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REPORT ON GEOTECHNICAL INVESTIGATION FOR EXPANSION OF THE HOUT BAY CEMETERY

JUNE 2025

K&T PROJECT REFERENCE: 17017GG

REVISION 0

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Reviewed By	Leroi Celliers

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This report has been prepared by Kantey & Templer (Pty) Ltd, with all reasonable skill, care and diligence within the terms of the Contract with the client, incorporating our General Terms and Conditions of Business and taking account of the resources devoted to it by agreement with the client.

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This report is confidential to the client and we accept no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report at their own risk.

For and on behalf of Kantey & Templer (Pty) Ltd

For and on behalf of

Kantey & Templer (Pty) Ltd

Approved by: L Celliers

Signed: 

Position: Executive Associate

Date: 27/06/2025

REPORT ON GEOTECHNICAL INVESTIGATION FOR EXPANSION OF THE HOUT BAY CEMETERY

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REPORT ON GEOTECHNICAL INVESTIGATION FOR EXPANSION OF THE HOUT BAY CEMETERY

1. TERMS OF REFERENCE

In terms of written instructions Kantey & Templer was instructed by Mrs Angela Botha of Zutari Consulting Engineers on behalf of the client, the City of Cape Town, to investigate and report on subsoil conditions at the site of the proposed extensions of Hout Bay Cemetery.

In particular we were required to investigate and advise on the following:

- Subsoil Profile
- Groundwater Conditions
- Founding Conditions and Solutions
- Excavation Conditions
- Materials Utilisation Potential

2. INFORMATION RECEIVED

The following information was available at the time of our investigation:

- Construction drawings related to the previous development of the site obtained from the City of Cape Town provided by Zutari, namely:
    - 1845-B-006 AB0 Civil Services
    - 1845-B-007 C2 Dwelling Setting Out Layout_
    - 1845-B-006 C5 Triangle Proposed Civil Services
- Wayleave drawings obtained from the City of Cape Town provided by Zutari, namely:
    - ENERGY S WL 37 03 25 ZUTARI HOUT BAY CEMETERY HOUT BAY_appID9336
    - WL37-03-25 IS T Infrastructure_appID9336
    - WL-37-03-25 WATER LAYOUT_appID9336

- 1:250 000 Geological Survey Series Map (Number 3318 Cape Town).
- 1:50 000 Council for Geoscience geological map, namely 3418AB Cape Peninsula.
- Published explanation booklet “The Geology of Cape Town” by J.N. Theron accompanying the 1:50 000 geological map.
- Google Earth Imagery of the site.

3. SCOPE OF INVESTIGATIONS

3.1 Field Investigation

Following a walkover inspection of the site, five (5) machine dug trial holes (TLB) were put down to 2.50m to 2,60m depth at selected positions over the proposed development area.

Subsoil conditions were assessed by detailed visual examination of the in-situ materials exposed in the trial holes. Disturbed soil samples were extracted from selected horizons for further laboratory analysis and assessment of the material properties.

Where possible, Dynamic Cone Penetrometer tests (DCP) were carried out, in close proximity to the trial holes. In this test a cone tipped steel rod is driven into the ground by means of a standardised falling weight, the penetration per blow providing a useful indication of in-situ density.

The trial hole and DCP test positions are indicated on the attached layout drawing (no. 17017GG-01) whilst the trial hole profiles and DCP test results are given in the Appendices.

3.2 Laboratory Investigation

The disturbed soil samples extracted from trial holes 1 to 5 were subjected to Indicator and CBR tests to establish the soil constants and utilisation potential.

The laboratory test results are given in the Appendices.

4. SITE DESCRIPTION

The site is located immediately southeast of the existing cemetery and approximately 350m southeast of the Houtbaai River. The site is bordered by residential erven towards the southeast and informal settlements towards the south.

Topographically the site comprises level terraces constructed in the steeply sloping terrain. These terraces were originally constructed for housing with the servicing of the site already completed for this purpose.

The platforms increase in elevation from northwest to the southeast. Along the northwestern boundary a block retaining wall has been constructed for the retaining of the platform soils, whilst a cut slope occurs along the southeastern boundary.

A gravel wearing coarse has been placed over the bulk of the area with precast concrete ablution facilities positioned at scattered locations over the site.

Uncontrolled dumping has also been observed during our field investigation but is mainly limited to the northeastern portion (TH1) of the site.

5. ANALYSIS OF RESULTS

5.1 Geology and Subsoil Profile

Based on published geological data and the results of previous geotechnical investigations carried out by Kantey & Templer in Hout Bay, the site is known to be situated in terrain composed of and underlain by granites of the Cape Granite Suite.

The above was confirmed during the field investigation with granite intersected in all the trial holes with the exception of TH 1 & 3, occurring from as shallow as 0,20m in TH 2 to a maximum depth of 2,25m at TH 5. The granite comprises stiff to very stiff residual fissured variably clayey and sandy silt with scattered rootlets and locally containing feldspar and quartz grit. The upper zone residual granite has generally been reworked and tended to be more sandy.

Overlying the residual granite and encountered from 0,25 to 2,50m depth is naturally transported soils; these transported soils consist of medium dense to dense slightly silty to silty fine to coarse sand to grit with occasional sandstone cobbles. No

transported soils were encountered over the area of TH 2 and TH 5, this most likely due to the earthworks operations undertaken at the site previously.

Mantling the site to depth of up to 2,50m and placed/generated during the terracing of the site, the fill initially comprises a fine to coarse crushed gravel wearing coarse which is underlain by a variable mixture of very stiff gritty, sandy silt, medium dense fine to coarse grained sand and clayey sand/silt containing builders rubble (concrete kerbs, tree stumps etc.) locally.

No hard rock was encountered in any of the trial holes.

5.2 Groundwater Conditions

Groundwater was not encountered in any of the trial holes with soil moisture conditions ranging from slightly moist to moist.

Given that our field investigation was undertaken in May before the onset of winter rains, the groundwater levels recorded are not representative of soil moisture levels throughout the year.

During periods of sustained rainfall, it is expected that a temporary perched water table will develop at the interface of the impermeable residual soils and transported/fill materials. Given the sloping topography of the area, rapid flow of groundwater can be anticipated through the upper site soils and can where not controlled lead to the flooding of excavations.

Given the above and having regard for the site geology and the fact that site has been terraced, we are accordingly of the opinion that the site is at risk of becoming waterlogged during the latter part of the rainy season and during periods of intense rainfall.

It is therefore recommended that a suitably engineered drainage system be constructed at the site to allow for the collection and removal of not only surface water but also subterranean water.

5.3 Permeability of Subsoils

Disturbed soil samples were extracted for grading tests to determine the permeability of the various site soils using Hazen's theoretical permeability formula. The following results were obtained from these tests.

FILL

Trial Hole	Depth (metres)	Coefficient of Permeability k (metres/s)
TH 3	0,40 – 2,60	$1{,}00 \times 10^{-8}$
TH 5	0,60 – 1,40	$1{,}00 \times 10^{-8}$

TRANSPORTED SOILS

Trial Hole	Depth (metres)	Coefficient of Permeability k (metres/s)
TH 1	1,40 – 2,60	$3{,}60 \times 10^{-5}$

RESIDUAL SOILS

Trial Hole	Depth (metres)	Coefficient of Permeability k (metres/s)
TH 2	0.20 – 2,50	8.10×10^{-5}
TH 4	0,60 – 2,50	$5{,}76 \times 10^{-8}$

From the results obtained, the drainage of the transported materials can be regarded as marginal whilst the fill and residual soils would be of poor drainage characteristics.

5.4 Materials Utilisation Potential

The fill, transported and residual soils were sampled and subjected to:

- Indicator Testing specifically to establish the fines content (silt and clay) and expansiveness potentials and,
- CBR Testing for the assessment of the utilisation potential of the soils likely to be utilised as fill or selected subgrade.

The CBR and Indicator tests results are given in the tables below:

Table 1: CBR Test Results

Position	Depth (m)	Origin	MDD	OMC	% Swell	PI	LL	LS%	CBR Compaction					TRH14 Class.
									100%	98%	95%	93%	90%	
TH1	1.40-2.60	Transported	1969	12.3	0	NP	NP	0	24	21	16	13	10	G8
TH3	0.40-2.50	Fill	1957	10.2	2.43	13	30.7	5.6	6	4	3	2	1	NC
TH4	0.60-2.50	Residual	1761	16.5	2.1	15.9	44.9	7.4	3	2	1	1	1	NC
TH5	0.60-1.40	Fill	1849	14.5	6.46	13.2	36.8	6.6	7	5	3	3	2	NC

Table 2: Foundation Indicator Test Results

Position	Depth (m)	Origin	Gravel	Sand	Silt	Clay	LL	PI	LS	Potential Exp.	USCS
TH1	1.40-2.60	Transported	1	88	6	5	NP	NP	0	low	SW-SM
TH2	0.20-2.50	Residual	0	49	27	23	38.8	15	7.3	low	CL
TH3	0.40-2.50	Fill	5	62	18	15	30.7	13	6.5	low	SC
TH4	0.60-2.50	Residual	0	51	35	14	44.9	15.9	7.4	low	SM
TH5	0.60-1.40	Fill	1	63	17	19	36.8	13.2	6.6	low	SC

Based on the laboratory results (Tables 1 and 2), our observations on site and past experience with similar soils, the following assessments can be made with regard to the utilisation potential of the various site soils:

Fill: Given that the fill is variable in composition, generally containing high volumes soil fines (33-36%), as well as poor CBR values recorded during the laboratory testing. It is recommended that the fill not be used as structural fill or roadbed material.

Transported Soils: The naturally transported soils can be used as structural fill and lower selected subgrade, once reworked, selected and compacted to 95% of the MDD.

Residual Soils: Due to a high fines (clay and silt) content, these soils are considered highly moisture sensitive. Compaction to any meaningful density will accordingly be very difficult, particularly where undertaken in wet weather conditions. It is recommended that these soils, where excavated, be used for landscaping purposes only or be carted off site.

5.5 Excavation Conditions

Given the largely unconsolidated nature of the site soils, no significant problems should be experienced in excavating the material to depths of up to 2,5m below existing ground level using conventional light earthmoving equipment. However, given the local presence of builders rubble containing oversized material such as concrete objects, tree stumps and cobbles, hand excavation is likely to prove extremely problematic within the fill.

On account of potential slumping of the excavation sidewalls due to the non cohesive nature of the upper site soils (fill and transported material), all excavations will require either shoring or side slope battering (1h to 1v) to ensure safe working conditions, in particular when undertaken during the rainy season.

