APPENDIX B
Submission Report
(Geotechnical Investigation)

Our Ref: P 22649

Your Ref:

Drennan Maud cc.

CK 95/54198/23
Consulting Geotechnical Engineers & Engineering Geologists
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19th January 2012

Department of Works
Private Bag X9153
PIETERMARITZBURG
3200

Attention: Mr J. Wilkins

Dear Sir,

GEOTECHNICAL INVESTIGATION FOR PROPOSED NEW PSYCHIATRIC WARD, PORT SHEPSTONE HOSPITAL

Further to a site inspection held on 5th July 2011 and subsequent letter of appointment by the Department of Works dated 8th November 2011, Drennan, Maud cc carried out a geotechnical investigation on the western side of the hospital property for the proposed new psychiatric ward.

Recorded below are our findings, conclusions and recommendations in this matter.

1. INFORMATION SUPPLIED

At the aforementioned site inspection the scope of works and extent of the site was presented by Artek 4 Architects to Drennan Maud cc and Scott Milton Conway (SMC) Land Surveyors.

The development plan for the psychiatric ward was provided at a briefing meeting with Artek 4 in December 2011.

2. TACHE SURVEY

A tache survey of the site was provided by SMC and used to produce a contoured site plan showing the existing buildings and the approximate position all field tests undertaken. The drawing is presented as Figure 1 in this report.

3. FIELD WORK

3.1 Auger Holes (AH 1 - AH 4)

Four auger holes were put down at the approximate positions indicated on Figure 1.

The profiles so obtained are recorded in Appendix A.

3.2 Dynamic Cone Penetrometer Probes (DCP 1 - DCP 12)

Twelve Dynamic Cone Penetrometer probes (DCP 1 - 12) were carried out at the approximate positions indicated on Figure 1. The results are presented graphically as Figures 2 -13.

In order to determine the consistency of the subsoils the following empirically derived table is provide but should be used as a relative guide only.

№ of Blows per 300mm Penetration	Consistency
<8	Very Soft
8 - 18	Soft
9 - 54	Medium Dense
55 - 90	Dense
>90	Very Dense

It is instructive to note that the DCP's encountered very loose to loose sand to depths of between 3 and 3.5 metre below present ground levels.

No refusal was met at any of the DCP test positions where some were taken down to depths of about 6 metre below present ground level. Bedrock is not expected within 15 to 20 metres of the current surface.

3.3 Sampling (S 1 - 3)

Three bulk samples were collected from the site at the positions indicated on Figure 1 and sent to Thekwini Soils Laboratory for analysis.

The laboratory results are recorded in Appendix B and discussed under Section 5 of this report.

4. GEOLOGY AND SOILS

The site is underlain to some depth by aeolian (wind blown) dune sand and Berea Formation sand and clayey sand. It is anticipated that underlying the unconsolidated sediment at between 15 and 20 metre depth is Dwyka tillite bedrock.

Fill of between 0.6 and 1.4 metre thickness and comprising light grey brown, very loose fine sand is evident over most of the current building platform. Below this is light brown to yellow brown very, loose to medium dense dune sand. Underlying the dune sand is reddish brown, firm, Berea Formation clayey sand or sandy clay.

5. LABORATORY TEST RESULTS

The laboratory test results are contained in Appendix B and discussed below.

5.1 Dune Sand

The dune sand material (S1 & 3) classifies as a poorly graded sand to silty sand mixture with a clay content of less than 2% by mass. It has a Liquid Limit of 16 to 22, Plastic Index of 0 and Linear Shrinkage of 0%. Furthermore it has grading modulus of 0.95, a 'low' potential expansiveness rating and an AASHTO Soil Classification of A-3(0), a fair to good sub-grade.

The material (S3) has a Mod AASHTO density of 1795 kg/m³ and an optimum moisture content of 8%. At 90% of Mod AASHTO compaction the material has a CBR of 25 and at 100% it has a CBR of 31. The material has a maximum swell value of 0.83% and a TRH 14 (1985) classification of G7.

5.2 Berea Formation

The Berea Formation material (S2) classifies as a clayey sand with a clay content of less than 7% by mass. It has a Liquid Limit of 24, Plastic Index of 8 and Linear Shrinkage of 4%. Furthermore it has grading modulus of 0.83, a 'low' potential expansiveness rating and an AASHTO Soil Classification of A-2-4(0), a fair to good subgrade.

6. GEOTECHNICAL CONSIDERATIONS

6.1 Erosion and Collapse Settlement

The dune sand and Berea Formation soils are susceptible to both water and wind erosion hence precautions must be taken during construction to prevent concentrated water in particular being discharged onto these soils.

The very loose to loose nature of the subsoils makes them vulnerable to collapse settlement under a load and saturation.

These materials should be vegetated as soon after construction of the platform.

6.2 Earthworks

Where trees have to be cut down then the root bulb must also be removed and the hole so created backfilled and re-compacted to the same specification as recommended below. All other vegetation should be grubbed clear before cutting and filling commences.

As the in-situ soils are susceptible to collapse settlement, they should be proof rolled with a vibratory roller before being developed upon.

Compaction of the dune sand and Berea Formation soils should be to a minimum of 95% of the materials Mod AASHTO dry density and at optimum moisture content and in maximum 300 mm loose thickness layers.

Permanent batters, cut or fill, should not exceed 1:2 in these materials as the soils are highly erodible as stated above.

A friction angle of 30º and cohesion of 0 kPa should be used as the shear strength parameters for the design of retaining walls.

6.3 Founding

In terms of the prevailing soils and architectural nature of the structure to be constructed, it is recommended that it be carried on piled ground beams.

The length and size (diameter) of piles will depend on the loads however the type of piles should be grouted injected continuous flight augers (CFA) to circumvent the possibility of sidewall collapse. Furthermore given the depth to bedrock, friction piles will have to be designed to carry the loads.

Surface beds can be layed directly on the dune sand or Berea Formation sand/clayey sand provided low loads are anticipated. Where high point loads, due to racking say, are required then independent foundations specifically designed for such circumstances should be provided.

Retaining walls can be founded on reinforced strip footings and assume an allowable bearing capacity of 80 kPa provided that the founding soils are well vibratory rolled before casting of the concrete. In this regard, if dune sand is encountered in the foundation excavation it would be advisable to saturate the material before compacting as this will assist in the compaction process.

6.4 Stormwater Disposal

All storm water must be collected from the proposed new structure and paved areas and piped to discharge into the stormwater system.

No storm water may be disposed of adjacent to the existing or new structures unless sanctioned by the Geotechnical Engineer.

6.5 Effluent Disposal

Although the soils have potentially good percolation properties all effluent must be discharged into the existing sewage reticulation system.

7. ROAD MAKING PROPERTIES

In terms of TRH 14 (1985) the dune sand classifies as G7 and hence suitable as general fill, subgrade and selected layers.

The material must be suitably ripped and re-compacted beneath the road formation (sub-grade) layers while sub-base (G5) and crushed rock (base course) requirements for road layer works must be imported from the nearest quarry and/or borrow pit.

8. CONCLUSION

In terms of the findings of the present geotechnical investigation, the proposed new psychiatric ward development is considered feasible provided that the above mentioned recommendations are adhered to, these amounting to no more than good engineering practice.

We trust the above is of some immediate assistance to you however should you require any additional information please feel at liberty to contact the author.

Yours faithfully
DRENNAN MAUD CC

M J-F BÉNET Pr.Sci.Nat.

Encls.	Appendix A	-	AH's 1 - 4
	Appendix B	-	Lab Test Results
	Figure 1	-	Site Plan
	Figures 2 - 13	-	DCP's 1 - 12

/kc

APPENDIX A

AUGER HOLE PROFILES
(AH 1 - AH 4)

DRENNAN MAUD & PARTNERS

Consulting Civil Engineers and Engineering Geologists

Department of Works
Port Shepstone Hospital

HOLE No: AH 1
Sheet 1 of 1

JOB NUMBER: P 22649

Scale 1:20

SAMPLE	DEPTH (m)	
		0.00 Slightly moist, light grey brown, very loose, fine SAND – (Fill)
	1	
		1.40
		Slightly moist, light brown, loose fine SAND – (Dune Sand)
OIMC	2	
		2.60
		Slightly moist, very light brown, loose to medium dense, leached fine SAND – (Dune Sand)
	3	
		3.30

