irregular lump		
	D	Distance between platens when just in contact with specimen		
	D'	Distance between platens at point of failure		
	De	Equivalent core diameter	Is	P/De^2
	Is(50)	F x Is	F	$(De/50)^{0.45}$
	Is(50) point load strength index corrected for a diametral test of core diameter 50mm			
	For Axial/Lump tests $De^2 = (4/Pi) \times (W \times D')$		For Diametral tests $De^2 = D \times D'$	

Important note: summary sheets are provided for convenience and in no way replace individual test result sheets which shall, without exception, be regarded as the definitive result.

Project Name #7 Duynefontein

Project No. LT1072

Engineer SRK Consulting

Client SRK Consulting

Summary Of Laboratory Rock Strength Tests

Hole ID	Sample depth m	Sample no.	Sample type	Specimen depth m	Specimen no.	Water Content	Bulk Density	Dry Density	Particle density	Point load			UCS	Brazil	Porosity	Elastic Modulus	Posissons Ratio
										Type	I_s	I_s50					
						%	kg/m³	kg/m³	Mg/m³		MN/m²	MN/m²	MN/m²	MN/m²	%	GPa	
KB07	47.030	001	C	47.030	01	0.3	2680	2670					*51.6*			*80.3 Ave*	*0.321*
KB07	52.280	002	C	52.280	01	0.3	2690	2680					*50.8*			*94.1 Ave*	*0.281*
								End									