5.6 Founding Conditions

Whilst the investigation was undertaken for the assessment of the subsoil conditions applicable to establishment of a cemetery, we have also assessed founding conditions which may be of relevance should the development also include light structures. Based on the results of the DCP tests as well as visual assessment within the trial holes, the following allowable bearing capacities can be used for preliminary design of spread footings:

Material		**Allowable bearing capacity**
Fill	-	40kPa*
Transported Material	-	100kPa
Residual Soils	-	150kPa

Excessive settlements can be expected locally within this horizon.

The above bearing capacities should be considered as preliminary and must be confirmed by both in-situ testing and visual assessment.

5.7 Subgrade Conditions for Roads

The in-situ subgrade conditions for roads were assessed using the penetration rates recorded during DCP testing.

The DCP tests undertaken within the residual soils recorded penetration rates of 10 to 25mm per blow. Using a penetration rate of 25/mm per blow and the fact that these soils classify as a lean clay (CL) material as determined by the Unified Classification System, an in-situ CBR of at least 5 can be anticipated where these soils are freshly exposed at subgrade level.

It should however be noted that where box cuts for roads/parking areas are taken into the residual soils, it must be accepted that these will degrade into an unworked mud where freshly exposed under wet weather conditions. Furthermore, due to its high clay content, once disturbed, reworking and compaction could prove to be extremely problematic. Final trimming should therefore be undertaken in a well-controlled manner preferably working from one end using plant fitted with sand buckets (no tines) and allowing for removal/carting away of the excavated soils without trafficking of the exposed surfaces. Placement of imported selected granular material (selected subgrade) should be undertaken by way of end-tipping such that the exposed clayey surfaces are not subjected to traffic.

Although penetration rates of up to 30mm blow were recorded within the fill, this material, given its more favourable classification (SC), will offer an in-situ CBR of 9. It must however be noted that the fill contains deleterious material which can decompose with time and affect subgrade/pavement stability. These materials where encountered within the box cuts must be removed and replaced by selected material.

Given the contrasting strength of the materials to be exposed at subgrade level, it is recommended that a conservative allowance for layerworks be made at this stage, allowing for pavement design layerworks to be placed on the residual soils. Once the contactor has established on site, the parking area can be excavated to the design levels. This would allow for inspection and assessment of the cut surfaces. During this inspection, the nature of the soils and in-situ treatment of the subgrade can be confirmed. Alternatively, additional inspection pits can be formed to provide additional data points for assessment of the in-situ soils at subgrade level.

Accordingly, it is recommended that the layerworks be designed for an in-situ subgrade with a CBR value of 5. Imported layerworks would then be required for the selected subgrade, sub-base and base layers, all of which would have to be sourced commercially.

The surfacing solution finally adopted will be subject to a detailed cost/benefit analysis which is based on operational requirements and costs obtained from Civil Engineering Contractors experienced in the construction of roadways surfaced in asphalt, concrete and block paving.

5.8 Evaluation of Potential Cemetery Sites

The geotechnical investigation employed the method of evaluation of cemetery sites proposed by Hall et.al (1990). This method evaluates the following criteria and applies a weighted factor to each:

The six individual ratings are summed to give a single rating that can be used to evaluate the development potential of the site for use as a cemetery. The final rating indicates the physical suitability of the site as shown below:

5.8.1 *Soil Excavatibility*

Soil excavatibility refers to the ease of grave excavation without mechanical aid to a minimum depth of 1.8m. The soil conditions are evaluated and rated as shown below:

Easy spade excavation	15
Pick and spade	10
Machine	5
Blasting	0

5.8.2 *Grave Stability*

This criterion evaluates the potential instability of the open grave, during excavation and prior to burial. It is obviously highly undesirable to have unstable excavations that may be susceptible to collapse or overbreak, and the criteria are rated as follows:

Stable	20
Overbreak	15
Slightly unstable	8
Unstable	F*

An F* rating is considered as a Fatal Flaw and the site should be rejected.

5.8.3 *Soil Workability*

Soil workability refers to the ease with which the soil can be manipulated in and out of the grave. Stiff clay for example can be difficult to excavate and especially difficult to recompact, and could therefore be considered to be not suitable.

Excellent/Good	10
Fair	5
Poor	2
Very poor	0

5.8.4 *Water Table Depth*

This refers to the depth from the base (1,8m) of the grave to the water table, which is also known as the buffer zone. This effectively creates a barrier between the potential source of pollutants and their water table. The various criteria are rated as follows:

Deep water table	depth >8m	25
Intermediate	depth 4-8m	15
Possible perched	depth 0-4m	5
Waterlogged	depth 0-4m	F

5.8.5 *Subsoil Permeability*

The subsoil permeability is a measure of the rate of fluid movement through the soil. Typically this should be neither too high or too low, as the extreme situations would either threaten groundwater resources and a low permeability would impede the dispersion of pathogens from the grave.

Impermeable	not measurable	15
Relatively impermeable	10-15mm/hr	20
Relatively permeable	15-50mm/hr	10
Permeable	50-1000mm/hr	0

5.8.6 *Drainage and Infiltration*

These criteria evaluate the potential for infiltration into the grave through the backfill, and the permeability of the soil is assessed. Gravelly coarse grained soils will more readily permit the migration of water through the grave than will a fine grained clayey

sand, and this criteria is used to determine the suitability of the site of the development of a cemetery.

Impermeable	5
Relatively impermeable	10
Relatively permeable	7
Very permeable	0

The sum of the individual ratings is used to consider the suitability of the site as follows:

>90	Site considered very good
75-90	Site considered satisfactory
60-75	Site is considered to be poor and precautions are required
<60	Site is unacceptable
F	Site has Fatal Flaws

5.8.7 *Evaluation of Site*

EVALUATION OF PARYS CEMETERY SITE		
CRITERIA	**SITE ASSESSMENT**	**RATING**
Excavation conditions to 1,8m	Pick and Spade	10
Stability	Overbreak	15
Workability	Poor	2
Water table depth	Intermediate*	15
Subsoil permeability	Relatively Impermeable	20
Drainage and infiltration	Relatively Permeable	7
Site Rating >90 Very good 75-90 Satisfactory 60-75 Poor <60 Unacceptable		69

***Where surface cut off trenches are constructed.**

6. CONCLUSIONS

- The site is mantled by fill and transported material of variable consistency which is in turn underlain by competent residual soils.

- Groundwater was not intersected in any of the trial holes. A perched water table can however develop during periods of extended rainfall.

- Only the transported material can be used for structural fill or subgrade once selected / reworked / compacted to a density of at least 95% MDD.

- Conventional earthmoving equipment would be suitable for excavation purposes down to at least 2,5m BGL. Hand excavation could be troublesome when excavating the fill.

- Shoring or sideslope battering will be required for all deep excavations.

- Subgrade conditions will have to be improved by selection / reworking / compaction of the in-situ soils down to at least 0.5m below of subgrade.

- Whilst the existing graveyard located to the immediate northwest of the site has over a number of years been operated, apparently without major difficulties, the site of the proposed cemetery extension does, according to the Hall method of cemetery evaluation, classify as a 'poor' site. Development of the site may accordingly warrant more detailed assessment of site levels, terracing and drainage prior to finalising the cemetery expansion.

FOR KANTEY & TEMPLER

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CLIENT

ZUTARI IMPACT. ENGINEERED.

PROJECT

HOUT BAY CEMETERY EXPANSION

TITLE

PROPOSED TRIALHOLE LOCATION PLAN

Scale: 1:500

Drawing No. 17017GG-01

Rev.

Y:\DWG-G\17017GG Erf 1459, Hout Bay, Cape Town\Drawings\Working\17017GG Hout Bay Cemetary Trial Hole Location Plan-Civils.dwg 13/05/2025 03:15 Guido Postma

Appendix A
Trial Hole Profiles

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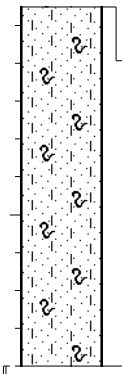
ZUTARI
HOUT BAY CEMETERY
EXTENSION

HOLE No: TH1
Sheet 1 of 1

JOB NUMBER: 17017GG

Scale
1:20



0.00	Brownish grey angular medium to coarse crushed GRAVEL medium densely packed in a matrix of slightly moist dark brown slightly silty sand with abundant organic material; FILL.
0.05	Dry to slightly moist light yellowish olive blotched orange stiff to very stiff slightly clayey SAND/SILT with scattered grit; FILL.
0.45	Slightly moist light brown occasionally blotched reddish orange and light yellowish olive medium dense to dense silty medium to coarse grained SAND with scattered grit, gravel, concrete curbs, rootlets, isolated plastic and tree stumps; FILL.
1.40	Slightly moist light reddish orange medium dense slightly silty fine to coarse grained SAND with occasional sandstone cobbles and weakly cemented sandy concretions; TRANSPORTED.
2.60	

1.40--2.60m

NOTES

1) Excavation sidewalls stable.
2) Water table not encountered.
3) DCP taken adjacent to trial hole.
4) Disturbed soil samples extracted from 1.40--2.60m depth.

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PROFILED BY : GP

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ELEVATION :
X-COORD :
Y-COORD :

HOLE No: TH1

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ZUTARI
HOUT BAY CEMETERY
EXTENSION

HOLE No: TH2
Sheet 1 of 1

JOB NUMBER: 17017GG

Scale 1:20

0.20--2.50m

0.00 Dark brown angular fine to coarse crushed GRAVEL medium densely packed in a matrix of dry reddish brown slightly silty sand; FILL.

0.20 Slightly moist to moist white occasionally blotched yellowish orange stiff to very stiff fissured slightly sandy clayey SILT with scattered feldspar grit and squashed rootlets in fissures; RESIDUAL GRANITE.

2.50

NOTES

1) Excavation sidewalls stable.
2) Water table not encountered.
3) DCPs taken adjacent to trial hole.
4) Disturbed soil sample extracted from 0.20--2.50m depth.

CONTRACTOR : Rubble Cycle
MACHINE : TLB
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PROFILED BY : GP
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ELEVATION :
X-COORD :
Y-COORD :

HOLE No: TH2

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ZUTARI
HOUT BAY CEMETERY
EXTENSION

HOLE No: TH3
Sheet 1 of 1

JOB NUMBER: 17017GG

Scale 1:20

0.00	Dark brown and grey angular fine to coarse crushed GRAVEL densely packed in a matrix of dry brown slightly silty sand with abundant rootlets; FILL.
0.20	Dark brown and grey angular fine to coarse crushed GRAVEL densely packed in a matrix of dry brownish olive slightly silty sand with abundant rootlets; FILL.
0.35	Dry light olive loose to medium dense fine grained SAND; FILL.
0.40	Slightly moist light brownish olive becoming brownish olive with depth occasionally mottled orange medium dense to dense clayey silty SAND with scattered grit and gravel with occasional sandstone cobbles, wood and rootlets; FILL.
0.40--2.50m	
2.50	Slightly moist light reddish orange medium dense slightly silty fine to coarse grained SAND with occasional sandstone cobbles and weakly cemented sandy concretions; TRANSPORTED.
2.60	

NOTES

1) Excavation sidewalls stable.
2) Water table not encountered.
3) DCPs taken adjacent to trial hole.
4) Disturbed soil samples extracted from 0.40--2.50m depth.

