KARN GEOSERVICES

Our ref: 23119

Date: 10th July 2023

Westco Properties Limited
Clyst Honiton
Exeter
Devon
EX5 2FZ

[redacted]

Site Ref: Carn Thomas IOS

Dear Robin,

Karn Geoservices Ltd (KGL) has been commissioned to undertake an intrusive investigation of the existing slopes at Carn Thomas, Telegraph Road, Hugh Town, St Marys, Isles of Scilly. This report provides additional information on the stability of the existing ground conditions and follows on from the previous investigation reports detailed in the following section.

It is understood that the site is to be redeveloped for residential purposes and the existing slopes must be cut to facilitate the construction.

Background Geology

The site is shown to be underlain by the Isles of Scilly Intrusion with some localised deposits of Blown Sands and Tidal Deposits although it is suspected the Tidal deposits are absent as these are likely restricted to the lowest topographical areas adjacent.

Previous Reports

The following reports were provided to KGL at the time of writing and have been used in the preparation of this letter report.

- Wheal Jane Consultants, Factual Ground Investigation Report dated January 2020
- Campbell Reith, 13241/A Engineering Report dated April 2020

- Karn Geoservices, 22106 Carn Thomas Slope Letter Report dated September 2022

A factual ground investigation report was commissioned and undertaken by Wheal Jane in January 2020 under reference SI19937A. A series of trial pits (TP01 – TP09) were excavated to obtain soil samples for subsequent laboratory testing. The logs and site photos are presented describing the ground conditions only.

The report shows that the ground conditions comprise Made Ground overlying the weathered Granite. The Made Ground is described as being a grey angular to sub-angular, medium to coarse gravel of granite with frequent anthropogenic components of glass, plastic and wood throughout. A single grading is given showing the sample to comprise 69% Gravel, 24% Sand and 7% Silt.

The weathered Granite is described as an orangish brown and dark brown silty, gravelly medium to coarse SAND. Gravel is angular to subangular, medium to coarse. Laboratory testing shows the unit to comprise between 51-73% Gravel, 21-38% Sand and 6-10% Fines fraction.

The previous slope report undertaken by KGL was a visual assessment only and was undertaken to observe conditions and gain a better understanding of the topography and ground conditions. The report found the site was formed of terraces standing about 2-4m in height with face angles between 60-90 degrees, but areas of spalling were clearly visible where material had failed and collapsed.

The report found that the slopes were largely formed of Made Ground and were generally oversteepened with evidence of spalling observed. The report recommended battering the slopes back to a safe angle of repose or retaining. The report concluded that for planning purposes the stability of the site will require design consideration to ensure long term stability is guaranteed and short-term stability can be relied upon for the safety of any workers present onsite. With the correct engineering systems in place the slopes can be made stable and therefore protective of the construction work, end users and boundary properties.

Site Description and Investigation

At the time of the investigation the site was fenced from the main road and was accessed by a side gate. The site was generally level in the northern section and sloped up towards the south with graded slopes in the west and defined benches in the east. The southern section of the site was still largely overgrown at the time of the investigation.

The investigation focussed on the stability of the benched section in the northeast section of the site. The site profile is formed of two well defined benches striking in a general northwest to southeast orientation. Both benches were between 2-4m in height with a slope angle of approximately 60-90°. The terrace created between the two benches varied in width across the site.

This investigation comprised seven machine excavated trial pits undertaken on the 8th and 9th June 2023. The trial pits were excavated into the face of the existing slopes in the east of the site. All exploratory hole locations were backfilled with the available arisings upon completion. Copies of the exploratory hole logs are presented in Appendix 2.

Ground Conditions

Three machine excavated trial pits (TP01, TP02, TP07) were excavated from the bottom level and pulled through the lower bench and toe to expose the slope profile. The exploratory holes recorded Made Ground covering the crest, slope face, and toe area and this was underlain by the gradationally weathered granite (Isles of Scilly Intrusion).

Four machine excavated trial pits (TP03, TP04, TP05, TP06) were excavated from the terraced area and pulled through the upper bench also cutting into the toe. The exploratory holes encountered shrubs and vegetation overlying the gradationally weathered granite (Isles of Scilly Intrusion). Thin deposits of Made Ground were noted to be present on the face and at the toe of the slope.

Made Ground: The Made Ground was between 0.05m and 0.35m in thickness and generally comprised a grey sandy gavel of angular to sub-angular fine to coarse granite and crushed concrete along with rare fragments of other anthropogenic material.

Isles of Scilly Intrusion (IOS): The Isles of Scilly Intrusion was encountered with a gradational weathering profile becoming increasingly competent vertically and laterally into the slope. The IOS intrusion comprised a dark brown slightly clayey sandy cobbly GRAVEL of angular to sub-rounded fine to coarse granite underlain by an orangish-brown slightly clayey sandy cobbly GRAVEL of angular to sub-angular fine to coarse granite. Frequent boulders were noted to be present in the orangish-brown horizon. The dark brown horizon and was between 0.50m and 2.30m thick.