CONTRACTOR : NA
MACHINE : Hand Auger
DRILLED BY : NA
PROFILED BY : GN

INCLINATION : NA
DIAM : NA
DATE : NA
DATE : 05/12/2011

ELEVATION : -
X-COORD : -
Y-COORD : -

TYPE SET BY : kc
SETUP FILE : DMPSP.SET

DATE : 20/01/12 07:55
TEXT : ..C:\DOTIN\SPMASTER.DOC

HOLE No: AH 1

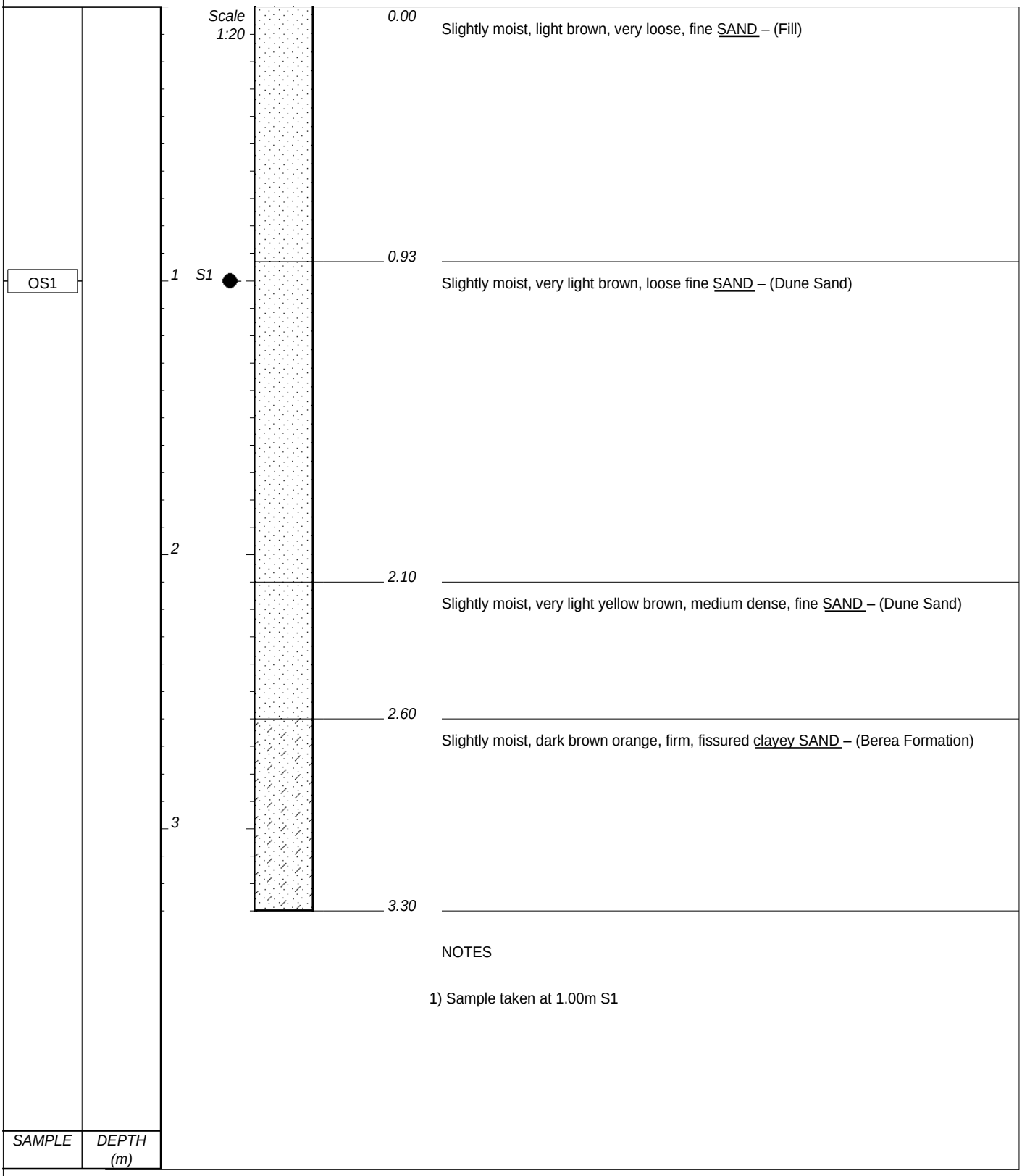
DRENNAN MAUD & PARTNERS

Consulting Civil Engineers and Engineering Geologists

Department of Works
Port Shepstone Hospital

HOLE No: **AH 2**
Sheet 1 of 1

JOB NUMBER: **P 22649**



CONTRACTOR : NA
MACHINE : Hand Auger
DRILLED BY : NA
PROFILED BY : GN

TYPE SET BY : kc
SETUP FILE : DMPSP.SET

INCLINATION :
DIAM : NA
DATE : NA
DATE : 05/12/2011

DATE : 20/01/12 07:55
TEXT : ..C:\DOTIN\SPMASTER.DOC

ELEVATION : -
X-COORD : -
Y-COORD : -

HOLE No: **AH 2**

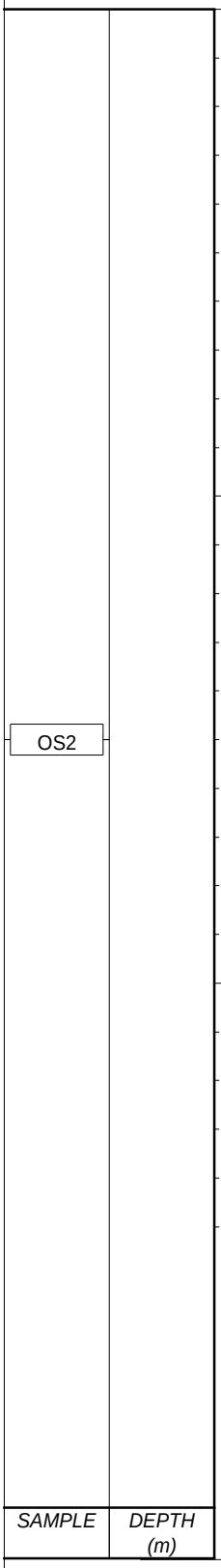
DRENNAN MAUD & PARTNERS

Consulting Civil Engineers and Engineering Geologists

Department of Works
Port Shepstone Hospital

HOLE No: **AH 3**
Sheet 1 of 1

JOB NUMBER: **P 22649**



SAMPLE	DEPTH (m)	
	0.00	CONCRETE – (Floor Slab)
	0.08	Slightly moist, light brown and orange brown, loose clayey SAND – (Fill)
	0.69	Slightly moist, dark red orange, firm, fissured sandy CLAY – (Berea Formation)
	2.50	

NOTES

1) Refusal due to dryness

2) Sample taken at 1.50m S2

CONTRACTOR : NA
MACHINE : Hand Auger
DRILLED BY : NA
PROFILED BY : GN

TYPE SET BY : kc
SETUP FILE : DMPSP.SET

INCLINATION :
DIAM : NA
DATE : NA
DATE : 05/12/2011

DATE : 20/01/12 07:55
TEXT : ..C:\DOTIN\SPMASTER.DOC

ELEVATION : -
X-COORD : -
Y-COORD : -

HOLE No: **AH 3**

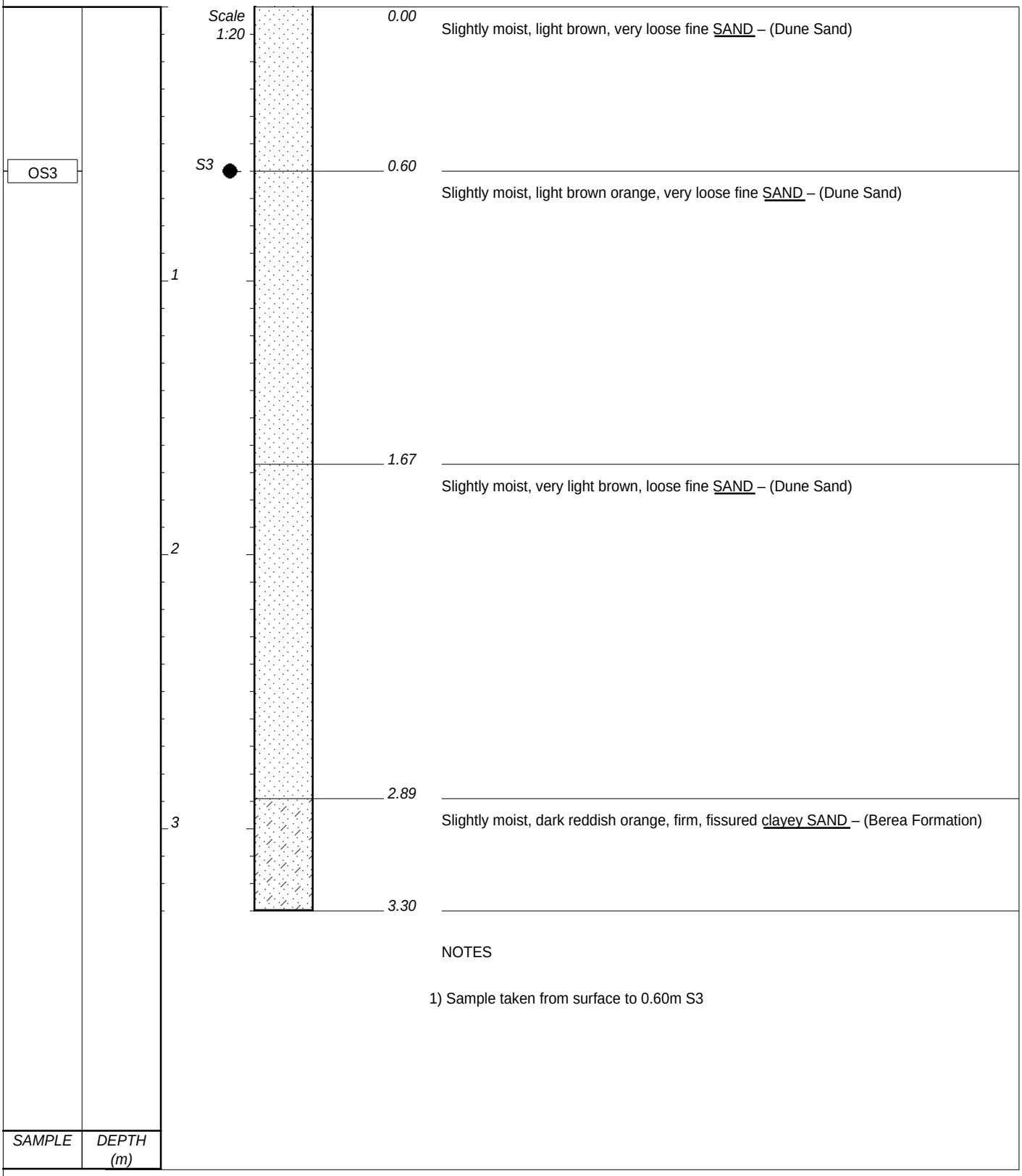
DRENNAN MAUD & PARTNERS

Consulting Civil Engineers and Engineering Geologists

Department of Works
Port Shepstone Hospital

HOLE No: **AH 4**
Sheet 1 of 1

JOB NUMBER: **P 22649**



CONTRACTOR : NA
MACHINE : Hand Auger
DRILLED BY : NA
PROFILED BY : GN

TYPE SET BY : kc
SETUP FILE : DMPSP.SET

INCLINATION :
DIAM : NA
DATE : NA
DATE : 05/12/2011

DATE : 20/01/12 07:55
TEXT : ..C:\DOTIN\SPMASTER.DOC

ELEVATION : -
X-COORD : -
Y-COORD : -

HOLE No: **AH 4**

APPENDIX B

LABORATORY TEST RESULTS

Laboratory Test Summary

THEKWINI SOILS LAB. CC
V.A.T. REGISTRATION NO. 4590210961.
68 Ridge Road, Tollgate, DURBAN
Tel : (031) 201-8992
P.O. Box 30464, MAYVILLE, 4058
Fax : (031) 201-7920

Job Description: Port Shepstone Hospital
Job no.: 22649/3038
Date: 09.01.2012

Lab no.		111215	111216	111217								
Location		AH2,S1	AH3,S2	S3								
Depth		1.0	1.5	0.0 - 0.6								
Description		Dune Sand	Brea Formation	Dune Sand								
		0	0	0								
Binder Material		-	-	-								
Particle Size (mm)	75											
	53											
	37.5											
	26.5											
	19											
	13.2		100									
	9.5	100	100									
	4.75	100	100									
	2	100	99	100								
	0.425	99	99	99								
	0.25	75	97	39								
	0.15	12	30	13								
	0.075	5	19	6								
	0.05	3	14	6								
	0.02	3	12	5								
	0.005	3	10	1								
	0.002	2	7	1								
Soil Mortar	Coarse Sand <2.0 >0.425mm	0.6	0.3	0.7								
	Fine Sand <0.425>0.05mm	96.5	85.9	93.8								
	Silt <0.05 >0.005	0.0	4.1	4.8								
	Clay <0.005	2.9	9.7	0.7								
Atterberg Limits	Liquid Limit	22	24	16								
	Plasticity Index	0	8	0								
	Linear Shrinkage	0	4	0								
	Natural MC	-	-	-								
Mod AASHTO Density	Density Kg/m^3			1795								
	OMC			8								
CBR	100%			31								
	98%			30								
	95%			28								
	93% (Inferred)			27								
	90%			25								
	CBR Swell			0.83								
AASHTO Soil Classification		A - 3 (0)	A - 2 - 4 (0)	A - 3 (0)								
Grading Modulus		0.95	0.83	0.95								
TRH 14 (1985)				G7								

MATERIALS ANALYSIS

THEKWINI SOILS LAB. CC
V.A.T. REGISTRATION NO. 4590210961.
68 Ridge Road, Tollgate, DURBAN
Tel : (031) 201-8992
P.O. Box 30464, MAYVILLE, 4058
Fax : (031) 201-7920

Project: Port Shepstone Hospital

Ref no.: 22649/303 **Lab no.:** 111215 **Borehole/Pit no.:** AH2,S1 **Fig no.:** 0

Depth: 1

Grading Analysis	
Grain Size (mm)	%Passing
75	100.0
53	100.0
37.5	100.0
26.5	100.0
19	100.0
13.2	100.0
9.5	100.0
4.75	100.0
2	99.9
0.425	99.3
0.25	75.1
0.15	12.1
0.075	5.3
0.05	2.9
0.02	2.9
0.005	2.9
0.002	1.8