CONTRACTOR : Rubble Cycle
MACHINE : TLB
DRILLED BY :
PROFILED BY : GP

INCLINATION : Vertical
DIAM :
DATE :
DATE : 13-05-2025

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: TH3

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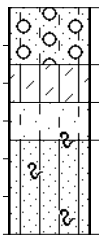
ZUTARI
HOUT BAY CEMETERY
EXTENSION

HOLE No: TH4
Sheet 1 of 1

JOB NUMBER: 17017GG

Scale 1:20



0.60--2.50m

0.00	Brownish grey angular medium to coarse crushed GRAVEL densely packed in a matrix of slightly moist dark brown slightly silty sand with abundant organic material; FILL.
0.15	Moist light olive speckled grey very stiff clayey SILT with abundant grit; FILL.
0.25	Slightly moist to moist reddish orange dense silty sandy GRIT with abundant felspar nodules and occasional roots and cobbles; TRANSPORTED.
0.35	Slightly moist reddish orange blotched olive very stiff fissured gritty SILT/SAND with abundant squashed rootlets in fissures and occasional decomposed roots; REWORKED RESIDUAL GRANITE. Fissures are stained reddish orange.
0.60	Slightly moist to moist white occasionally blotched yellowish orange very stiff fissured clayey SILT/SAND with scattered feldspar, quartz grit and squashed rootlets in fissures; RESIDUAL GRANITE.
2.50	

NOTES

1) Excavation sidewalls stable.
2) Water table not encountered.
3) DCPs taken adjacent to trial hole.
4) Disturbed soil samples extracted from 0.60--2.50m depth.

CONTRACTOR : Rubble Cycle
MACHINE : TLB
DRILLED BY :
PROFILED BY : GP

INCLINATION : Vertical
DIAM :
DATE :
DATE : 13-05-2025

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: TH4

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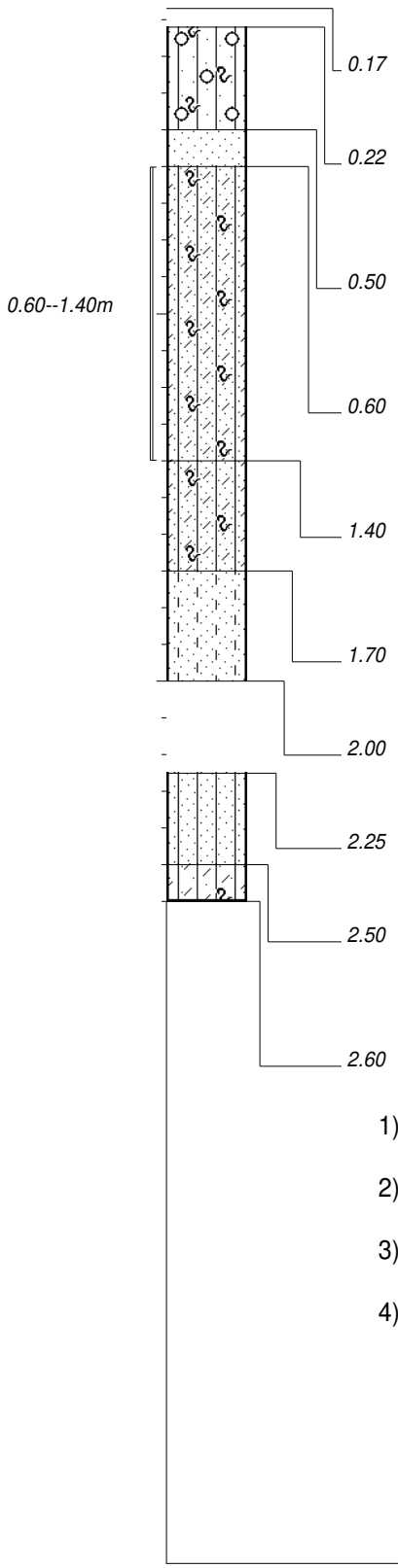
ZUTARI
HOUT BAY CEMETERY
EXTENSION

HOLE No: TH5
Sheet 1 of 1

JOB NUMBER: 17017GG

Scale 1:20



0.00	Dark brown and grey angular fine to coarse crushed GRAVEL medium densely packed in a matrix of dry brown slightly silty sand with occasional rootlets; FILL.
0.17	Black orange and red coarse ferruginous GRAVEL densely packed in a matrix of slightly moist reddish orange medium to coarse grained sand; FILL.
0.22	Slightly moist light olive occasionally mottled yellowish orange very stiff gritty sandy SILT with abundant grey crushed angular gravel and occasional rootlets; FILL.
0.50	Dry light olive medium dense fine grained SAND with occasional rootles; FILL. Horizon varies from 0.10m in thickness to 0.35m through trial hole.
0.60	Slightly moist light olive brown medium dense to dense silty fine to medium grained SAND with lumps of light olive and reddish orange clayey silt (residual granite) with occasional roots and plastic; FILL.
1.40	Slightly moist brown occasionally blotched reddish orange medium dense silty gritty SAND with abundant rootlets and occasional lumps of clayey silt (residual granite); FILL.
1.70	Slightly moist reddish orange streaked brownish grey medium dense silty SAND with occasional rootles; FILL.
2.00	Slightly moist brown medium dense slightly silty SAND with abundant angular crushed gravel; FILL.
2.25	Dry to slightly moist reddish orange stiff fissured gritty SILT/SAND with squashedrootlets; REWORKED RESIDUAL GRANITE.
2.50	Slightly moist to moist white occasionally blotched yellowish orange very stiff fissured slightly sandy clayey SILT with scattered feldspar, quartz grit and squashed rootlets; RESIDUAL GRANITE.
2.60	

NOTES

1) Excavation sidewalls stable.
2) Water table not encountered.
3) DCPs taken adjacent to trial hole.
4) Disturbed soil samples extracted from 0.60--1.40m depth.

CONTRACTOR : Rubble Cycle
MACHINE : TLB
DRILLED BY :
PROFILED BY : GP

INCLINATION : Vertical
DIAM :
DATE :
DATE : 13-05-2025

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: TH5

TYPE SET BY : GP
SETUP FILE : K&T-TR~1.SET

DATE : 03/06/2025 10:39
TEXT : ..CapeTown\TH\G1701705.txt

Appendix B
DCP Test Results

STEYN-WILSON LABORATORIES
CIVIL ENGINEERING TESTING LABORATORIES

sanas Testing Laboratory T0835

11 Gooderson Road Blackheath
PO Box 58 Blackheath 7581
Tel: 021 905 0435
Fax: 086 499 9482
Email: info@steynwilson.co.za
Web: www.steynwilson.co.za

JOB No:	SWL42270	Ref. No:	-	Date Tested:	14 May 2025

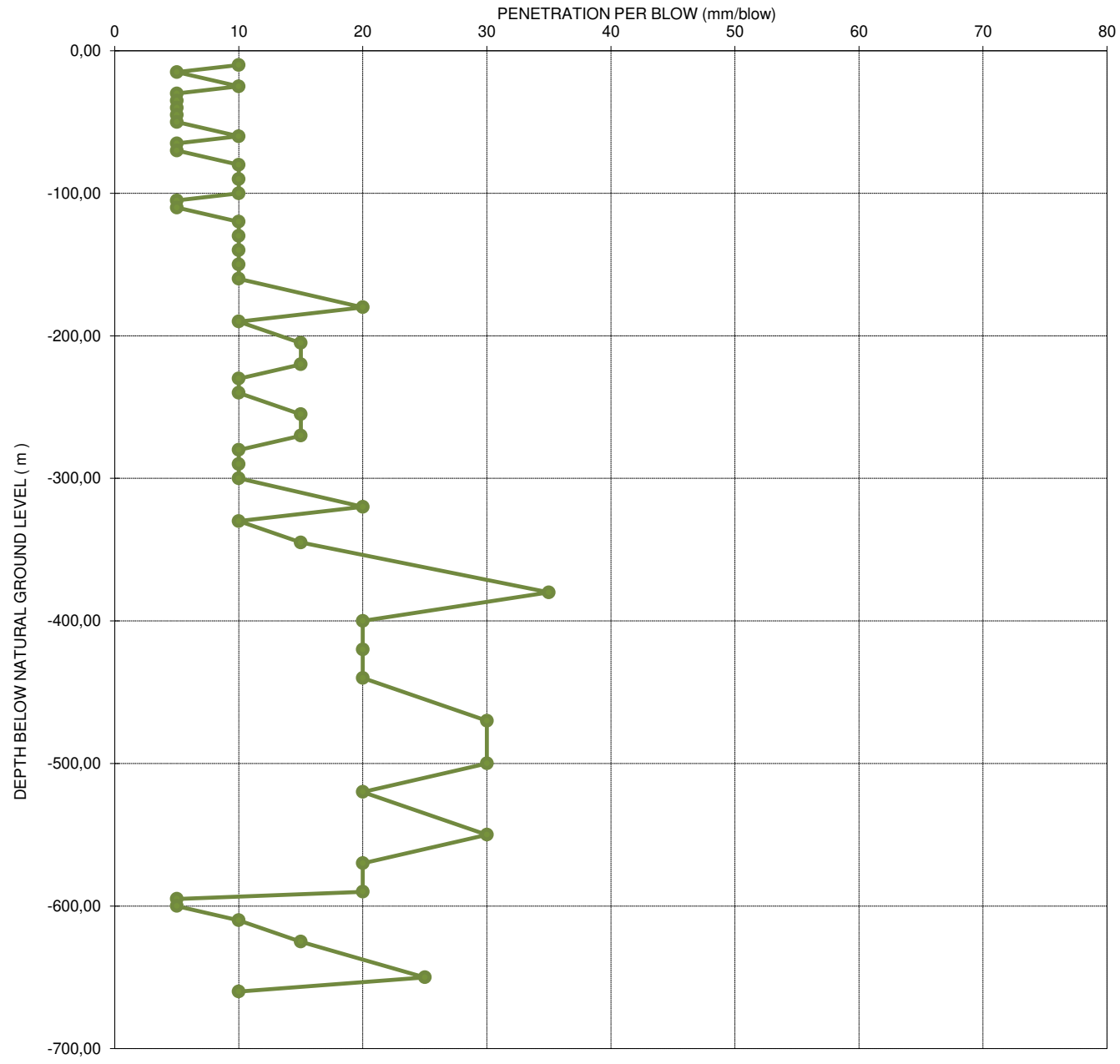
Client: Kantey & Templer (Pty) Ltd
P.O. Box 3132
Cape Town
8000
Attention: Guido Postma

KANTEY & Ttempler CONSULTING ENGINEERS Engineering African Development

DYNAMIC CONE PENETROMETER TMH6 ST6

Project:	17017GG - Hout Bay Cemetery	Level:	NGL
DCP No.:	TP1		N/A
Position:	TP1	Max. penetration depth:	0.660m
Test Depth:	2.0m	Refusal:	N/A
Instrument (DCP) Set No:	BT2 / 0008	Number of blows per test	1

PENETRATION GRAPH



NOTE: All tests marked with (*) means that those test methods are not accredited.