Approved by: Kevin Walker

Leeds Laboratory

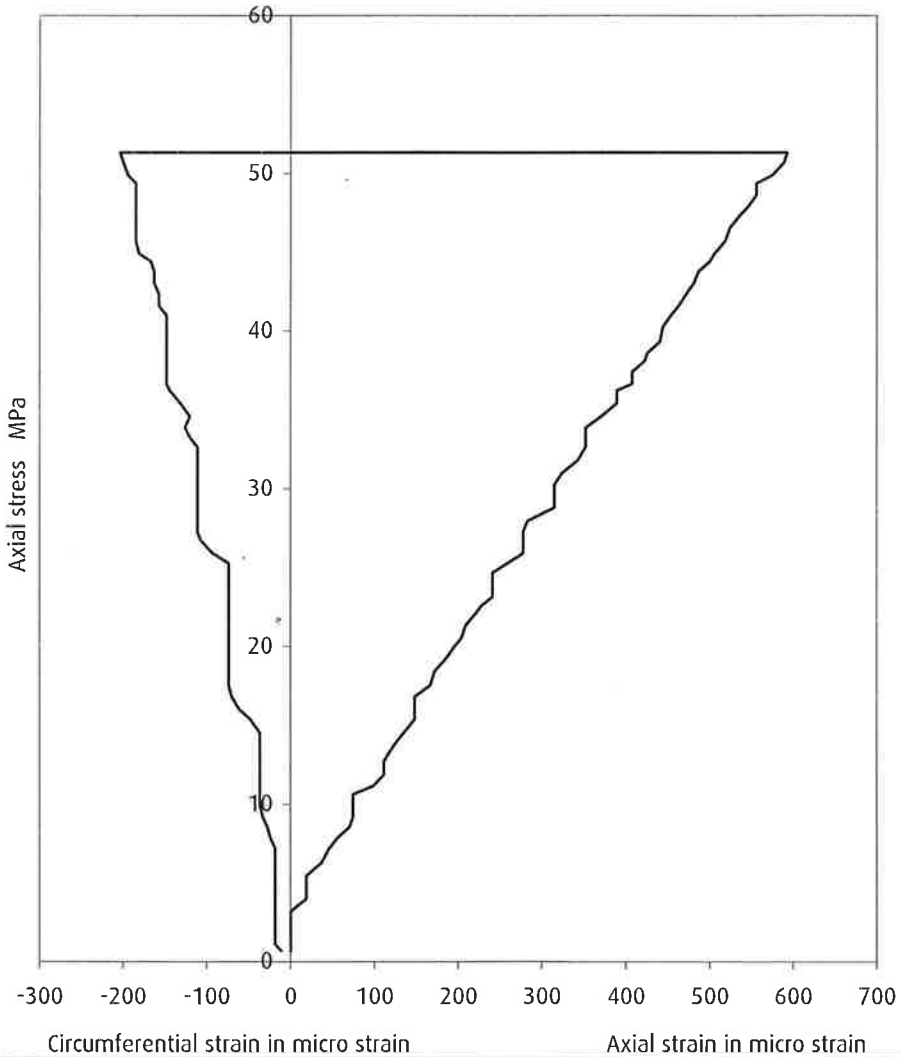
Print date 22/09/2008

Revision No. 2.01 Issue Date 18/08/2006

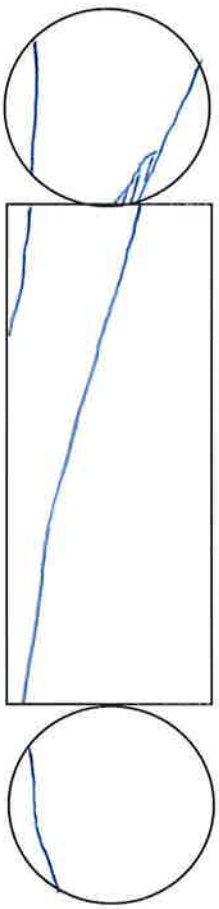
NORWEST HOLST SOIL ENGINEERING

Project Name	#7 Duynefontein	**Unconfined Compressive Strength With Youngs Modulus And Poissons Ratio**	Hole ID KB07
Project No.	LT1072		Sample Depth 47.03m
Engineer	SRK Consulting		Sample Number 001
Client	SRK Consulting	I.S.R.M. Suggested methods 1981	Sample Type C
Description	Grey metamorphic SANDSTONE.		Specimen Depth 47.03m
			Specimen Number 1

Graph of stress strain curves



Failure sketch



Failure type: Axial

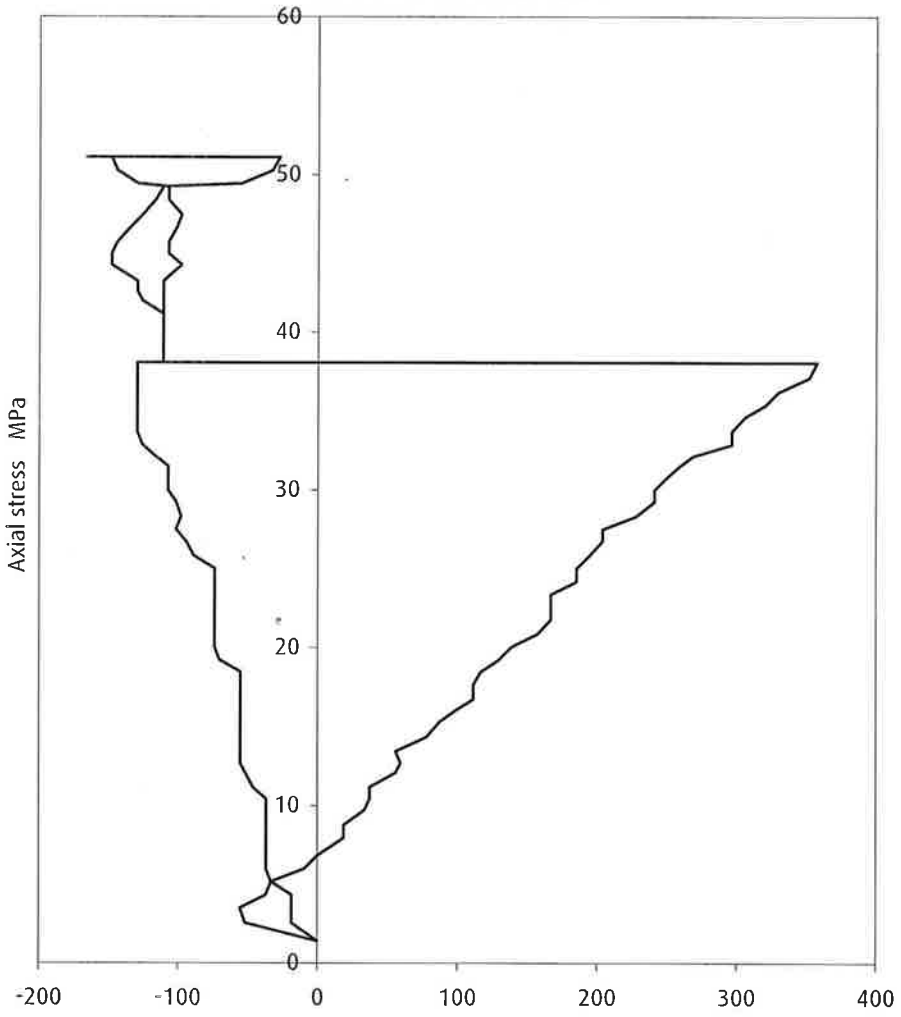
Moisture content	%	0.3	Stress rate	MPa/s	0.14	Tangent modulus	E_t	96.7	GPa
Length	mm	142.59	Test duration	min	06:05	Average modulus	E_{ave}	80.3	GPa
Diameter	mm	52.47	U.C.S.	MPa	51.6	Secant modulus	E_{sec}	94.8	GPa
Mass	g	826.33	Type of machine	Controls 1300/Automax 5		Poissons ratio (Determined using E_{ave})	v	0.321	
Bulk density	kg/m^3	2680							
Dry density	kg/m^3	2670							
Date		18/09/2008							

Test remarks

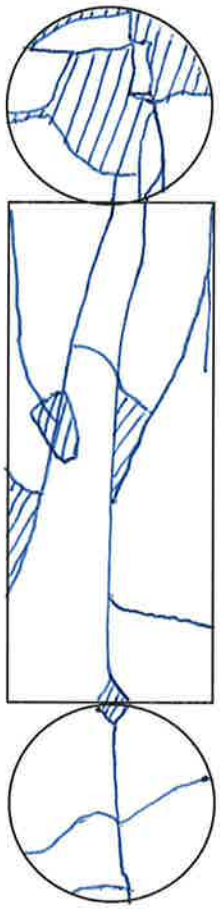
Specimen remarks: Top and bottom of specimen fails ISRM criteria for perpendicularity and/or flatness. Top of specimen is flat and perpendicular to 0.474mm. Bottom of specimen is flat and perpendicular to 0.116mm.