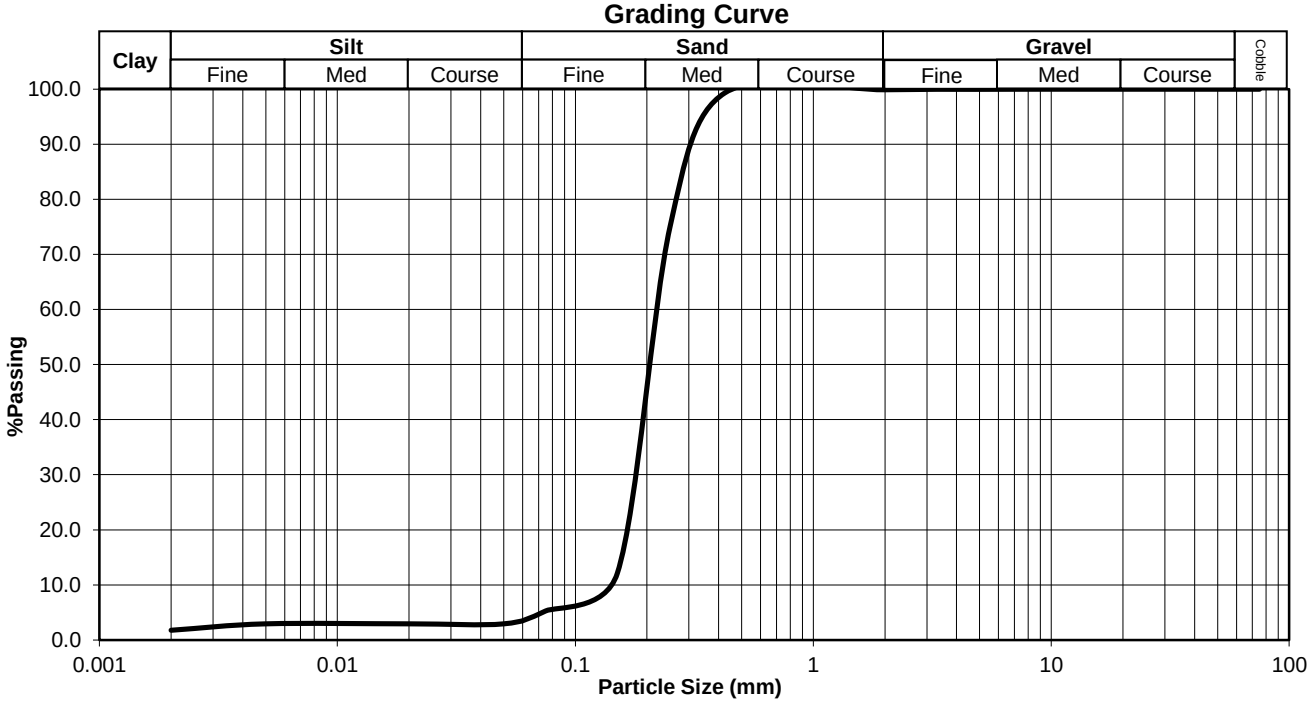
M.I.T SIZE CLASSIFICATION	
Cobble%	0.0
Gravel%	0.1
Course	0.0
Medium	0.0
Fine	0.1
Sand%	96.0
Course	0.5
Medium	55.8
Fine	39.7
Silt%	2.1
Course	0.9
Medium	0.0
Fine	1.2
Clay%	1.8

PLASTICITY	
Liquid Limit	22
Plasticity Index	0
Linear Shrinkage	0

GRADING	
D10 Size	0.1214
Uniformity Coefficient	1.82
Grading Modulus	0.95

CLASSIFICATION	
Potential Expansiveness	Low
Group Index	0
AASHTO Soil Classification	A - 3
Unified Classification	SP - SM

Grading Curve



Ref no.: 22649/3038 Fig no.: 0

MATERIALS ANALYSIS

THEKWINI SOILS LAB. CC
V.A.T. REGISTRATION NO. 4590210961.
68 Ridge Road, Tollgate, DURBAN
Tel : (031) 201-8992
P.O. Box 30464, MAYVILLE, 4058
Fax : (031) 201-7920

Project: Port Shepstone Hospital

Ref no.: 22649/303 **Lab no.:** 111216 **Borehole/Pit no.:** AH3,S2 **Fig no.:** 0

Depth: 1.5

Grading Analysis	
Grain Size (mm)	%Passing
75	100.0
53	100.0
37.5	100.0
26.5	100.0
19	100.0
13.2	100.0
9.5	99.8
4.75	99.6
2	99.4
0.425	99.1
0.25	96.6
0.15	29.8
0.075	19.0
0.05	13.8
0.02	11.8
0.005	9.7
0.002	6.7

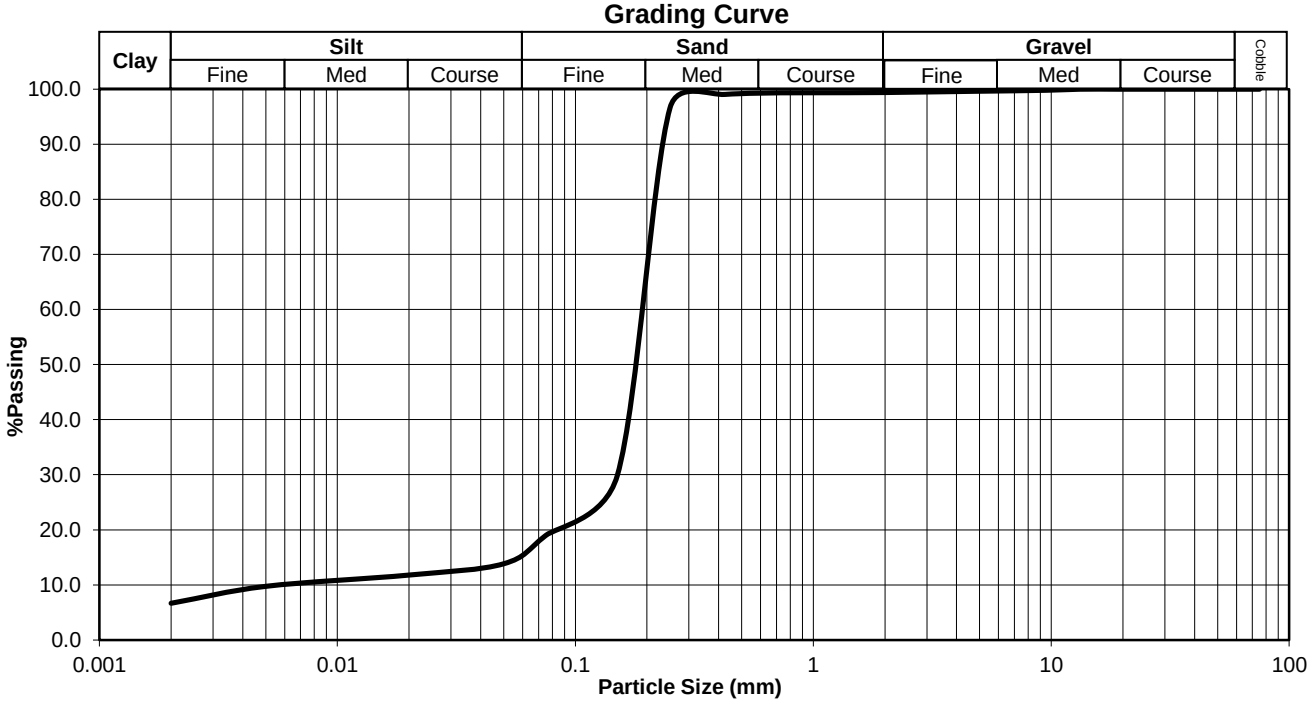
M.I.T SIZE CLASSIFICATION	
Cobble%	0.0
Gravel%	0.6
Course	0.0
Medium	0.3
Fine	0.3
Sand%	83.5
Course	0.3
Medium	35.9
Fine	47.4
Silt%	9.2
Course	4.1
Medium	1.9
Fine	3.2
Clay%	6.7

PLASTICITY	
Liquid Limit	24
Plasticity Index	8
Linear Shrinkage	4

GRADING	
D10 Size	0.0060
Uniformity Coefficient	31.55
Grading Modulus	0.83

CLASSIFICATION	
Potential Expansiveness	Low
Group Index	0
AASHTO Soil Classification	A - 2 - 4
Unified Classification	SC

Grading Curve



Ref no.: 22649/3038 Fig no.: 0

MATERIALS ANALYSIS

THEKWINI SOILS LAB. CC
V.A.T. REGISTRATION NO. 4590210961.
68 Ridge Road, Tollgate, DURBAN
Tel : (031) 201-8992
P.O. Box 30464, MAYVILLE, 4058
Fax : (031) 201-7920

Project: Port Shepstone Hospital

Ref no.: 22649/303 **Lab no.:** 111217 **Borehole/Pit no.:** S3 **Fig no.:** 0

Depth: 0.0 - 0.6

Grading Analysis	
Grain Size (mm)	%Passing
75	100.0
53	100.0
37.5	100.0
26.5	100.0
19	100.0
13.2	100.0
9.5	100.0
4.75	100.0
2	100.0
0.425	99.3
0.25	39.1
0.15	13.4
0.075	5.9
0.05	5.5
0.02	5.1
0.005	0.7
0.002	0.9

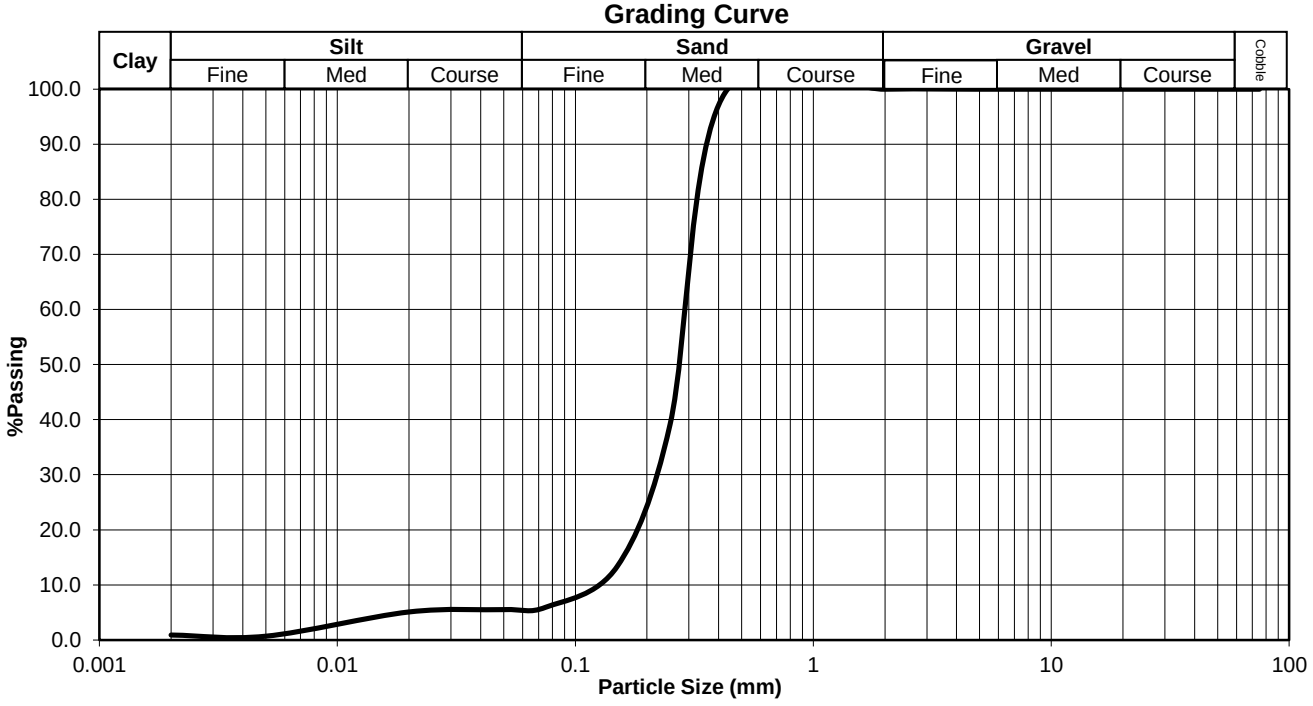
M.I.T SIZE CLASSIFICATION	
Cobble%	0.0
Gravel%	0.0
Course	0.0
Medium	0.0
Fine	0.0
Sand%	94.3
Course	0.6
Medium	73.1
Fine	20.6
Silt%	4.8
Course	0.6
Medium	4.1
Fine	0.1
Clay%	0.9