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CIVIL ENGINEERING TESTING LABORATORIES

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Web: www.steynwilson.co.za

JOB No:	SWL42270	Ref. No:	-	Date Tested:	14 May 2025

Client: Kantey & Templer (Pty) Ltd
P.O. Box 3132
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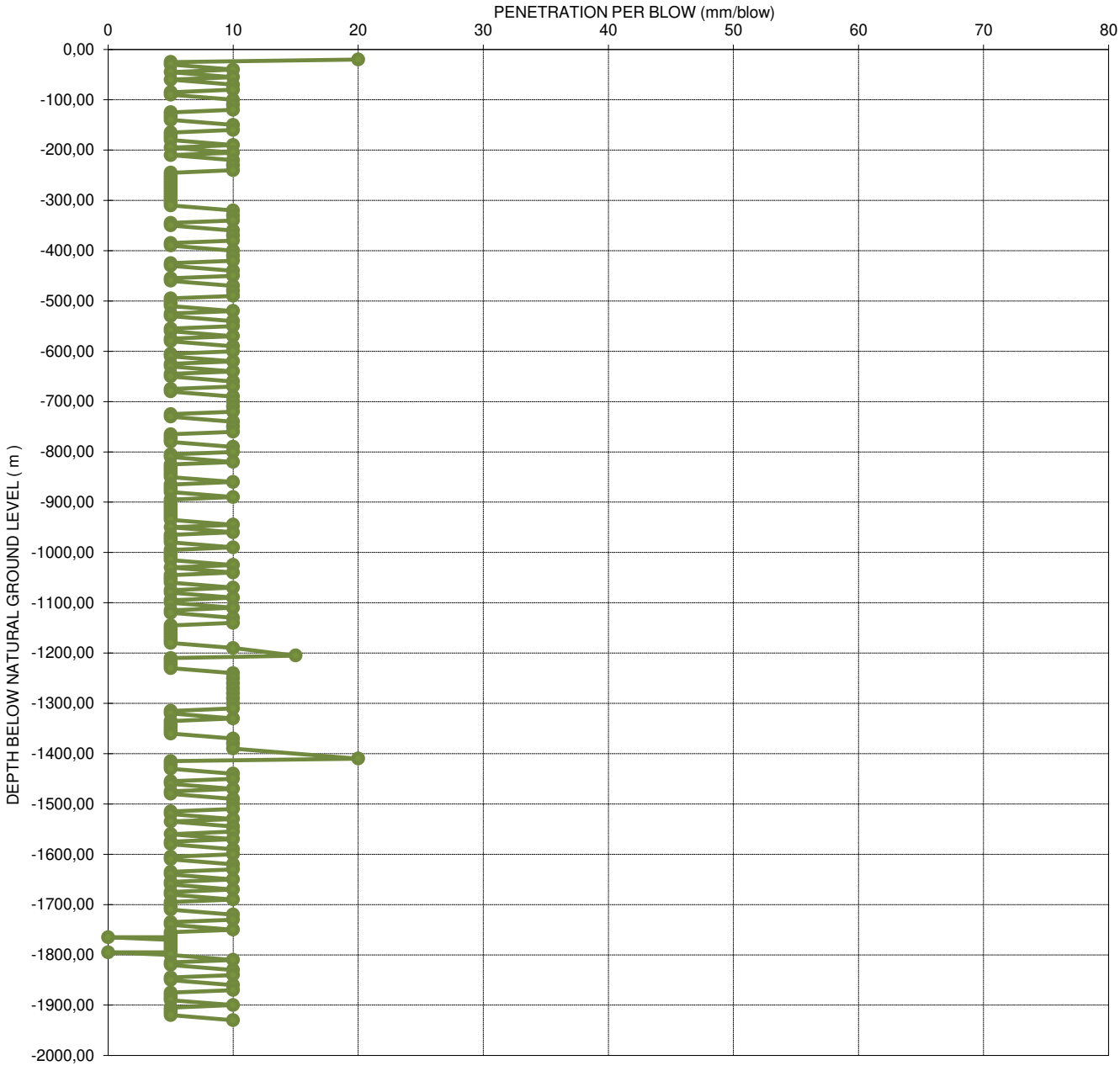
KANTEY & Ttempler CONSULTING ENGINEERS
Engineering African Development

DYNAMIC CONE PENETROMETER TMH6 ST6

Project:	17017GG - Hout Bay Cemetery	Level:	NGL
DCP No.:	TP2	Foundation:	N/A
Position:	TP2	Max. penetration depth:	1.930m
Test Depth:	2.0m	Refusal:	N/A
Instrument (DCP) Set No:	BT2 / 0008	Number of blows per test	1

PENETRATION GRAPH



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JOB No:	SWL42270	Ref. No:	-	Date Tested:	14 May 2025

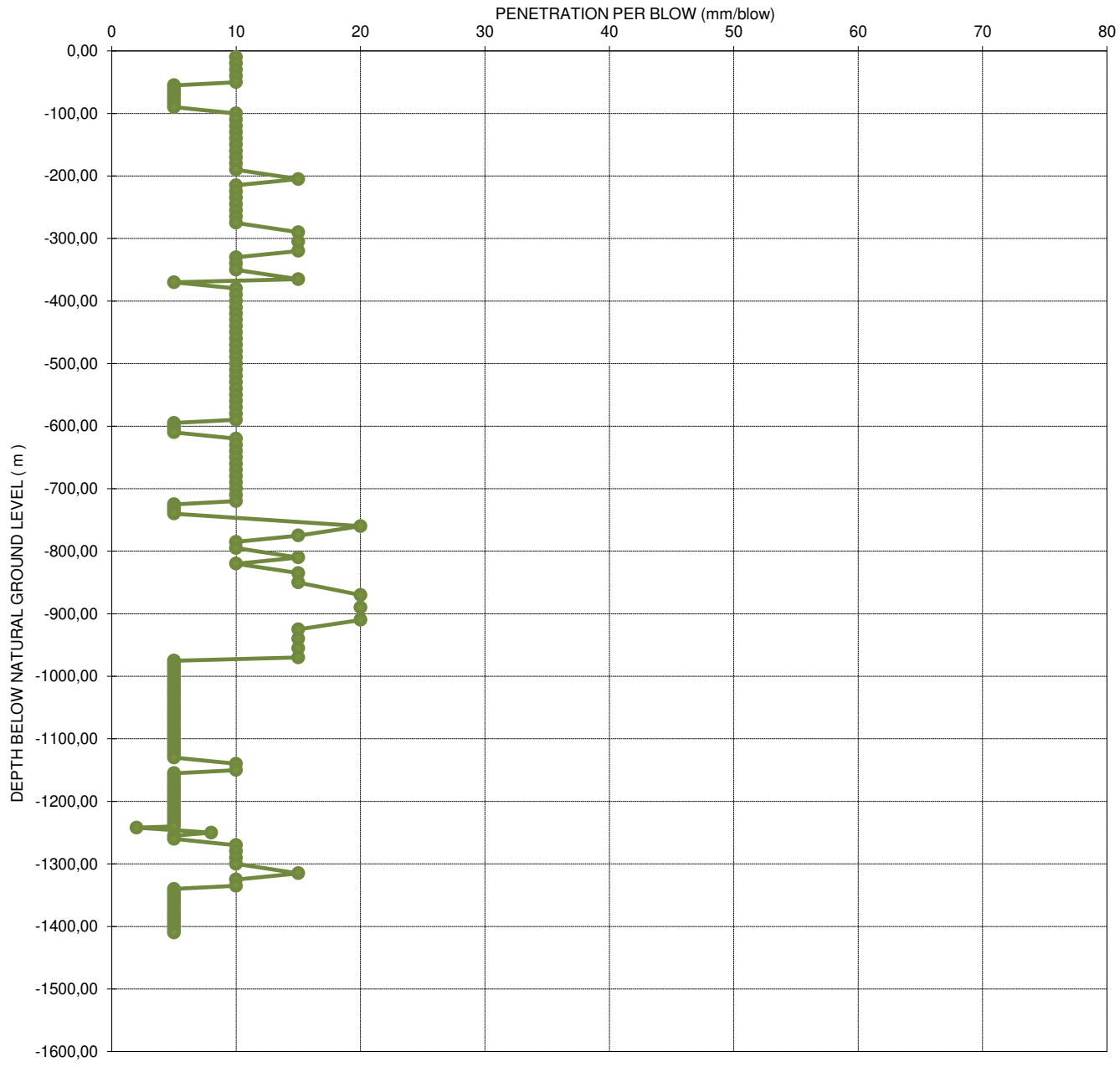
Client: Kantey & Templer (Pty) Ltd
P.O. Box 3132
Cape Town
8000
Attention: Guido Postma

KANTEY & Ttempler CONSULTING ENGINEERS Engineering African Development

DYNAMIC CONE PENETROMETER TMH6 ST6

Project:	17017GG - Hout Bay Cemetery	Level:	NGL
DCP No.:	TP3	Foundation:	N/A
Position:	TP3	Max. penetration depth:	1.410m
Test Depth:	2.0m	Refusal:	N/A
Instrument (DCP) Set No:	BT2 / 0008	Number of blows per test	1

PENETRATION GRAPH



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JOB No:	SWL42270	Ref. No:	-	Date Tested:	14 May 2025