Project Name	#7 Duynefontein	**Unconfined Compressive Strength With Youngs Modulus And Poissons Ratio**	Hole ID KB07
Project No.	LT1072		Sample Depth 52.28m
Engineer	SRK Consulting		Sample Number 002
Client	SRK Consulting	I.S.R.M. Suggested methods 1981	Sample Type C
Description	Grey metamorphic SANDSTONE.		Specimen Depth 52.28m
			Specimen Number 1

Graph of stress strain curves



Failure sketch



Failure type: Axial

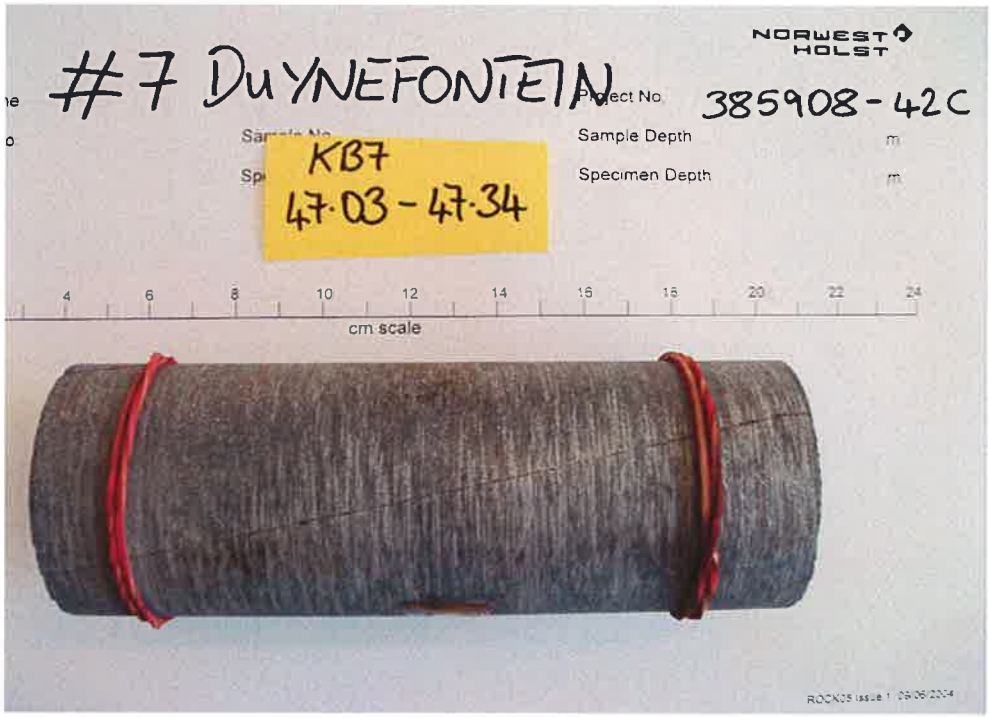
Moisture content	%	0.3	Stress rate	MPa/s	0.15	Tangent modulus	E_t	134	GPa
Length	mm	142.73	Test duration	min	05:34	Average modulus	E_{ave}	94.1	GPa
Diameter	mm	52.43	U.C.S.	MPa	50.8	Secant modulus	E_{sec}	128	GPa
Mass	g	827.54	Type of machine	Controls 1300/Automax 5		Poissons ratio (Determined using E_{ave})	v	0.281	
Bulk density	kg/m^3	2690							
Dry density	kg/m^3	2680							
Date		18/09/2008							

Test remarks

Specimen remarks: Top and bottom of specimen fails ISRM criteria for perpendicularity and/or flatness. Top of specimen is flat and perpendicular to 0.188mm. Bottom of specimen is flat and perpendicular to 0.131mm.

Project Name	#7 Duynefontein	Photographic Record	Hole ID
Project No.	LT1072		KB7
Engineer	SRK Consulting		Fig no.
Client	SRK Consulting		

Before test



After test

Photographed by	Date photographed	Filename 1
PA	18/09/2008	Filename 2
Form No. SI PMPA4	Revision No. 2.02	Issue Date 26/02/2007

NORWEST HOLST SOIL ENGINEERING

Project Name	#7 Duynefontein	Photographic Record	Hole ID
Project No.	LT1072		KB7
Engineer	SRK Consulting		Fig no.
Client	SRK Consulting		

Before test

After test

Photographed by	Date photographed	Filename 1
PA	18/09/2008	Filename 2
Form No. SI PMPA4	Revision No. 2.02	Issue Date 26/02/2007

NORWEST HOLST SOIL ENGINEERING