PLASTICITY	
Liquid Limit	16
Plasticity Index	0
Linear Shrinkage	0

GRADING	
D10 Size	0.1096
Uniformity Coefficient	2.74
Grading Modulus	0.95

CLASSIFICATION	
Potential Expansiveness	Low
Group Index	0
AASHTO Soil Classification	A - 3
Unified Classification	SP - SM

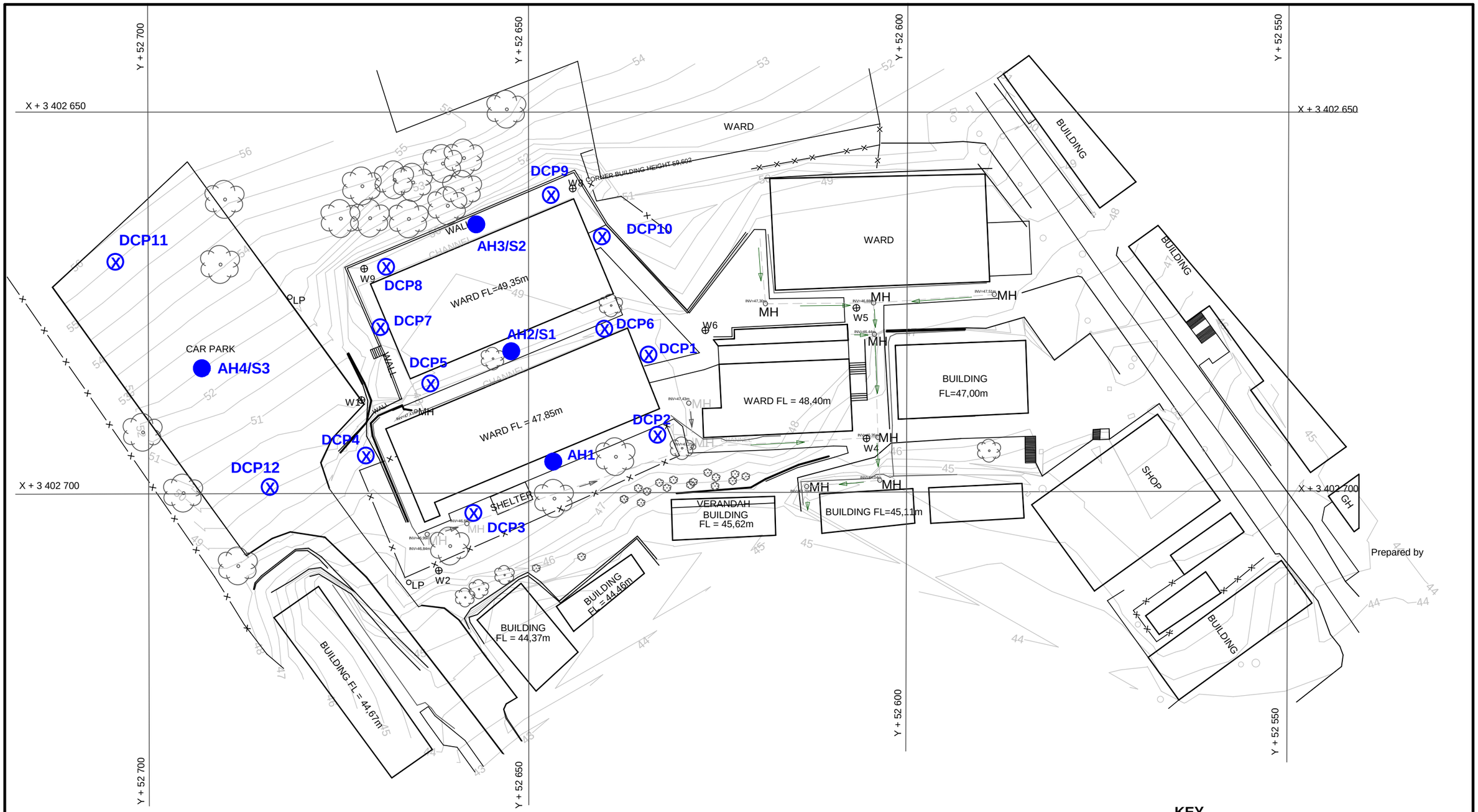
Grading Curve



Ref no.: 22649/3038 Fig no.: 0

FIGURE 1

SITE PLAN



KEY

DCP1 ⊗	APPROX. POSITION OF DYNAMIC CONE PENETROMETER TESTS
S1	APPROX. POSITION OF SAMPLES
AH1 ●	APPROX. POSITION OF AUGER HOLES

DRENNAN, MAUD AND PARTNERS Consulting Civil Engineers	DESIGNED : G.N. DRAWN : S.P. DATE : 18/01/2012 SCALE : 1:500 CHECKED :	GEOTECHNICAL INVESTIGATION PSYCHIATRIC WARD, PORT SHEPSTONE HOSPITAL

REF. NO. 22649

FIG. NO. 1

FIGURES 2 - 13

DYNAMIC CONE PENETROMETER
TEST RESULTS (DCP 1 - DCP 12)

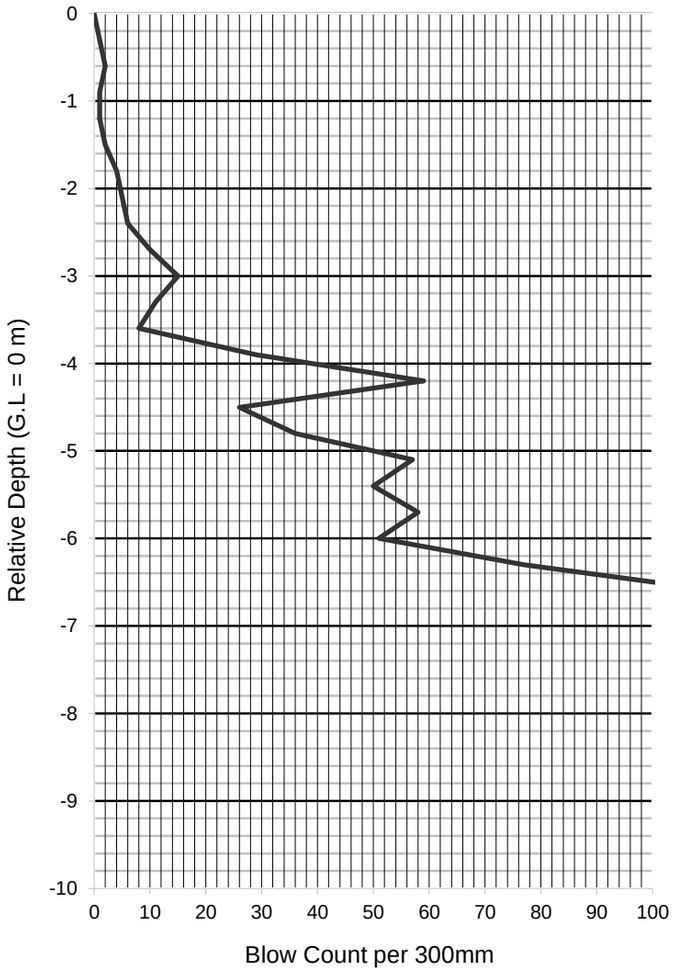
Dynamic Cone Penetrometer

Test No. : 1

Project : **Port Shepstone Psychiatric Ward**
Client : **Department of Works**
Date: 18/01/2012 Remarks: -
Test Location: 0 -
Date of Test: 05/12/2011 Depth Interval (m) : 0.3

Depth (m)	Count Blows/0.3m
0	0
-0.3	1
-0.6	2
-0.9	1
-1.2	1
-1.5	2
-1.8	4
-2.1	5
-2.4	6
-2.7	10
-3.0	15
-3.3	11
-3.6	8
-3.9	29
-4.2	59
-4.5	26
-4.8	36
-5.1	57
-5.4	50
-5.7	58
-6.0	51
-6.3	77
-6.6	112
-	
-	
-	
-	
-	
-	
-	
-	
-	
-	
-	

Blow Count vs Depth



Reference No. : 22649

Drennan Maud & Partners.

Fig. No. 2

Dynamic Cone Penetrometer

Test No. : 3

Project : **Port Shepstone Psychiatric Ward**
Client : **Department of Works**
Date: 18/01/2012 Remarks: -
Test Location: 0 -
Date of Test: 05/12/2011 Depth Interval (m) : 0.3

Depth (m)	Count Blows/0.3m
0	0
-0.3	4
-0.6	2
-0.9	5
-1.2	8
-1.5	5
-1.8	12
-2.1	9
-2.4	11
-2.7	13
-3.0	10
-3.3	26
-3.6	29
-3.9	41
-4.2	52
-4.5	57
-4.8	49
-5.1	63
-5.4	79
-5.7	110
-	
-	
-	
-	
-	
-	
-	
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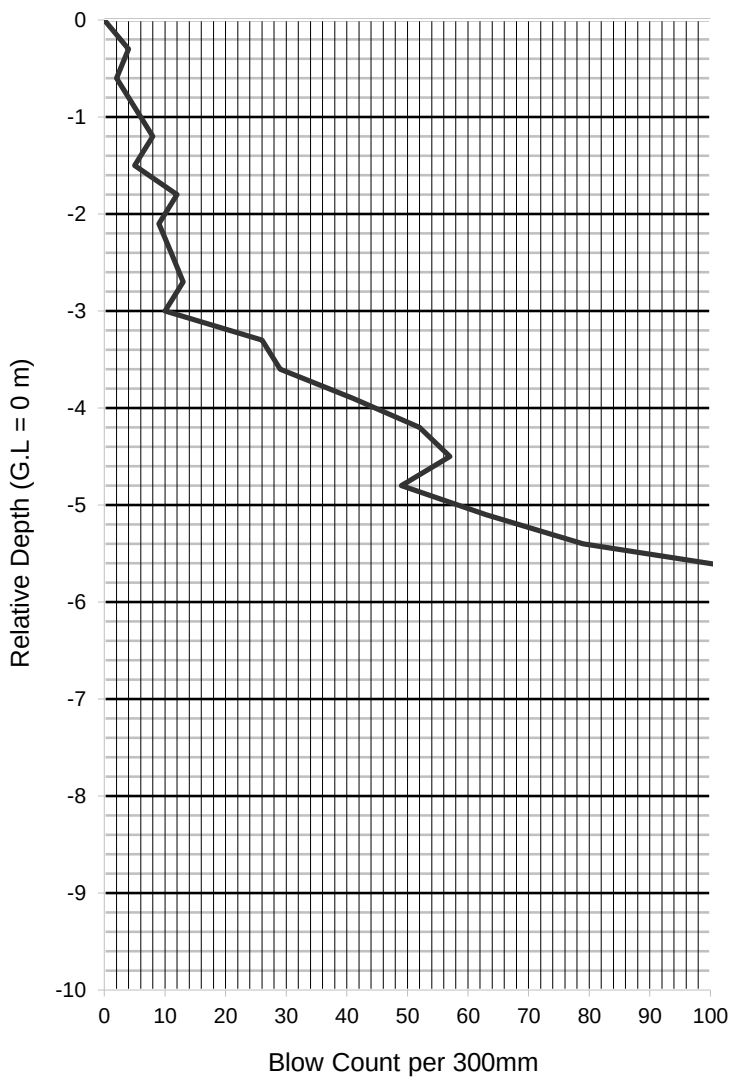
-	
-	
-	

Blow Count vs Depth



Reference No. : 22649

Drennan Maud & Partners.