Client: Kantey & Templer (Pty) Ltd
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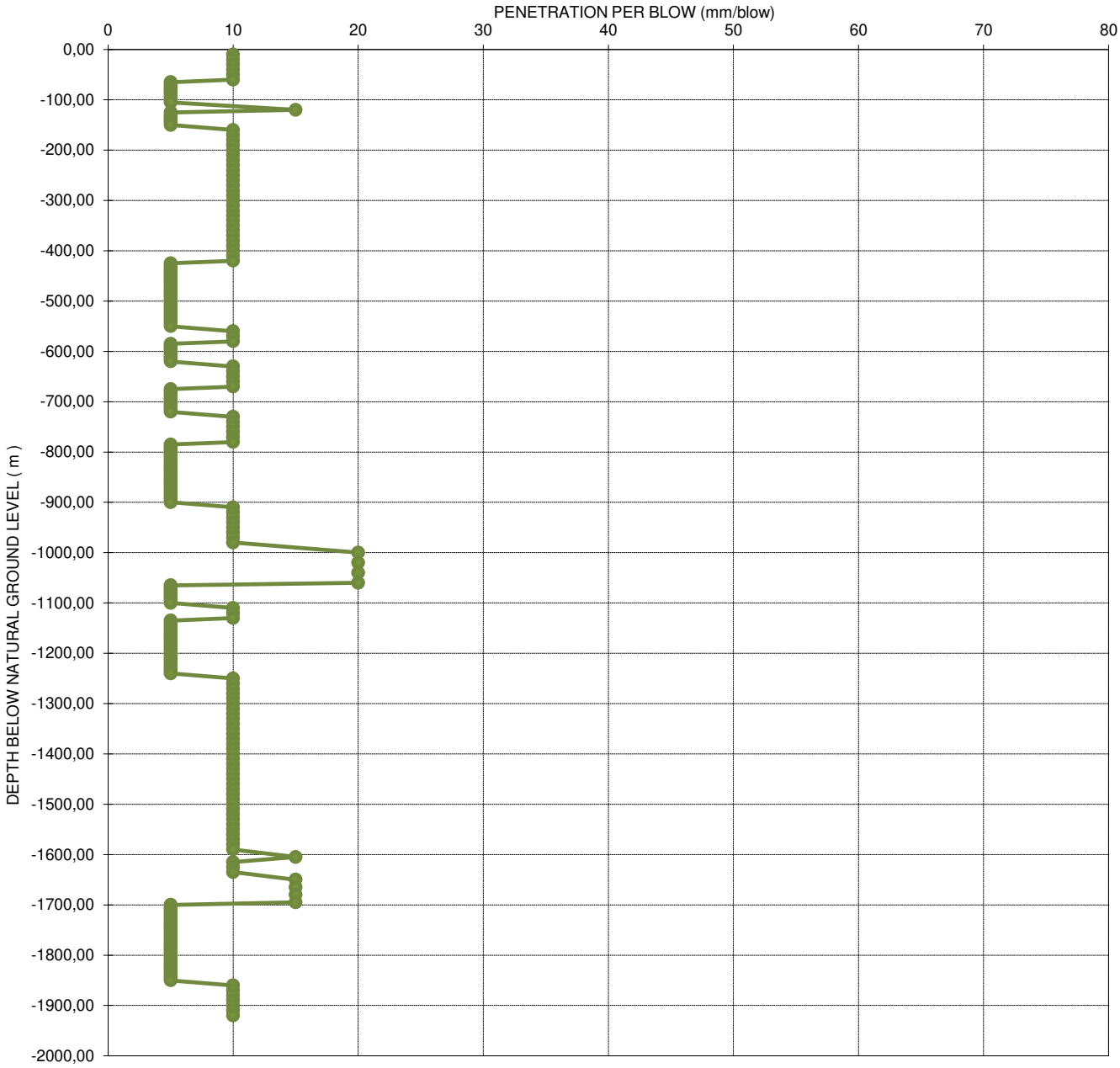
KANTEY & Ttempler CONSULTING ENGINEERS Engineering African Development

DYNAMIC CONE PENETROMETER TMH6 ST6

Project:	17017GG - Hout Bay Cemetery	Level:	NGL
DCP No.:	TP4	Foundation:	N/A
Position:	TP4	Max. penetration depth:	1.920m
Test Depth:	2.0m	Refusal:	N/A
Instrument (DCP) Set No:	BT2 / 0008	Number of blows per test	1

PENETRATION GRAPH



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JOB No:	SWL42270	Ref. No:	-	Date Tested:	14 May 2025

Client: Kantey & Templer (Pty) Ltd
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8000
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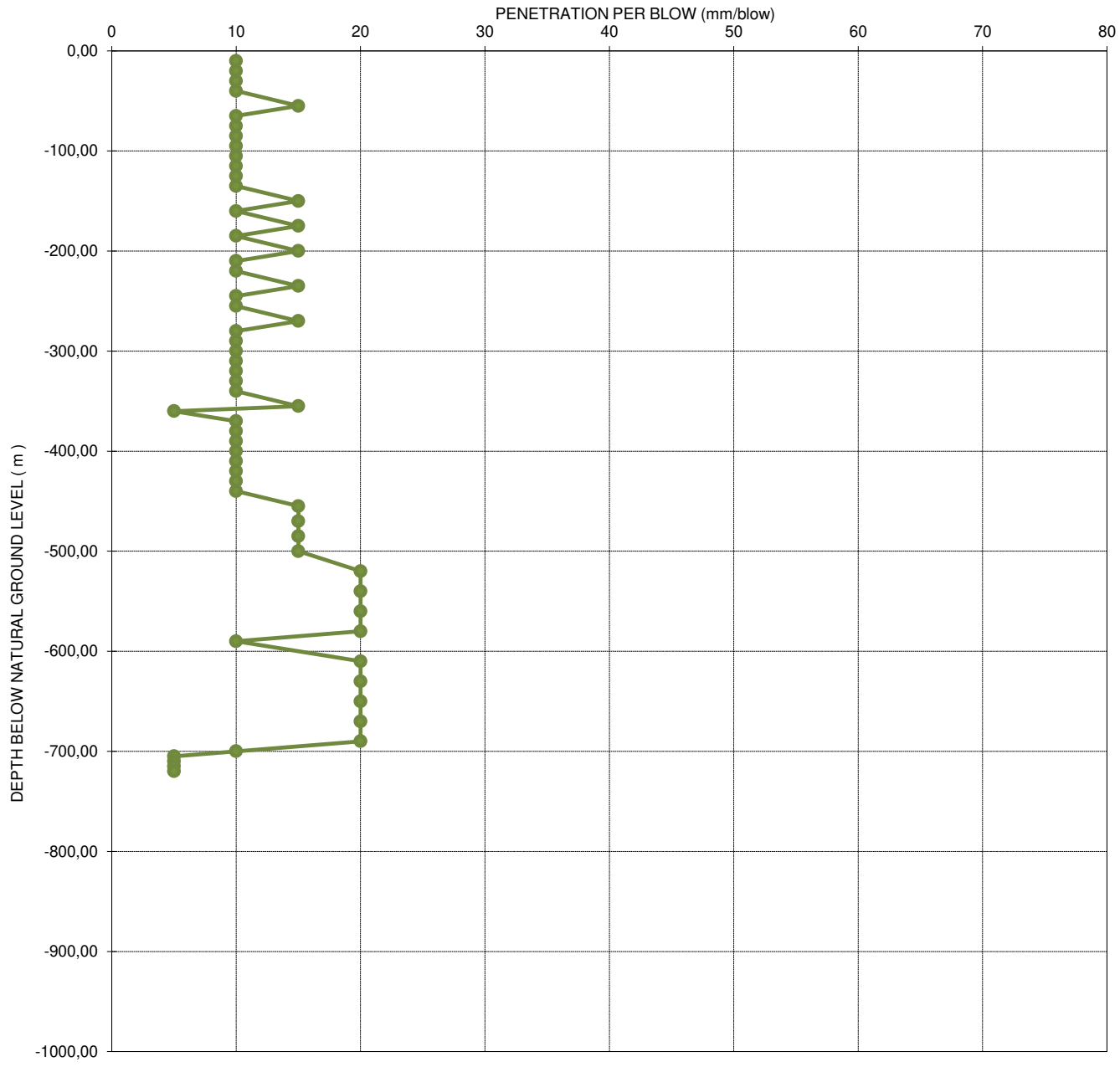
KANTEY & Ttempler CONSULTING ENGINEERS Engineering African Development

DYNAMIC CONE PENETROMETER TMH6 ST6

Project:	17017GG - Hout Bay Cemetery	Level:	NGL
DCP No.:	TP5	Foundation:	N/A
Position:	TP5	Max. penetration depth:	0.720m
Test Depth:	2.0m	Refusal:	N/A
Instrument (DCP) Set No:	BT2 / 0008	Number of blows per test	1

PENETRATION GRAPH



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Appendix C
Laboratory Test Results

STEYN-WILSON LABORATORIES
CIVIL ENGINEERING TESTING LABORATORIES

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Email: info@steynwilson.co.za
Web: www.steynwilson.co.za

Customer :	**Kantey & Templer (Pty) Ltd**	Project :	Houtbay Cemetery
	P.O. Box 3132	Date Received :	14 May 2025
	Cape Town	Date Reported :	30 May 2025
	8000	Req. Number :	-
Attention :	Guido Postma		

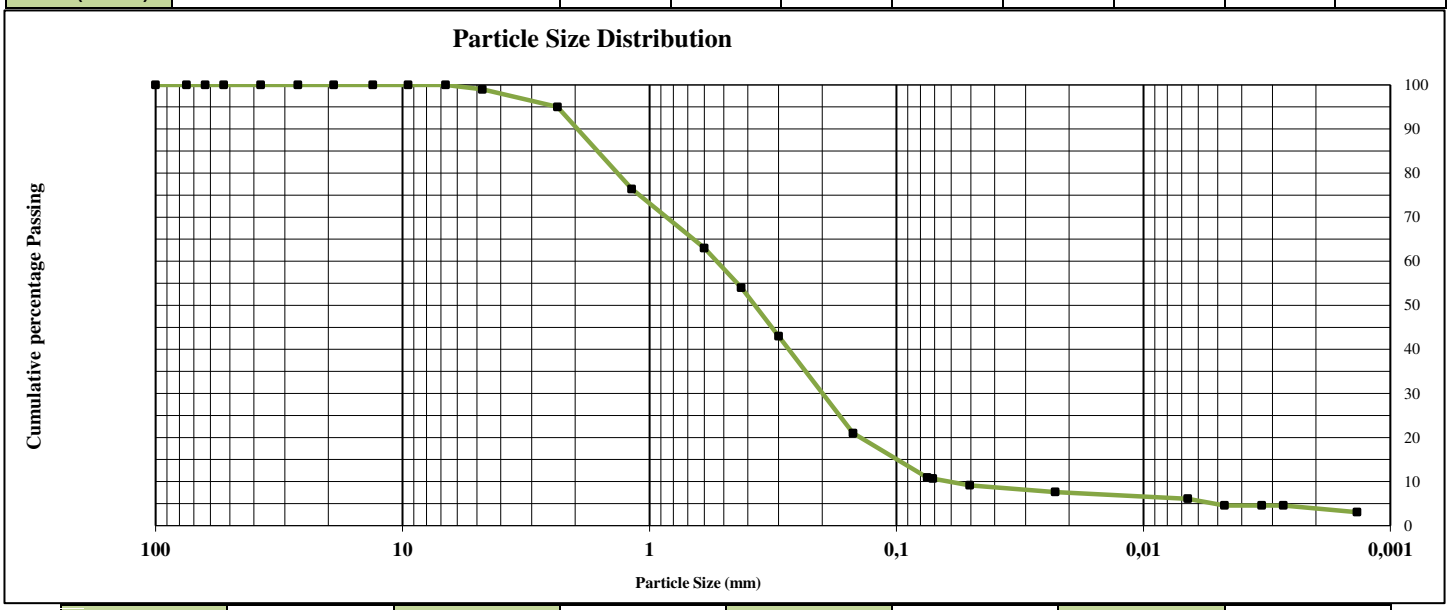
MOD / CBR / FOUNDATION INDICATOR - ASTM D422 / SANS 3001 GR10 / SANS 3001 GR12 / SANS 3001 GR30 / SANS 3001 GR40 / TMH1 A1* / TMH1 A12T*