Fig. No. 4

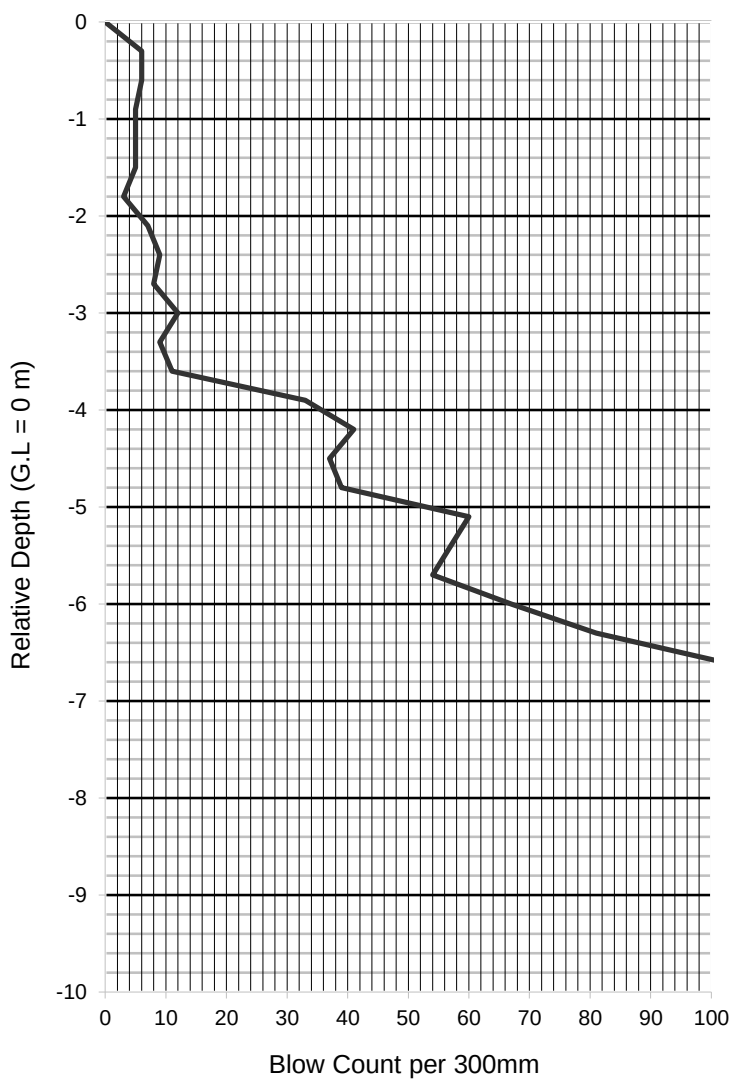
Dynamic Cone Penetrometer

Test No. : 2

Project : **Port Shepstone Psychiatric Ward**
Client : **Department of Works**
Date: 18/01/2012 Remarks: -
Test Location: 0 -
Date of Test: 05/12/2011 Depth Interval (m) : 0.3

Depth (m)	Count Blows/0.3m
0	0
-0.3	6
-0.6	6
-0.9	5
-1.2	5
-1.5	5
-1.8	3
-2.1	7
-2.4	9
-2.7	8
-3.0	12
-3.3	9
-3.6	11
-3.9	33
-4.2	41
-4.5	37
-4.8	39
-5.1	60
-5.4	57
-5.7	54
-6.0	67
-6.3	81
-6.6	102
-	
-	
-	
-	
-	
-	
-	
-	
-	
-	
-	

Blow Count vs Depth



Reference No. : 22649

Drennan Maud & Partners.

Fig. No. 3

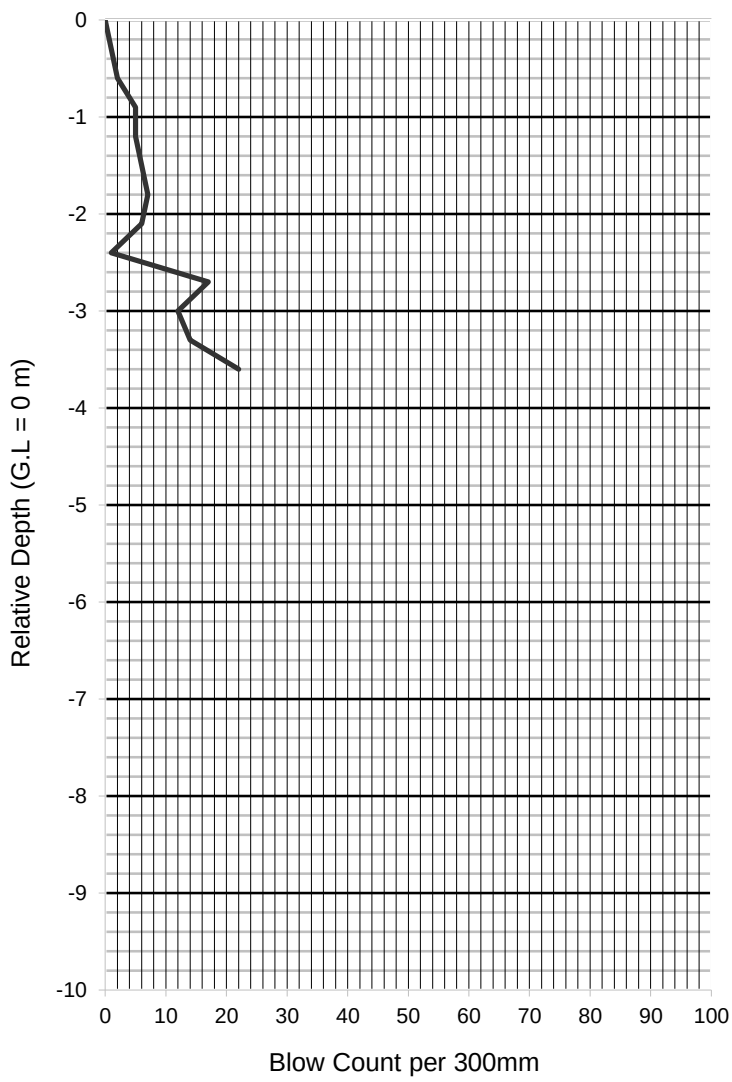
Dynamic Cone Penetrometer

Test No. : 4

Project : **Port Shepstone Psychiatric Ward**
Client : **Department of Works**
Date: 18/01/2012 Remarks: -
Test Location: 0 -
Date of Test: 05/12/2011 Depth Interval (m) : 0.3

Depth (m)	Count Blows/0.3m
0	0
-0.3	1
-0.6	2
-0.9	5
-1.2	5
-1.5	6
-1.8	7
-2.1	6
-2.4	1
-2.7	17
-3.0	12
-3.3	14
-3.6	22

Blow Count vs Depth



Reference No. : 22649

Drennan Maud & Partners.

Fig. No. 5

Dynamic Cone Penetrometer

Test No. : 5

Project : **Port Shepstone Psychiatric Ward**
Client : **Department of Works**
Date: 18/01/2012 Remarks: -
Test Location: 0 -
Date of Test: 05/12/2011 Depth Interval (m) : 0.3

Depth (m)	Count Blows/0.3m
0	0
-0.3	3
-0.6	3
-0.9	5
-1.2	8
-1.5	14
-1.8	18
-2.1	12
-2.4	19
-2.7	20
-3.0	18
-3.3	19
-3.6	23
-	
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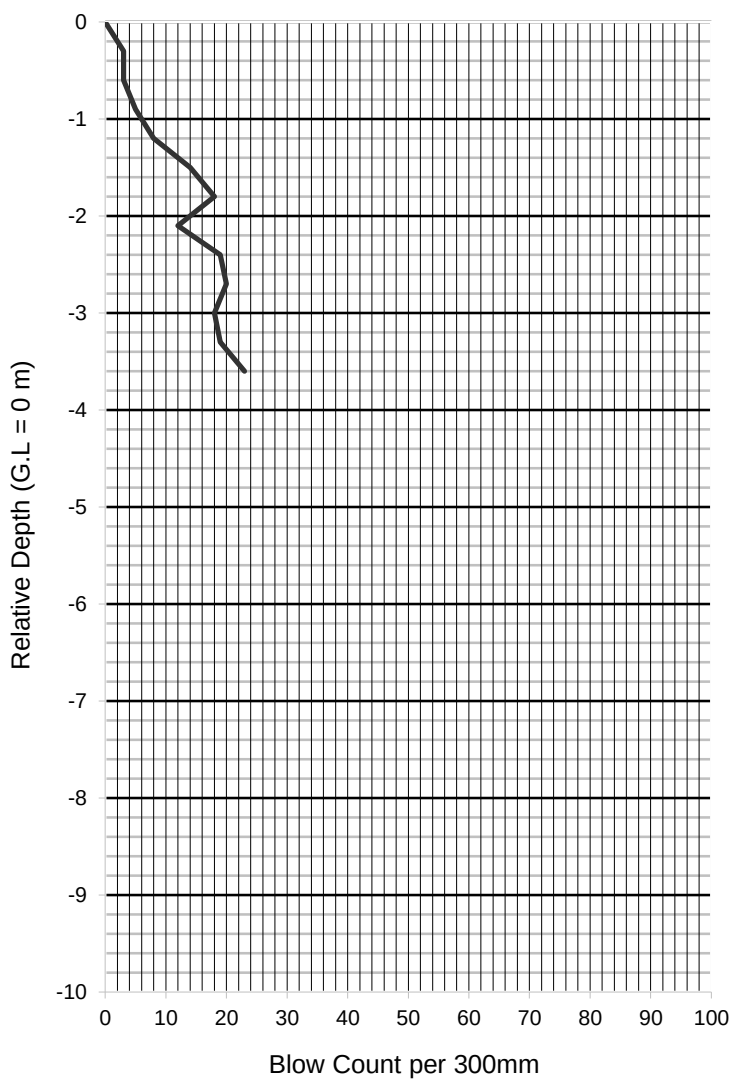
-	

Blow Count vs Depth



Reference No. : 22649

Drennan Maud & Partners.

Fig. No. 6

Dynamic Cone Penetrometer

Test No. : 6

Project : **Port Shepstone Psychiatric Ward**
Client : **Department of Works**
Date: 18/01/2012 Remarks: -
Test Location: 0 -
Date of Test: 05/12/2011 Depth Interval (m) : 0.3

Depth (m)	Count Blows/0.3m
0	0
-0.3	9
-0.6	5
-0.9	5
-1.2	10
-1.5	8
-1.8	10
-2.1	10
-2.4	10
-2.7	13
-3.0	16
-3.3	21
-3.6	17
-3.9	24
-4.2	31
-4.5	33
-4.8	41
-5.1	49
-5.4	51
-5.7	62
-6.0	83
-6.3	98
-	
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-	
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-	
-	
-	
-	
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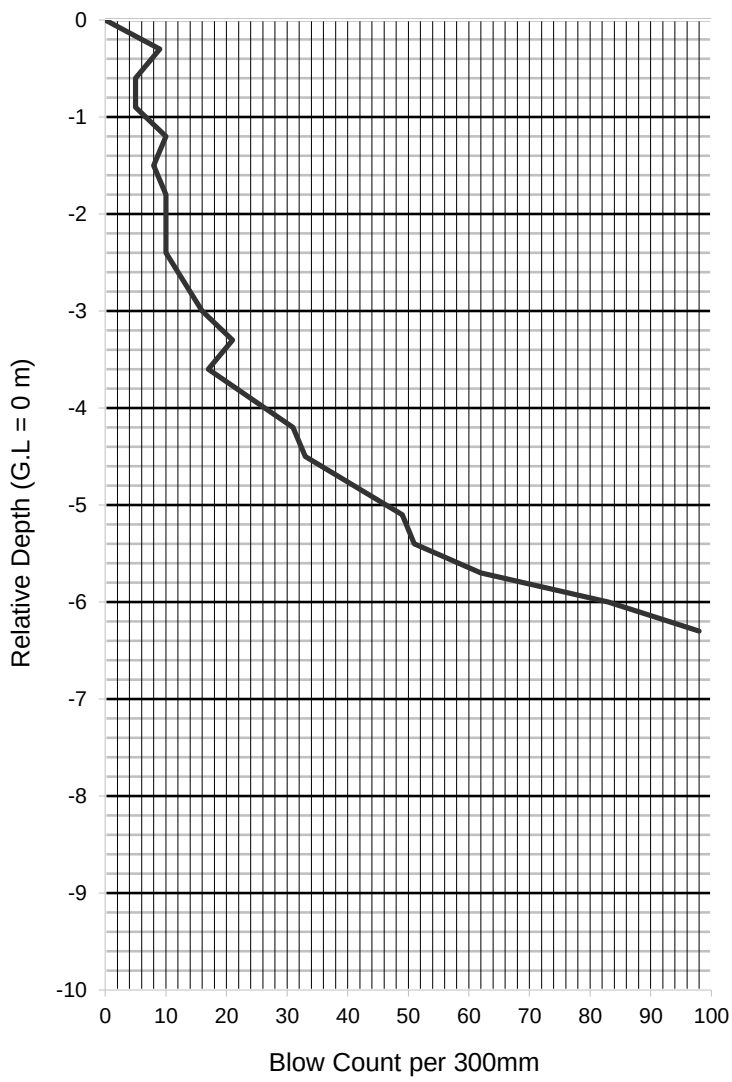
-	
-	
-	

Blow Count vs Depth



Reference No. : 22649

Drennan Maud & Partners.

Fig. No. 7

Dynamic Cone Penetrometer

Test No. : 7

Project : **Port Shepstone Psychiatric Ward**
Client : **Department of Works**
Date: 18/01/2012 Remarks: -
Test Location: 0 -
Date of Test: 05/12/2011 Depth Interval (m) : 0.3

Depth (m)	Count Blows/0.3m
0	0
-0.3	1
-0.6	2
-0.9	5
-1.2	8
-1.5	11
-1.8	16
-2.1	24
-2.4	33
-2.7	22
-3.0	17
-3.3	22
-3.6	34
-3.9	41
-4.2	56
-4.5	61
-4.8	79
-5.1	88
-5.4	113
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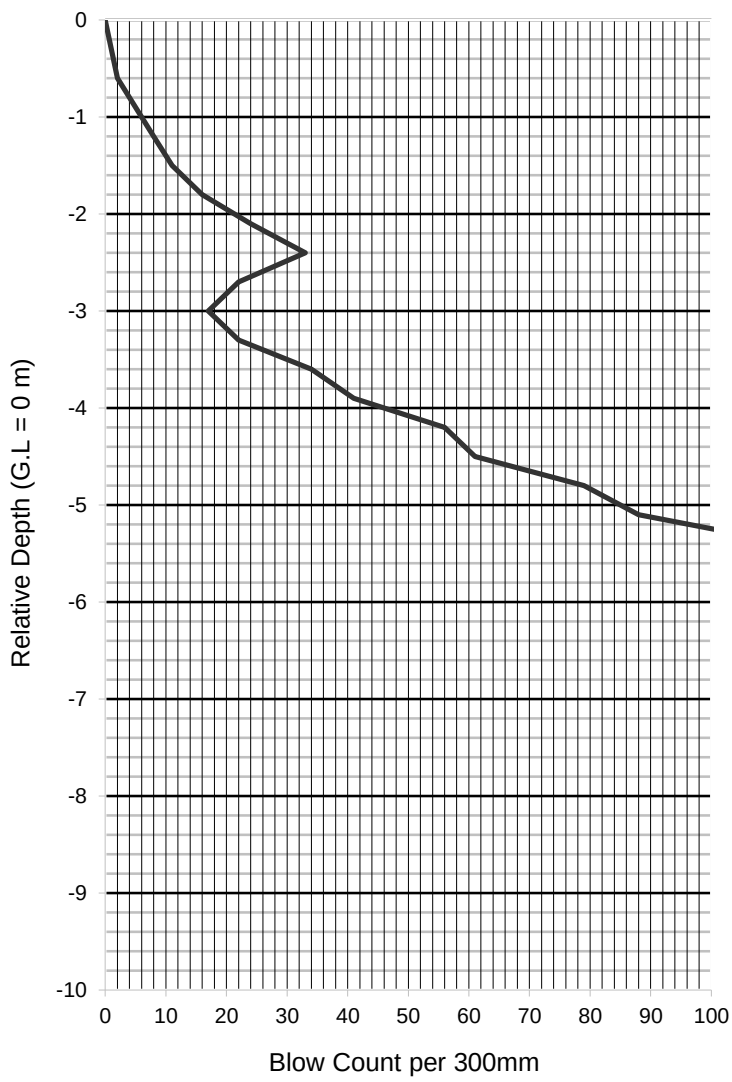
Blow Count vs Depth



Reference No. : 22649

Drennan Maud & Partners.

Fig. No. 8

Dynamic Cone Penetrometer

Test No. : 8

Project : **Port Shepstone Psychiatric Ward**
Client : **Department of Works**
Date: 18/01/2012 Remarks: -
Test Location: 0 -
Date of Test: 05/12/2011 Depth Interval (m) : 0.3

Depth (m)	Count Blows/0.3m
0	0
-0.3	7
-0.6	9
-0.9	9
-1.2	8
-1.5	10
-1.8	6
-2.1	7
-2.4	11
-2.7	9
-3.0	14
-3.3	14
-3.6	13
-3.9	8
-4.2	31
-4.5	30
-4.8	38
-5.1	56
-5.4	60
-5.7	69
-6.0	72
-6.3	75
-6.6	89
-6.9	112
-	
-	
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-	
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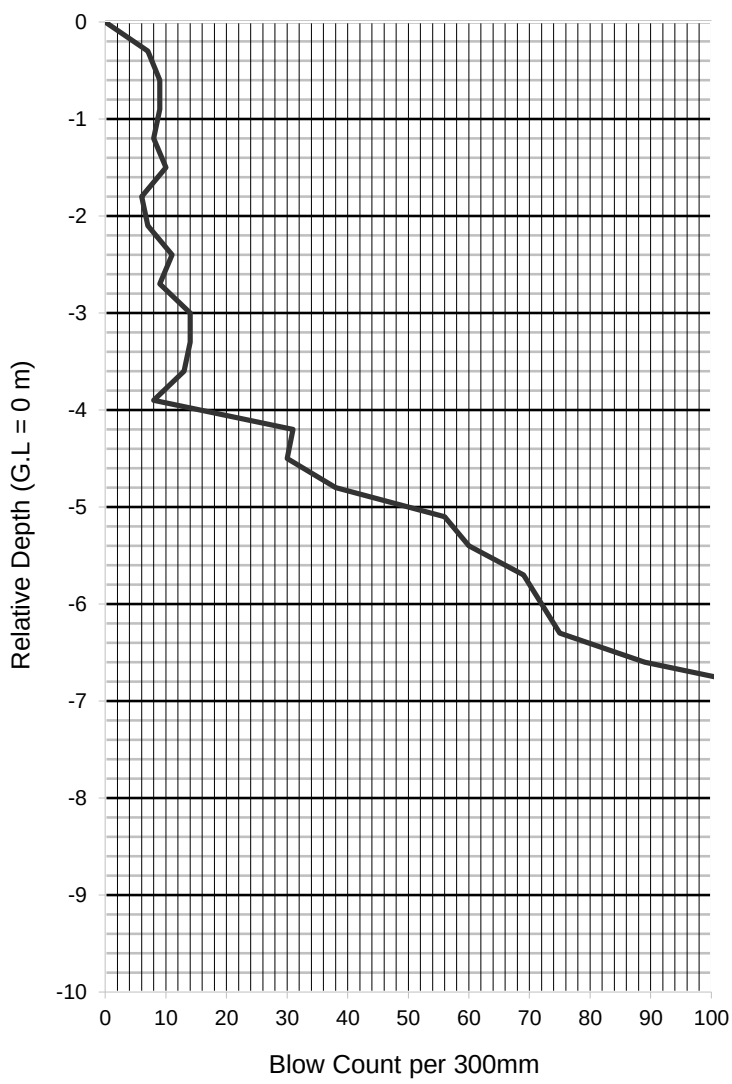
-	
-	

Blow Count vs Depth



Reference No. : 22649

Drennan Maud & Partners.

Fig. No. 9

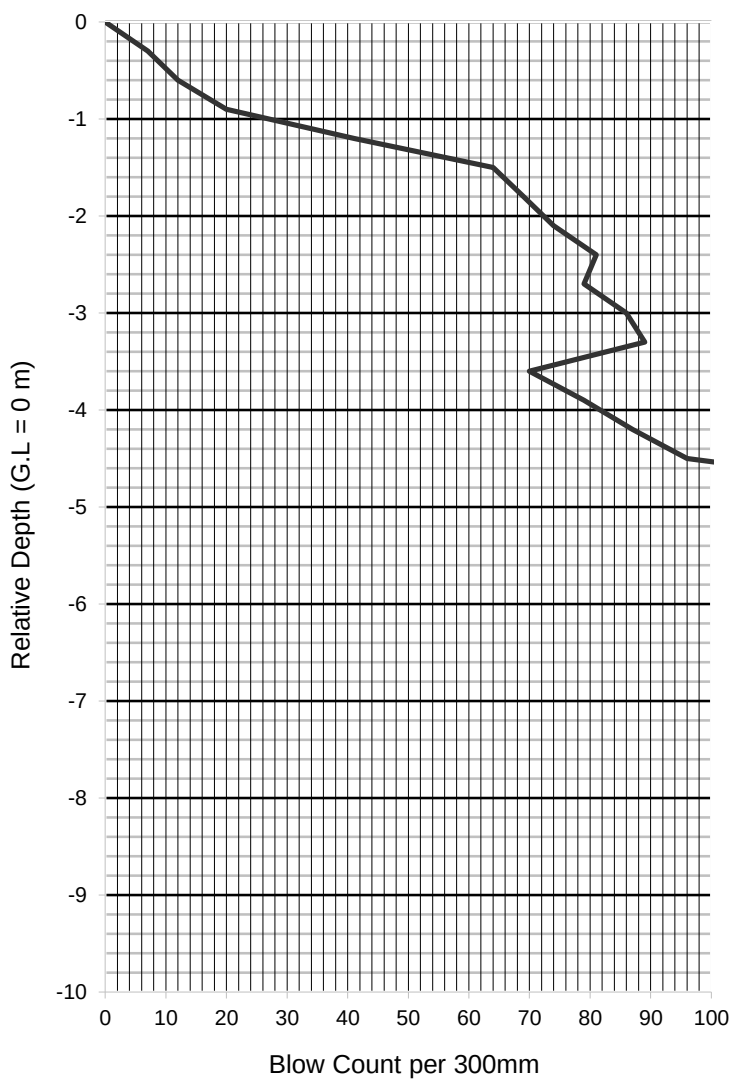
Dynamic Cone Penetrometer

Test No. : 9

Project : **Port Shepstone Psychiatric Ward**
Client : **Department of Works**
Date: 18/01/2012 Remarks: -
Test Location: 0 -
Date of Test: 05/12/2011 Depth Interval (m) : 0.3

Depth (m)	Count Blows/0.3m
0	0
-0.3	7
-0.6	12
-0.9	20
-1.2	41
-1.5	64
-1.8	69
-2.1	74
-2.4	81
-2.7	79
-3.0	86
-3.3	89
-3.6	70
-3.9	79
-4.2	87
-4.5	96
-4.8	133

Blow Count vs Depth



Reference No. : 22649

Drennan Maud & Partners.