Material Description:	Reddish Orange SAND	Sample Number:	42270/ 1			
Position:	TH1	Liquid Limit	**NP**	Linear Shrinkage	**0,0**	
Depth:	1.40 - 2.60m	Plasticity Index	**NP**	Insitu M/C%	**1,7**	

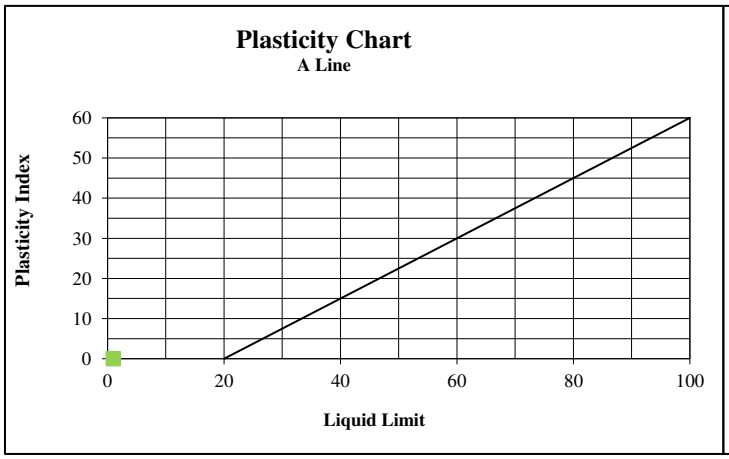
pH (TMH1 A20)		Conductivity (s/m) (TMH1 A21T)		SG (TMH1 A12T)*	2,603

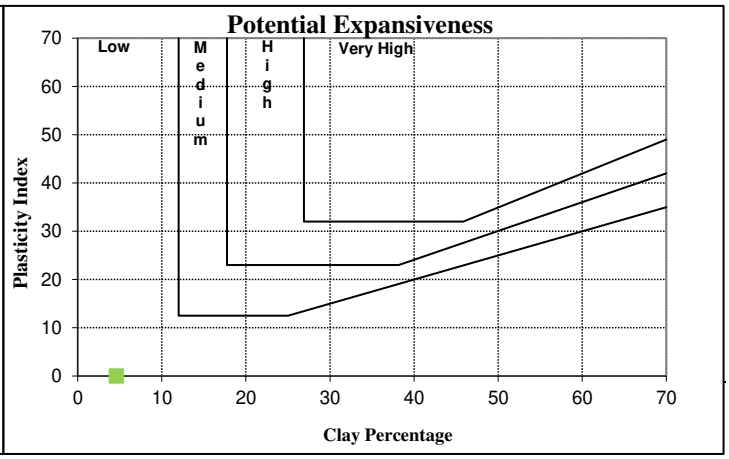
SIEVE ANALYSIS (TMH 1 A1a)*																		HYDROMETER ASTM D422							
100	75	63	53	37,5	26,5	19,0	13,2	9,5	6,7	4,75	2,36	1,18	0,60	0,425	0,300	0,150	0,075	0,071	0,051	0,023	0,007	0,005	0,003	0,003	0,001
100	100	100	100	100	100	100	100	100	100	99	95	76,4	63	54	43	21	10,9	10,7	9,168	7,64	6,112	4,584	4,584	4,584	3,056
% Passing																									

MOD AASHTO SANS 3001 GR30		CBR SANS 3001 GR40							
OMC%	12,3	COMP MC	% SWELL	100%	98%	97%	95%	93%	90%
MDD(KG/M^3)	1969	12,3	0,0	24	21	19	16	13	10



% Gravel	1	% Sand	88	% Silt	6	% Clay	5





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CIVIL ENGINEERING TESTING LABORATORIES

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Web: www.steynwilson.co.za

Customer :	**Kantey & Templer (Pty) Ltd**	Project :	Houtbay Cemetery
	P.O. Box 3132	Date Received :	14 May 2025
	Cape Town	Date Reported :	30 May 2025
	8000	Req. Number :	-
Attention :	Guido Postma		

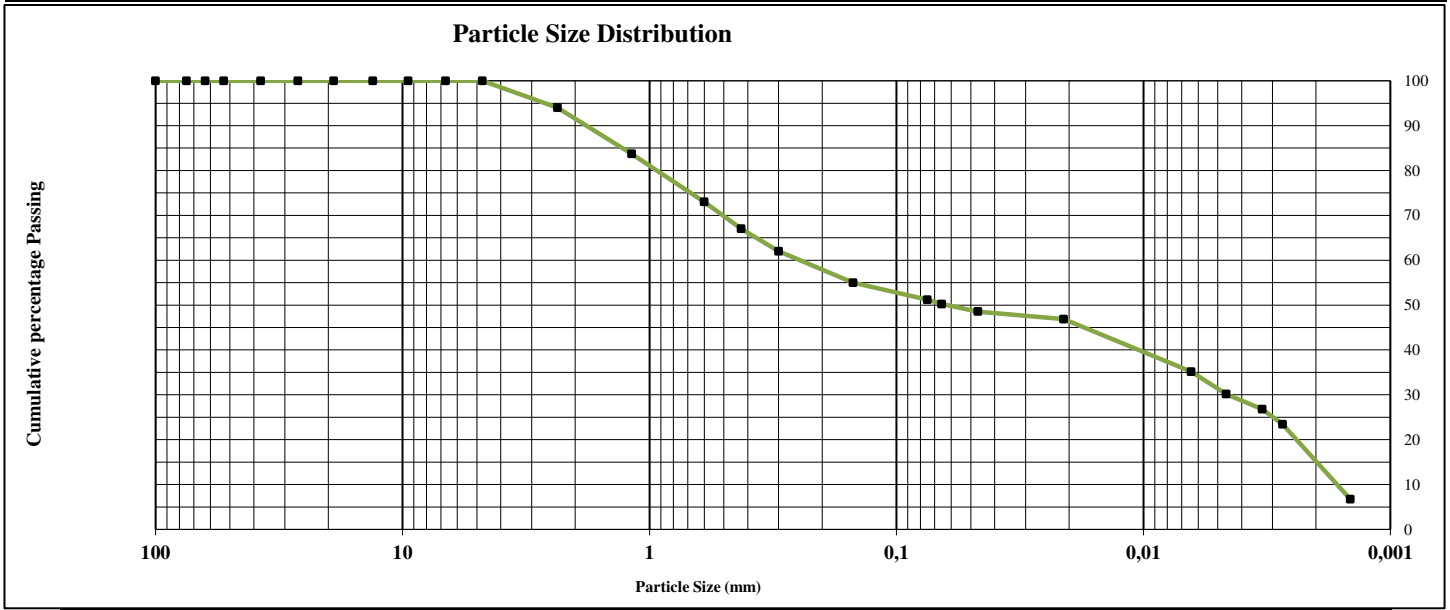
MOD / CBR / FOUNDATION INDICATOR - ASTM D422 / SANS 3001 GR10 / SANS 3001 GR12 / SANS 3001 GR30 / SANS 3001 GR40 / TMH1 A1* / TMH1 A12T*

Material Description:	White Clayey Silty SAND	Sample Number:	42270 / 2		
Position:	TH2	Liquid Limit	**38,8**	Linear Shrinkage	**7,3**
Depth:	0.20 - 2.50m	Plasticity Index	**15**	Insitu M/C%	**5,5**

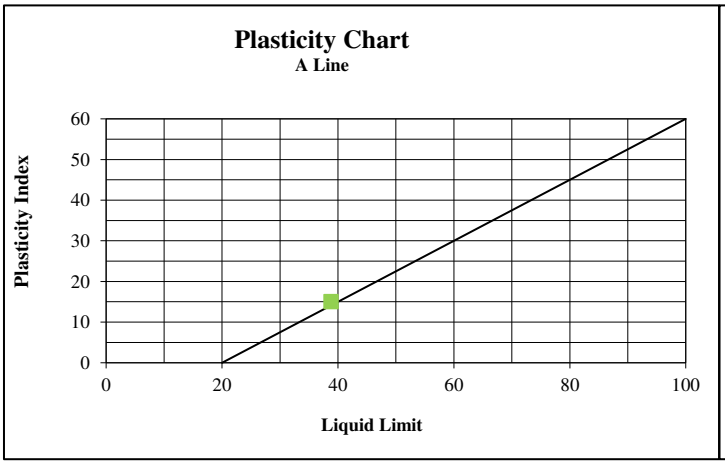
pH (TMH1 A20)		Conductivity (s/m) (TMH1 A21T)		SG (TMH1 A12T)*	2,381

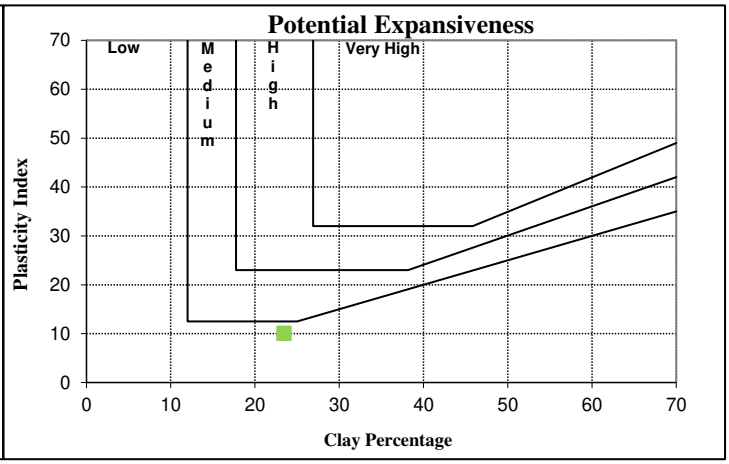
SIEVE ANALYSIS (TMH 1 A1a)*																		HYDROMETER ASTM D422							
100	75	63	53	37,5	26,5	19,0	13,2	9,5	6,7	4,75	2,36	1,18	0,60	0,425	0,300	0,150	0,075	0,066	0,047	0,021	0,006	0,005	0,003	0,003	0,001
100	100	100	100	100	100	100	100	100	100	100	94	83,7	73	67	62	55	51,2	50,22	48,55	46,87	35,15	30,13	26,78	23,44	6,696
% Passing																									

MOD AASHTO SANS 3001 GR30		CBR SANS 3001 GR40							
OMC%		COMP MC	% SWELL	100%	98%	97%	95%	93%	90%
MDD(KG/M^3)									



% Gravel		% Sand	49	% Silt	27	% Clay	23





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STEYN-WILSON LABORATORIES
CIVIL ENGINEERING TESTING LABORATORIES

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Email: info@steynwilson.co.za
Web: www.steynwilson.co.za

Customer : **Kantey & Templer (Pty) Ltd**
P.O. Box 3132
Cape Town
8000
Attention : Guido Postma

Project : Houtbay Cemetery
Date Received : 14 May 2025
Date Reported : 30 May 2025
Req. Number : -

MOD / CBR / FOUNDATION INDICATOR - ASTM D422 / SANS 3001 GR10 / SANS 3001 GR12 / SANS 3001 GR30 / SANS 3001 GR40 / TMH1 A1* / TMH1 A12T*

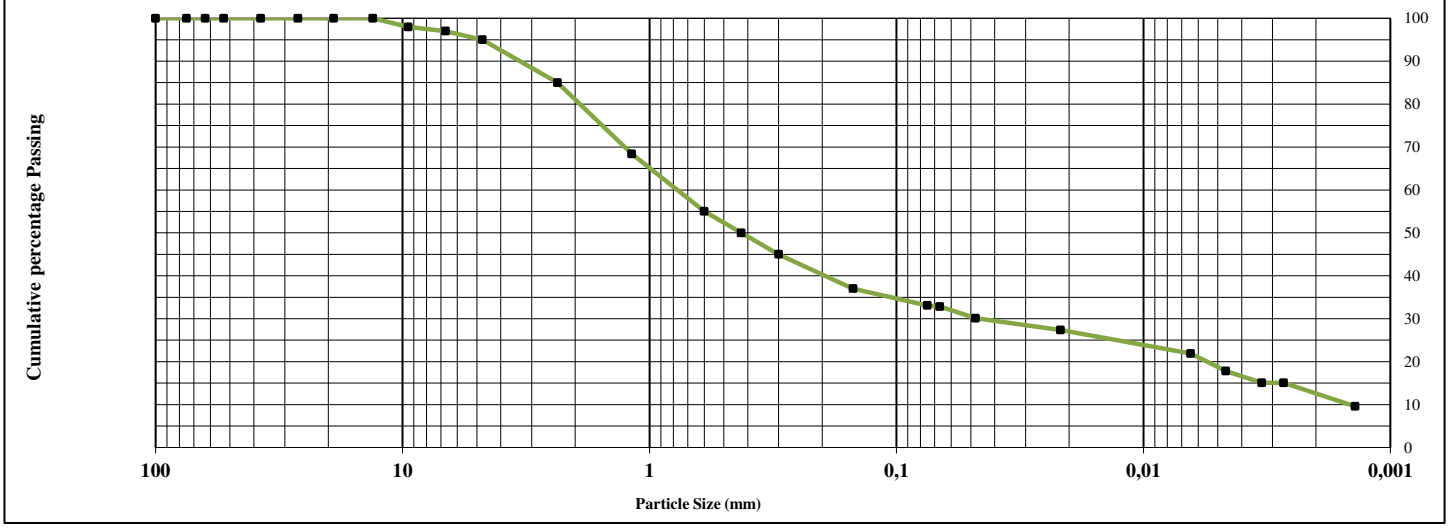
Material Description:	Brownish Olive Clayey Silty SAND	Sample Number:	42270 / 3			
Position:	TH3	Liquid Limit	**30,7**	Linear Shrinkage	**6,5**	
Depth:	0.40 - 2.50m	Plasticity Index	**13**	Insitu M/C%	**7,8**	

pH (TMH1 A20)		Conductivity (s/m) (TMH1 A21T)		SG (TMH1 A12T)*	2,462

SIEVE ANALYSIS (TMH 1 A1a)*																		HYDROMETER ASTM D422							
100	75	63	53	37,5	26,5	19,0	13,2	9,5	6,7	4,75	2,36	1,18	0,60	0,425	0,300	0,150	0,075	0,067	0,048	0,022	0,006	0,005	0,003	0,003	0,001
100	100	100	100	100	100	100	100	98	97	95	85	68,4	55	50	45	37	33,1	32,83	30,1	27,36	21,89	17,78	15,05	15,05	9,576
% Passing																									

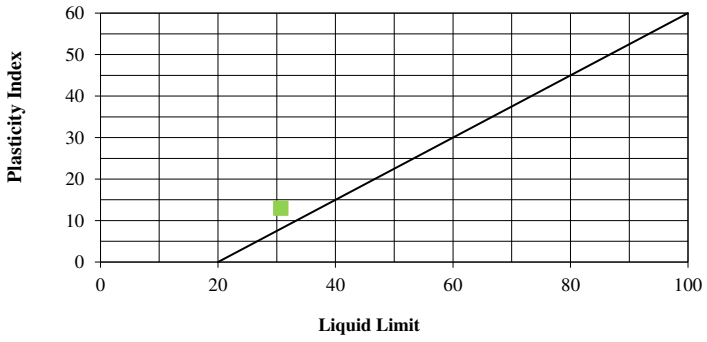
MOD AASHTO SANS 3001 GR30		CBR SANS 3001 GR40							
OMC%	10,2	COMP MC	% SWELL	100%	98%	97%	95%	93%	90%
MDD(KG/M^3)	1957	10,3	2,43	6	4	4	3	2	1

Particle Size Distribution

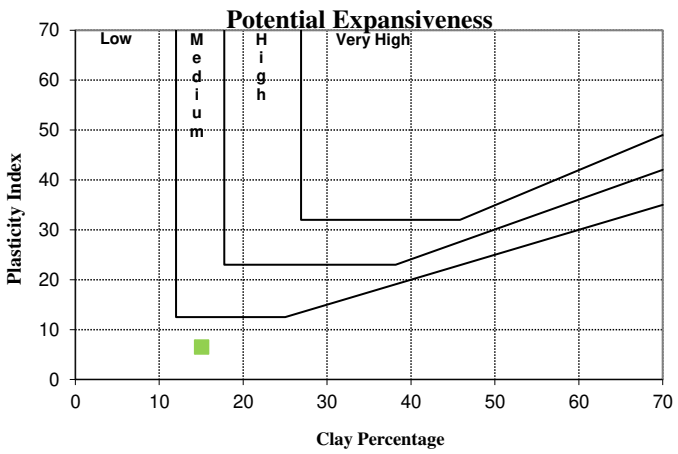


% Gravel	5	% Sand	62	% Silt	18	% Clay	15

Plasticity Chart
A Line



Potential Expansiveness



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Customer :	**Kantey & Templer (Pty) Ltd**	Project :	Houtbay Cemetery
	P.O. Box 3132	Date Received :	14 May 2025
	Cape Town	Date Reported :	30 May 2025
	8000	Req. Number :	-
Attention :	Guido Postma		

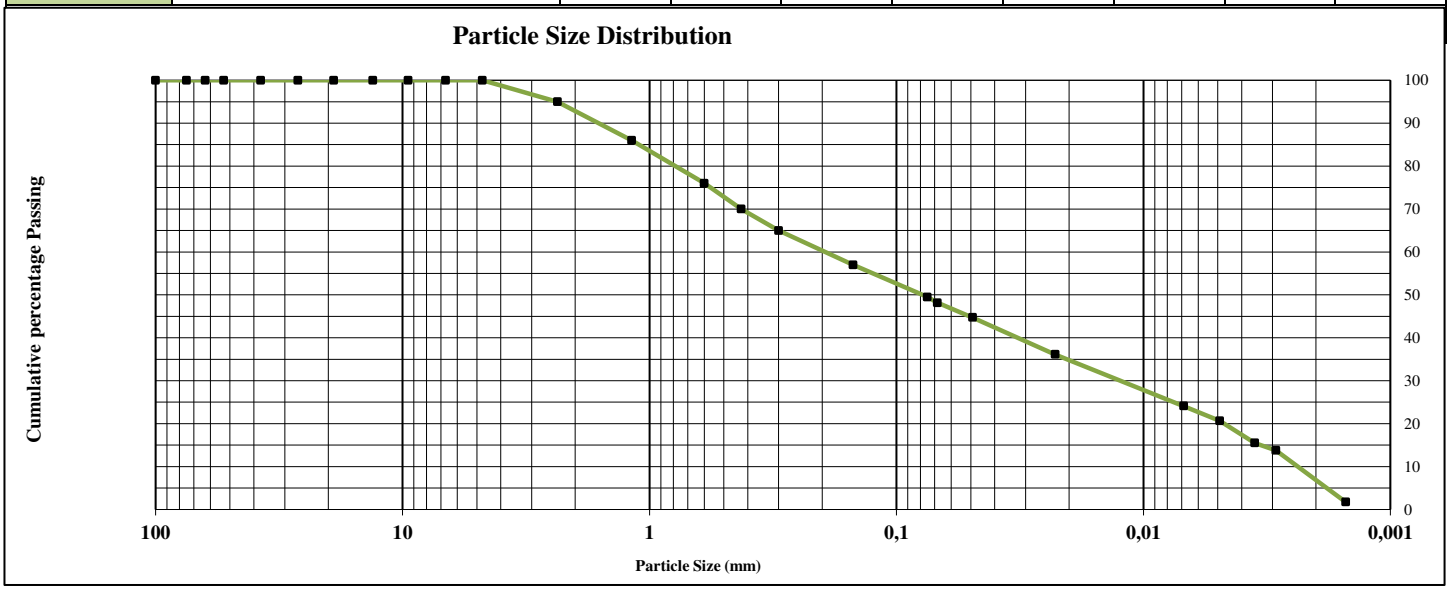
MOD / CBR / FOUNDATION INDICATOR - ASTM D422 / SANS 3001 GR10 / SANS 3001 GR12 / SANS 3001 GR30 / SANS 3001 GR40 / TMH1 A1* / TMH1 A12T*