Fig. No. 10

Dynamic Cone Penetrometer

Test No. : 10

Project : **Port Shepstone Psychiatric Ward**
Client : **Department of Works**
Date: 18/01/2012 Remarks: -
Test Location: 0 -
Date of Test: 05/12/2011 Depth Interval (m) : 0.3

Depth (m)	Count Blows/0.3m
0	0
-0.3	10
-0.6	13
-0.9	13
-1.2	11
-1.5	12
-1.8	14
-2.1	23
-2.4	22
-2.7	18
-3.0	20
-3.3	25
-3.6	38
-3.9	46
-4.2	49
-4.5	60
-4.8	68
-5.1	74
-5.4	93
-5.7	123
-	
-	
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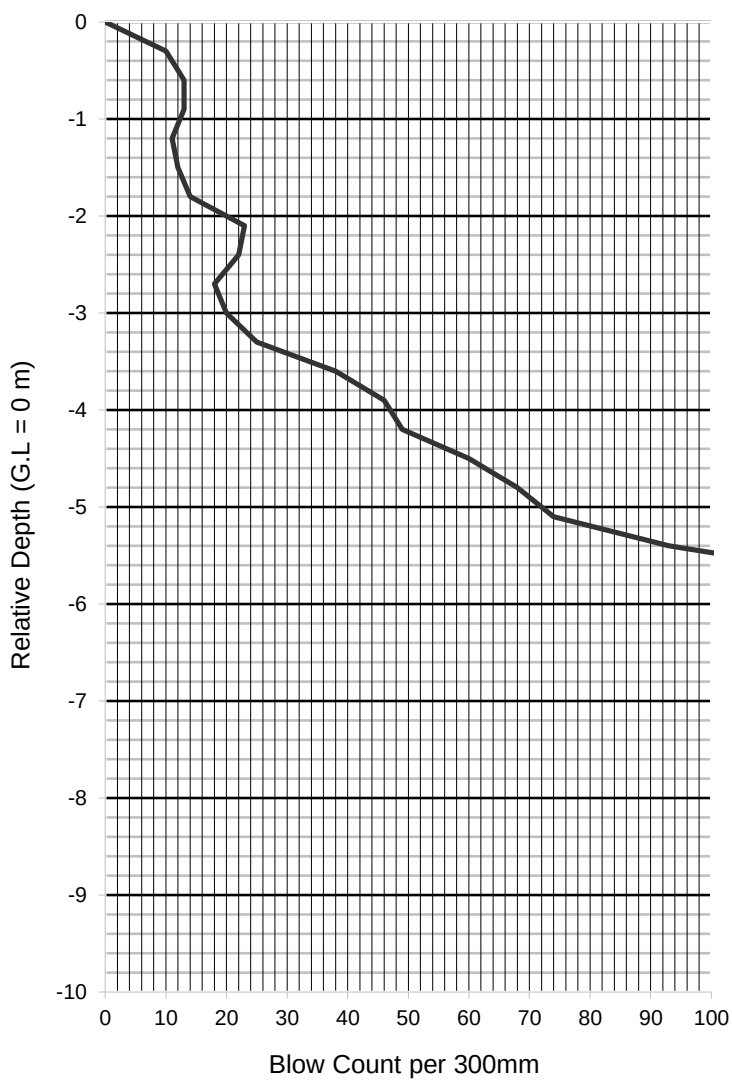
-	
-	

Blow Count vs Depth



Reference No. : 22649

Drennan Maud & Partners.

Fig. No. 11

Extension to
Geotechnical Investigation

DRENNAN MAUD (PTY) LTD

GEOTECHNICAL ENGINEERS AND ENGINEERING GEOLOGISTS
Incorporating Drennan Maud & Partners (Est.1975) and GAP Consulting

Reg. No. 2014/038872/07

Durban Head Office
68 Peter Mokaba Ridge, Tollgate, 4001
P.O. Box 30464, Mayville, 4058
T: +27 31 201 8992 F: +27 31 201 7920

Info@drennanmaud.com
www.drennanmaud.com

Margate Office
Unit 7 Gayridge Business Park No. 2
13 Wingate Avenue, Margate 4275
T: +27 39 3122 588 F: 0866 0275 53

Our Ref.: 22620P
Your Ref.: WIMS 044044

11 November 2015

ARTEK 4 ARCHITECTS (KZN)
26 Bazley Road
PORT SHEPSTONE
4240

Attention : Mr S. Govender

somers@artek4.co.za

Dear Sir,

WIMS 044044 : SOUTHERN REGION:
DEPARTMENT OF HEALTH : PORT SHEPSTONE HOSPITAL:
CONVERSION OF "A" WARD TO 25 BEDDED PSYCHIATRIC UNIT
MOTIVATION FOR EXTENSION TO GEOTECH

Further to a letter from the KZN Department of Public Works on the 8 November 2011, we accepted the commission as Geotechnical Engineers to the project in our letter dated the 24 February 2012. Between these dates, we visited the site for the purpose of conducting a limited geotechnical investigation. Our assessment, mindful of the proposed development on site, was presented in our report (Ref. 22649P) dated the 19 January 2012.

The geotechnical appointment comprised a time and cost assignment to a maximum of 50hr. We were briefed in early December 2011 by the project team on the requirements for the proposed new single storey, double volume structure. Subsequently, the geotechnical investigation was carried out on the 5 December 2011.

At a meeting on the 24 February 2012, the Architect informed the professional team that the scope of work had expanded to include basement parking. Limited space on site would result in the undermining of existing structures rendering them unstable should lateral support not be provided. We recommend that the solution should comprise piles for both lateral support and founding but

Directors:**M.J.F BENET** [Pr.Sci.Nat. B.Sc. (Hons) M.Sc. FSAIEG], **M.J.HADLOW** [Pr.Sci.Nat. B.Sc.(Hons.) MSAIEG], **G.A.R.PAUSELLI** [Pr.Eng. BSc Eng (Civil) MSAICE]
Consultants: **R.R. MAUD** [Pr.Sci.Nat. B.Sc. Ph.D. FGS. FGSSA. FSAIEG. FSAII], **R.D. COLLYER** [Pr.Eng. B.Sc.(Eng.) M.Sc.(Eng.) MSAICE]
Managers: **M.J.F. BENET** (Durban), **G. NTAKA** (Margate)

that the two be combined to make a saving. Further to the geotechnical information previously gathered, deep probes are required to determine pile design parameters.

We recommend that the additional work required in order to determine pile design parameters be carried out as an extension of the original time and cost assignment by 50hr with the deep probes as a disbursement to ourselves.

Given the extent of the above concept changes, DRENNAN MAUD respectfully requests an extension to the original Geotechnical assignment given that the Structural component of the new concept cannot be commenced without the information supplied by the extended appointment - it is unsafe to rely upon the limited information available to complete such a complex lateral earth support design.

We trust this meets with your immediate requirements in this regard. If you need more information or have any questions concerning the above, please contact us.

Yours faithfully,

S. BOYCE (Civ. Eng.)
For and on behalf of **DRENNAN MAUD (PTY) LTD**

Stacey Boyce

From: Somers Govender <somers@artek4.co.za>
Sent: 28 February 2016 02:39 PM
To: Stacey Boyce
Cc: 'Andy Chen'; 'Zulu, Mhlonipheni'; michel@drennanmaud.com
Subject: *****SPAM***** WIMS 044044: PS HOSP PSYCH WARD: GEOTECH APPOINTMENT

Importance: High

Hi Stacey,

See Trailing email.

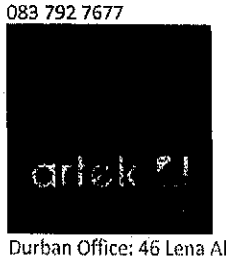
Please appoint the lowest responsive quote received for additional geotechnical works.

The appointment may proceed as a disbursement to the Existing Geo Tech Engineer as stipulated from the Acting Chief Professional.

In terms of good practice, ensure that you receive a valid Tax Clearance Certificate and appropriate Professional Indemnity Insurance Cover as a minimum in the appointment.

Regards

Somers Govender
Member
083 792 7677



Durban Office: 46 Lena Ahrens Road (Manning), Glenwood, Durban, 4001 I Tel: 031 201 0445 I Fax: 031 201 6609 I email: admindbn@artek4.co.za
Port Shepstone Office: 19 Tradewinds, Marine Drive, Shelly Beach I Tel: 039 682 2447 I Fax: 039 682 2446 I email: adminps@artek4.co.za

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From: Zulu, Mhlonipheni [mailto:mhlonipheni.zulu@kznworks.gov.za]
Sent: 26 February 2016 01:54 PM
To: Somers Govender <somers@artek4.co.za>
Cc: Andy Chen <Andy.Chen@kznworks.gov.za>
Subject: FW: WIMS 044044: PS HOSPITAL PSYCHIATRIC WARD

Morning

Somers you can procced now to appoint the **Geotech Engineer and Traffic Engineer** as per below email from Acting Chief Professional. The Fire Engineer the submission will be forwarded to CCM for approval and I will inform you once I get approval.

Regards
Mr Zulu

From: Andy Chen
Sent: Wednesday, February 17, 2016 11:02 AM
To: Zulu, Mhlonipheni; Somers Govender (somers@artek4.co.za)
Cc: Mabaso, Jabu J.
Subject: WIMS 044044: PS HOSPITAL PSYCHIATRIC WARD

Hi Zulu / Somers

Herewith the procedure as following for the additional consultants as requested by the Principal Agent due to the client department adding new works on site.

1. **Geotech Engineer** –Existing Geotech engineer needs to provide 3 quotations to carry out the new works
   And together with client requested letter therefore PM can decide this additional works will be charge
   as disbursement to the existing Geo-Tech engineer.

2. **Fire Engineer** – AOCC submission required, due to the quotation over the limit by the delegation.
   PM to submit AOCC requested to require new discipline to the existing project.

3. **Traffic Engineer** – Existing Civil Engineer needs to provide 3 quotations to carry out the new works
   And together with client requested letter therefore PM can decide this additional works will be charge
   as disbursement to the existing Civil Engineer.

I hope above mention items will help you to move the project forwards without delay the services delivery.