Material Description:	White Clayey Silty SAND	Sample Number:	42270 / 4		
Position:	TH4	Liquid Limit	**44,9**	Linear Shrinkage	**7,4**
Depth:	0.60 - 2.5m	Plasticity Index	**15,9**	Insitu M/C%	**8**

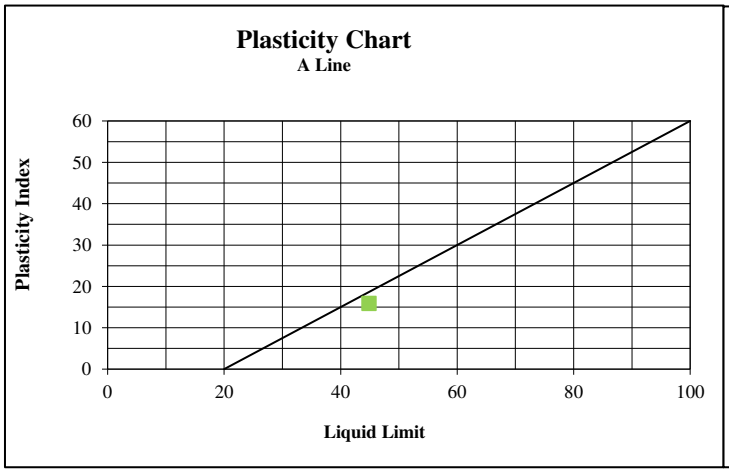
pH (TMH1 A20)		Conductivity (s/m) (TMH1 A21T)		SG (TMH1 A12T)*	2,305

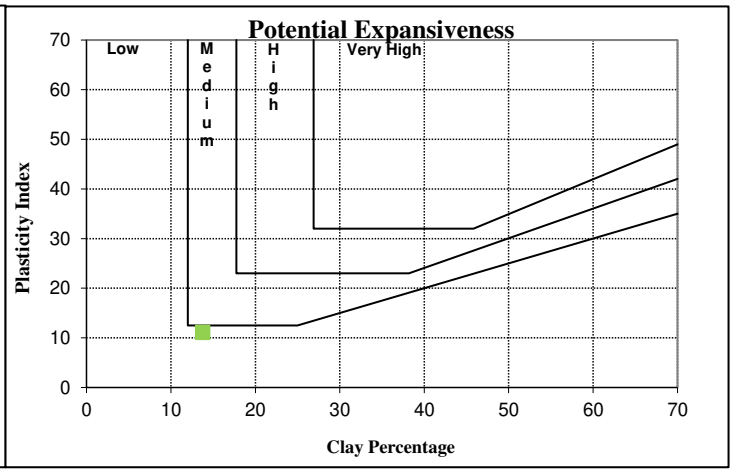
SIEVE ANALYSIS (TMH 1 A1a)*																		HYDROMETER ASTM D422							
100	75	63	53	37,5	26,5	19,0	13,2	9,5	6,7	4,75	2,36	1,18	0,60	0,425	0,300	0,150	0,075	0,068	0,049	0,023	0,007	0,005	0,004	0,003	0,002
100	100	100	100	100	100	100	100	100	100	100	95	86	76	70	65	57	49,5	48,16	44,72	36,12	24,08	20,64	15,48	13,76	1,72
% Passing																									

MOD AASHTO SANS 3001 GR30		CBR SANS 3001 GR40							
OMC%	16,5	COMP MC	% SWELL	100%	98%	97%	95%	93%	90%
MDD(KG/M^3)	1761	16,4	2,10	3	2	2	1	1	1



% Gravel		% Sand	51	% Silt	35	% Clay	14





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Customer :	**Kantey & Templer (Pty) Ltd**	Project :	Houtbay Cemetery
	P.O. Box 3132	Date Received :	14 May 2025
	Cape Town	Date Reported :	30 May 2025
	8000	Req. Number :	-
Attention :	Guido Postma		

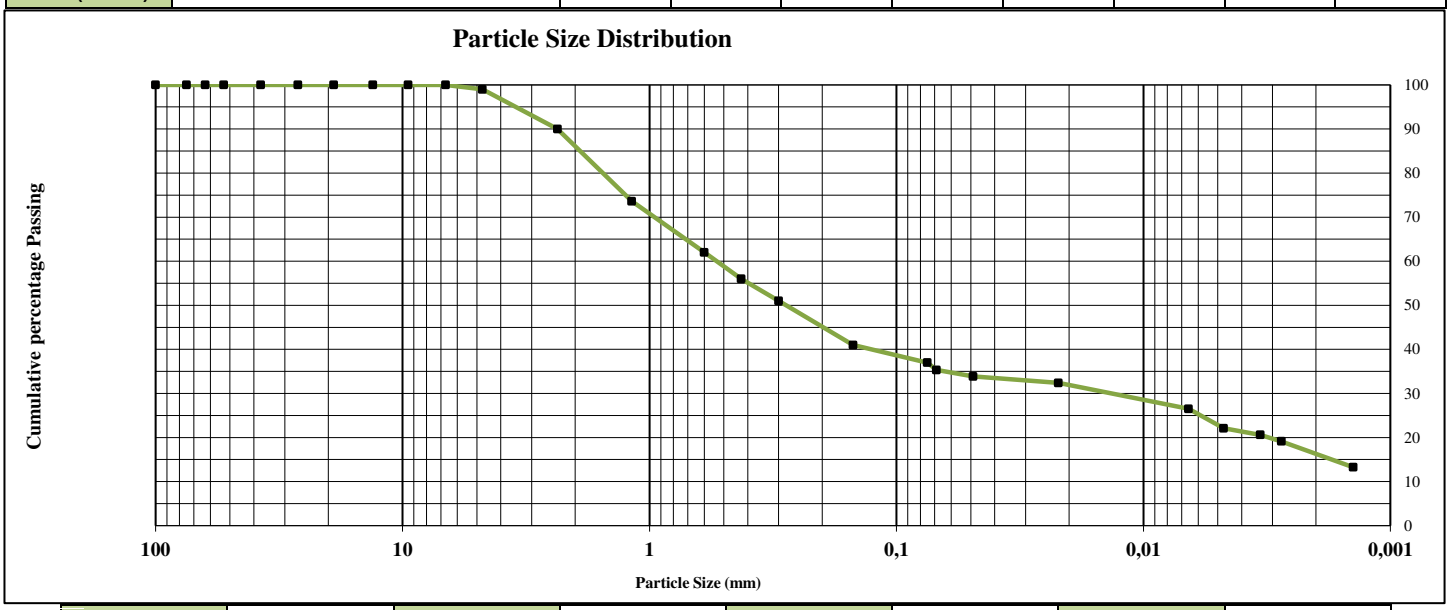
MOD / CBR / FOUNDATION INDICATOR - ASTM D422 / SANS 3001 GR10 / SANS 3001 GR12 / SANS 3001 GR30 / SANS 3001 GR40 / TMH1 A1* / TMH1 A12T*

Material Description:	Light Olive Brown Silty Clayey SAND	Sample Number:	42270/ 5		
Position:	TH5	Liquid Limit	**36,8**	Linear Shrinkage	**6,6**
Depth:	0.60 - 1.40m	Plasticity Index	**13,2**	Insitu M/C%	**8,2**

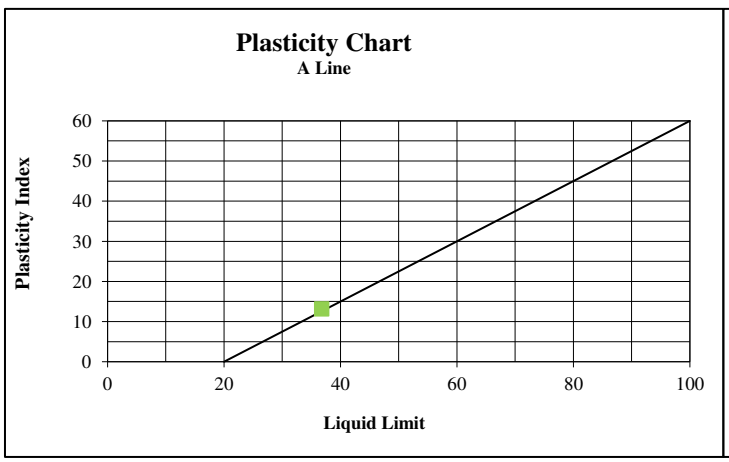
pH (TMH1 A20)		Conductivity (s/m) (TMH1 A21T)		SG (TMH1 A12T)*	2,369

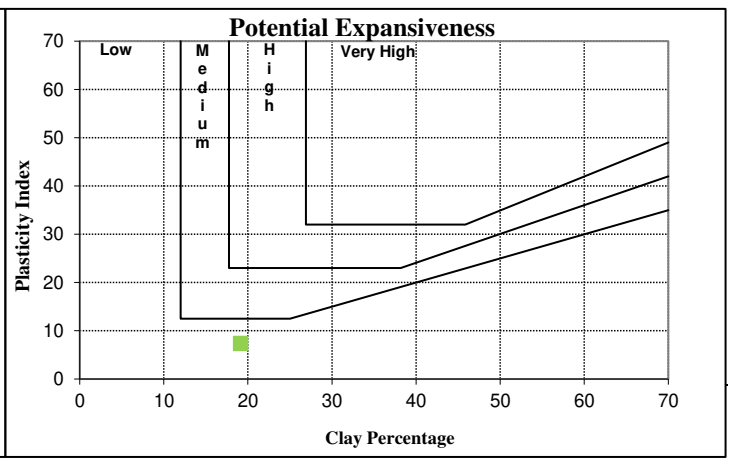
SIEVE ANALYSIS (TMH 1 A1a)*																		HYDROMETER ASTM D422							
100	75	63	53	37,5	26,5	19,0	13,2	9,5	6,7	4,75	2,36	1,18	0,60	0,425	0,300	0,150	0,075	0,069	0,049	0,022	0,007	0,005	0,003	0,003	0,001
100	100	100	100	100	100	100	100	100	100	99	90	73,6	62	56	51	41	37	35,33	33,86	32,38	26,5	22,08	20,61	19,14	13,25
% Passing																									

MOD AASHTO SANS 3001 GR30		CBR SANS 3001 GR40							
OMC%	14,5	COMP MC	% SWELL	100%	98%	97%	95%	93%	90%
MDD(KG/M^3)	1849	14,4	3,46	7	5	5	3	3	2



% Gravel	1	% Sand	63	% Silt	17	% Clay	19





NOTE: All tests marked with (*) means that those test methods are not accredited.