Regards

Andy Chen
Acting Chief Professional

public works
Department:
Public Works
PROVINCE OF KWAZULU-NATAL

SOUTHERN REGION
PROFESSIONAL SERVICES

Tel +27 33 8971312
Fax +27 33 8971344
email andy.chen@kznworks.gov.za
Private Bag X9153 pmb 3200
10 prince alfred street pietermaritzburg 3200

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Stacey Boyce

From: Stacey Boyce <stacey@drennanmaud.com>
Sent: 07 March 2016 12:04 PM
To: 'Lombaard, Gavin'
Cc: somers@artek4.co.za; michel@drennanmaud.com
Subject: 31319 - Port Shepstone Psychiatric Ward
Attachments: Geotech Motivation Franki.pdf

Hi Gavin

The Department of Works has approved the attached quote. We would like to proceed with work as soon as possible.

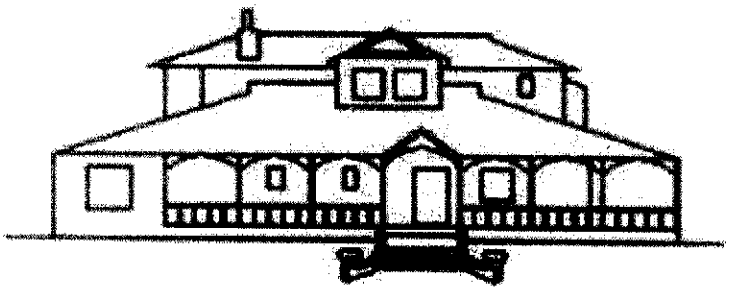
We will need to meet on site with the Port Shepstone Hospital Management to establish access to site and set out the test positions prior to your establishment. Michel has proposed meeting you on site early next week. Please advise your availability and the earliest date on which you can establish on site thereafter.

Somers; please advise whom to contact at the Hospital to programme the investigation.

Regards,

Stacey Boyce
Civil Engineer

For and on behalf of
DRENNAN MAUD (PTY) LTD
GEOTECHNICAL ENGINEERS AND ENGINEERING GEOLOGISTS
[Incorporating Drennan Maud and Partners (Est.1975) and GAP Consulting]



TEL: +27 (0)31 201 8992/3
FAX: +27 (0)31 201 7920
EMAIL: stacey@drennanmaud.com
WEB: www.drennanmaud.com

To view our disclaimer, please visit our website www.drennanmaud.com

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Phoenix 4068, Durban, South Africa
P.O. Box 40096, Redhill 4071, South Africa
Tel.: +27 (0)31 507 1051 Fax: +27 (0)31 507 5709
E-mail: info@franki.com www.franki.co.za
Reg. No.: 2011/140527/07
VAT No.: 4830264018

FRANKI AFRICA
A KELLER COMPANY

2 March, 2016 **Ref.: DSTE3586**

Drennan Maud

Attention: Stacey Boyce

Email: Stacey@drennanmaud.com

Dear Madam,

RE: PORT SHEPSTONE PSYCHE WARD

We thank you for the invitation to provide a quote for the above mentioned contract and have pleasure in submitting our quotations in the sum of:

	R 45,150.00
VAT @ 14%	**R 6,321.00**
TOTAL	**R 51,471.00**

Attached please find the following documents:

1. General conditions of quotation
2. Bill of Quantities

We trust we have understood your requirements correctly and look forward to receiving your further instructions.

Kind regards

Gavin Lombaard
CONTRACTS MANAGER

Byron Field
CONTRACTS MANAGER

FRANKI AFRICA is a division of Franki Geotechnical (Pty) Ltd.

Divisional Directors:
R McLintock (Managing), E Braithwaite, G Boyd, D de Sousa Neto, R Louw, W Neuwenhuis, I Stephen, M Taitz
Directors:
R McLintock, E Falk*, B Bulo, C Jiyane
**Austrian*

QUALITY IS OUR FOUNDATION

ISO 9001
ISO 14001
OHSAS 18001

GEOTECHNICAL INVESTIGATION

1. Provisions by others

Our price is based on the following being supplied by the Client or Main Contractor at no charge to ourselves:

(a) Suitable access and hard standing and working platforms for transport and equipment.

(b) Unrestricted continuity of work with one establishment only.

(c) Proving and relocating of services before our works commences.

(d) Setting out of positions.

(e) Site security.

(f) Ablution facilities for our staff.

(g) Suitable water on site for the duration of our works.

(h) All liaisons with applicable authorities.

(i) We expect to complete the works in 3 (three) days,

(j) We have the equipment available and need a lead time of 2 (two) days to establish

2. Points of clarification

(a) Should delays be incurred due to any of the factors above, then we will be entitled to claim for costs and losses. Our standing time rate is per hour is stated in the BOQ.

(b) Drilling will be measured and paid from platform level.

(c) All work is remeasurable on completion.

(d) If during the execution of the works we encounter adverse physical conditions or artificial obstructions which were not reasonably foreseeable by us when we submitted our tender, we shall be entitled to payment of all our reasonable costs, expenses and losses incurred by us in dealing with such conditions or obstructions.

(e) Our price is nett, with payment due in full with no retention within 30 (thirty) days of submission of our measurement certificate.

(f) Our bid is valid for 30 (thirty) days from the date of this quotation.

(g) We reserve the right to request an acceptable payment guarantee from yourselves.

(h) We have made no allowance in our price for insurances, excesses, sureties or penalties.

(i) Commencement of work on site and programme will be dependent on availability of plant, equipment and materials.

(j) Traffic accommodation and road closures, as may be required to be provided by others at no cost to ourselves.

(k) Acceptance of this quotation will indicate your compliance with the above conditions.

3586

B.O.Q

1	**Bore Hole Drilling**	**Unit**	**Quantity**	**Rates**	**Amount (ex VAT)**
1.1	Establishment and De-establishment	Sum	1	R 5,775.00	R 5,775.00
1.2	DPSH Daily Rate with Field Report (includes 1.5 m excavation for services)	No	3	R 13,125.00	R 39,375.00
1.4	Standing Time	Hr	1	R 577.50	Rate Only

Sub Total	**R 45,150.00**
Vat at 14%	**R 6,321.00**
Total	**R 51,471.00**

FRANKI

PENETROMETER REPORT

CLIENT DRENNAN MAUD PTY
PROJECT PSYCHIATIC WARD
SITE PORTSHEPSTONE HOSPITAL

ENGINEER
Test Hole No 1
DATE 23-03-2016

DEPTH m	HOLE NUMBER BH-1	BH-1				DEPTH m	HOLE NUMBER				
0.3	0	0				13.2					
0.6	1	2				13.5					
0.9	3	6				13.8					
1.2	1	2				14.1					
1.5	2	2				14.4					
1.8	6	3				14.7					
2.1	4	4				15.0					
2.4	9	8				15.3					
2.7	10	12				15.6					
3.0	11	16				15.9					
3.3	13	7				16.2					
3.6	10	13				16.5					
3.9	17	22				16.8					
4.2	14	23				17.1					
4.5	55	24				17.4					
4.8	100	33				17.7					
5.1	115	84				18.0					
5.4	130	89				18.3					
5.7	180	135				18.6					
6.0	300	141				18.9					
6.3	REFUSE	200				19.2					
6.6	10Cm	REFUSE				19.5					
6.9		20Cm				19.8					
7.2						20.1					
7.5						20.4					
7.8						20.7					
8.1						21.0					
8.4						21.3					
8.7						21.6					
9.0						21.9					
9.3						22.2					
9.6						22.5					
9.9						22.8					
10.2						23.1					
10.5						23.4					
10.8						23.7					
11.1						24.0					
11.4											
11.7											
12.0											
12.3											
12.6											
12.9											

REMARKS

INE SARTED 08:45 TO 09:40 AND MOVED ARENOTHE SIDE AND PUT 1:50 OGER AND ~~SARTED~~ MOVED 1.00KM AND STARTED AT 10:40 TO 11:45

RE-DRIVE ALL CPTs						
0.3	1	0				
0.6	2	1				

Operator

FRANKI

PENETROMETER REPORT

CLIENT DRENNAN MAUD PTY
PROJECT PSYCHIATRIC WARD
SITE PORT SHEPSTONE HOSPITAL

ENGINEER
Test Hole No 2
DATE 16-03-2016

DEPTH	HOLE NUMBER					DEPTH	HOLE NUMBER				
m	BH-2					m	BH-2				
0.3	0					13.2	74				
0.6	1					13.5	45				
0.9	2					13.8	49				
1.2	3					14.1	57				
1.5	3					14.4	45				
1.8	9					14.7	40				
2.1	13					15.0	39				
2.4	25					15.3	47				
2.7	40					15.6	59				
3.0	35					15.9	85				
3.3	32					16.2	80				
3.6	35					16.5	82				
3.9	52					16.8	85				
4.2	56					17.1	95				
4.5	54					17.4	77				
4.8	55					17.7	65				
5.1	110					18.0	90				
5.4	63					18.3	81				
5.7	60					18.6	65				
6.0	64					18.9	85				
6.3	75					19.2	110				
6.6	65					19.5	124				
6.9	64					19.8	70				
7.2	72					20.1	60				
7.5	74					20.4	55				
7.8	124					20.7	90				
8.1	66					21.0	112				
8.4	62					21.3	100				
8.7	56					21.6	90				
9.0	55					21.9	64				
9.3	56					22.2	104				
9.6	57					22.5	182				
9.9	54					22.8	190				
10.2	61					23.1	198				
10.5	48					23.4	200				
10.8	65					23.7					
11.1	110					24.0					
11.4	82										
11.7	95										
12.0	65										
12.3	100										
12.6	125										
12.9	140										

RE-DRIVE ALL CPTs						
0.3	1					
0.6	1					

REMARKS

STARTING at 11:00 HAGRY RAIN at 14:30 WE STOP
DATE - 17-03-2016
FROM 16,50m to 23.4 Pull out Rods cuts the trees and open the Road to the next position and open Platform FOR BH-3 and Setup

Operator

FRANKI

PENETROMETER REPORT

CLIENT DRENNAN MAUD PTY
PROJECT PSYCHIATRIC WARD
SITE PORTSHEPSTONE HOSPITAL

ENGINEER
Test Hole No 3
DATE 18-03-2016

DEPTH m	FRN 6212 HOLE NUMBER BH-3					DEPTH m	HOLE NUMBER				
0.3	1					13.2	81				
0.6	2					13.5	75				
0.9	3					13.8	76				
1.2	3					14.1	80				
1.5	7					14.4	75				
1.8	13					14.7	85				
2.1	17					15.0	76				
2.4	12					15.3	96				
2.7	13					15.6	97				
3.0	23					15.9	94				
3.3	25					16.2	95				
3.6	37					16.5	80				
3.9	47					16.8	85				
4.2	57					17.1	87				
4.5	42					17.4	90				
4.8	65					17.7	95				
5.1	55					18.0	96				
5.4	60					18.3	98				
5.7	40					18.6	99				
6.0	35					18.9	100				
6.3	34					19.2	90				
6.6	35					19.5	105				
6.9	33					19.8	110				
7.2	50					20.1	100				
7.5	60					20.4	102				
7.8	69					20.7	125				
8.1	75					21.0	189				
8.4	80					21.3	145				
8.7	70					21.6	160				
9.0	90					21.9	189				
9.3	94					22.2	200	REFUSER		FOR 10 Cm	
9.6	80					22.5					
9.9	70					22.8					
10.2	95					23.1					
10.5	60					23.4					
10.8	68					23.7					
11.1	77					24.0					
11.4	80										
11.7	65										
12.0	70										
12.3	80										
12.6	90										
12.9	74										

RE-DRIVE ALL CPTs

0.3	1					
0.6	2					

REMARKS

INF STARTING AT 08:1400
TO 12:00H

Operator