The exploratory holes were terminated upon reaching refusal both vertically and laterally as the excavations progressed into the slope faces. The trial pits refused on granite which appeared to comprise small to large boulders held within a matrix; however, this is likely to be the top of the more intact granite and part of the gradational weathering profile.

Suitable samples of the IOS intrusion obtained from the trial pit excavations were dispatched to the laboratory for geotechnical testing. The full test results are included within Appendix 2. Particle Size Distribution (PSD) tests showed the material to comprise 16-68% Cobbles, 22-64% Gravel, 7-13% Sand, and 3-7% Clay/Silt fractions.

Based on the PSD results the weathered IOS Intrusion is classified as being of no volume change potential in accordance with NHBC Standards Chapter 4.2. No Atterberg Limit testing was undertaken due to the low percentage of fines material.

Three consolidated drained peak shear strength shear boxes (60x60mm) were undertaken on the samples. The test samples were remoulded with all material >2mm removed, then tested to three pressure stages: 25kPa, 50kPa, and 100kPa to find the peak strength. The tests showed the weathered IOS intrusion to have an angle of shearing resistance (ϕ) between 35° and 43° with effective cohesion between 0kPa and 7kPa.

Slope Stability

At the time of the previous site visit in September 2022 and the investigation in June 2023 signs of spalling were noted to be present across the slopes. The spalling is considered to be the result of oversteepened Made Ground and weathered soils of the IOS intrusion.

The laboratory testing undertaken as part of this investigation identified angles of shearing resistance between 35° and 43° whereas the existing slopes are stood at 60° to 90°. The test results are a reflection of the finer material only and the soils are noted to be predominantly granular; however, it is considered that the results are reflective of the ground conditions. The results show the existing slopes to be significantly over steepened and are therefore likely to continue spalling until remedial work is undertaken.

Based on the laboratory testing and site observations it is recommended that any Made Ground is battered back to a maximum slope angle of 30° and the underling soils of the weathered IOS Intrusion battered back to 40°. Where the proposed slope angles are not appropriate for the proposed development, it is recommended that the slopes are faced with retaining structures.

All exploratory holes terminated upon refusal both vertically and laterally indicating the top of the intact bedrock to be near surface. The exploratory holes terminated on boulders of various size held in a matrix of more weathered soil and according to Stead et al (2000) this material should be treated as heterogeneous ground.

While the boulders themselves are competent granite, they are not wholly intact and the matrix between typically comprises fines material. Due to the nature of this matrix, there is potential for destabilisation when the slope is surcharged, or high groundwater conditions are encountered. It is considered that this material is generally stable in its current condition, however, the long-term stability cannot be guaranteed without remedial work.

As with all modes of slope stability, groundwater and surface water are key factors when considering potential destabilisation. The ground investigation was undertaken during a period of

pro-longed dry weather and no groundwater was observed with the excavations or issuing from slope faces. No surface water was observed at the time of the site works. It is recommended that suitable drainage is installed across the site to prevent the pooling of water at the crest and toe of the slope along with preventing run-off over the slope faces.

If further excavation works are to be undertaken on site, there is potential that the intact IOS Intrusion will be encountered in the rock faces. The stability of the intact rock will be controlled by the jointing and texture of the rock mass. The intact bedrock was not exposed at the time of the investigation and therefore kinematic analysis of potential joint controlled failures has not been undertaken.

It is considered that the global stability of the slope is likely to be stable in its current state providing groundwater and surface water are controlled appropriately. Any failures on the site are likely to be limited to ongoing sloughing and spalling of the benches.

Recommendations

Based on the above assessment, the slopes are considered to be unstable in their current condition. The following recommendations are given to ensure long term stability of the slopes:

- Made Ground must be battered back to 30° or retained appropriately.
- The soils of the weathered IOS intrusion must be battered back to 40° or retained appropriately.
- Assessment of jointing within the rockmass if the intact rock is exposed.
- Drainage and control measures put in place to prevent surface water run-off and pooling of water at the crest or toe of the slopes.

Overall, the stability of the site will require design consideration to ensure long term stability is guaranteed and short-term stability can be relied upon for the safety of any workers present onsite. With the correct engineering systems in place the slopes can be made stable and therefore protective of the construction work, end users and boundary properties.

Yours sincerely

For and on behalf of Karn Geoservices Limited

Oliver Scott
BSc (Hons) MSc ACSM FGS MIMMM
Director

Enclosures:

Appendix 1 – Plans and Drawings

Appendix 2 – Site Work

Appendix 3 – Laboratory Testing

KARN
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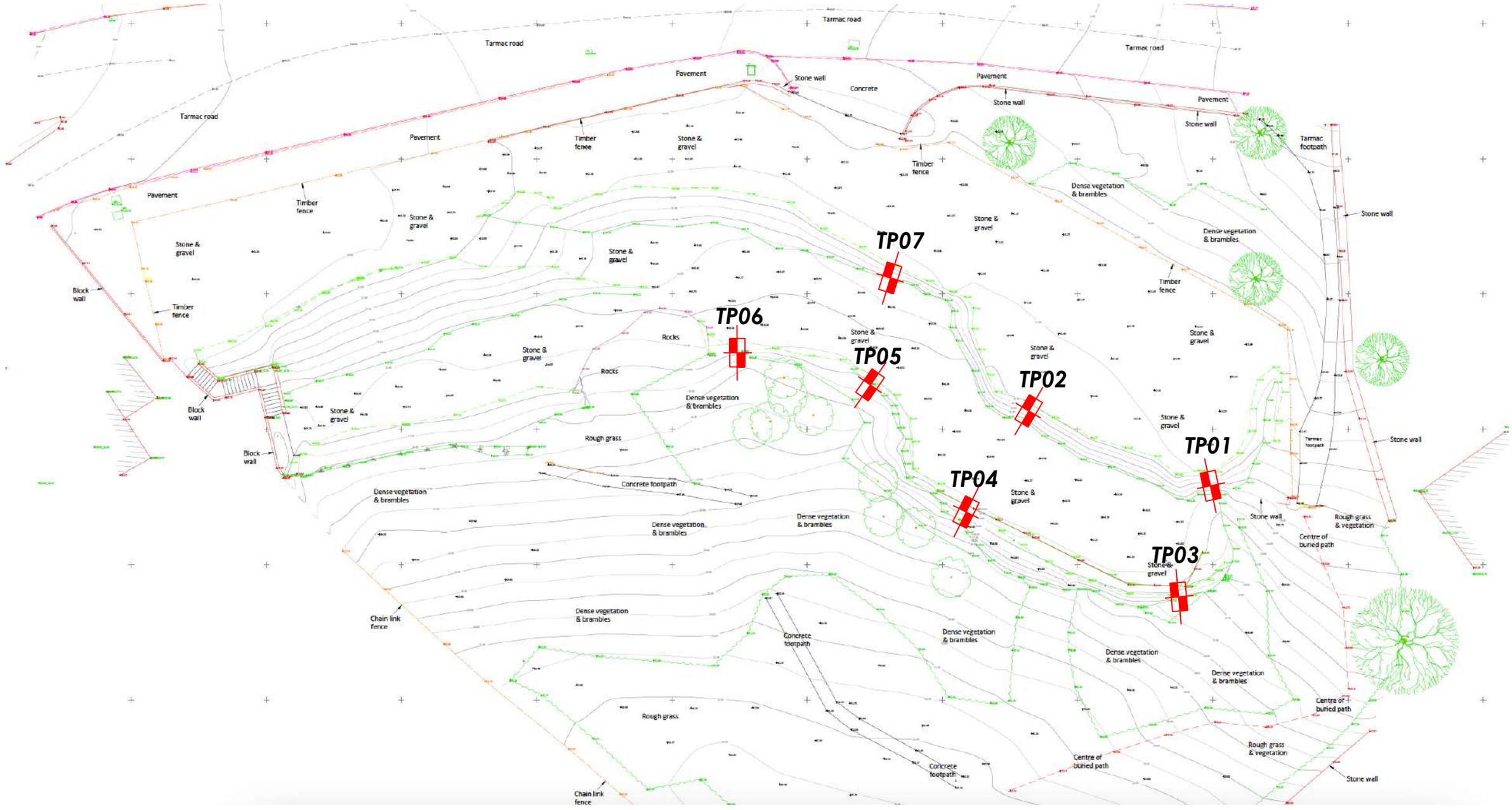
Appendix 1

KARN GEOSERVICES LTD www.karn-geo.co.uk info@karn-geo.co.uk	Title: Site Location Plan		
	Site: Carn Thomas, IOS		
	Client: Kirkham Board		Job No: 23135
	Figure: 1	Date Drawn: 15/06/2023	Scale: NTS



KARN GEOSERVICES LTD
www.karn-geo.co.uk
info@karn-geo.co.uk

Title: Exploratory Hole Plan		
Site: Carn Thomas, IOS		
Client: Kirkham Board		Job No: 23135
Figure: 1	Date Drawn: 15/06/2023	Scale: NTS

KARN GEOSERVICES LTD www.karn-geo.co.uk info@karn-geo.co.uk	Title: Proposed Development Plan		
	Site: Carn Thomas, IOS		
	Client: Kirkham Board		Job No: 23135
	Figure: 3	Date Drawn: 15/06/2023	Scale: NTS

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Appendix 2

HEAD OFFICE
9 BROAD STREET TRURO CORNWALL TR1 1JD UK Tel: 07341 391 138 www.karn-geo.co.uk
REGISTERED OFFICE 9 BROAD STREET TRURO CORNWALL TR1 1JD UK
KARN GEOSERVICES LTD – Registered in the United Kingdom and Wales Company Registration No. 13414537

Trial Pit Log

Project Name: Carn Thomas	Client: Kirkham Board	Date: 08/06/2023
Location: Isles of Scilly	Contractor: Karn Geoservices	
Project No. : 23119	Crew Name:	Equipment:

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP01	TP		KC	1:25	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								MADE GROUND: sandy gravel of crushed concrete
					0.35			Dark brown slightly clayey slightly sandy slightly cobbly GRAVEL of fine to coarse sub-angular to sub-rounded. Refusal at back of pit on large boulders. Weathered Isles of Scilly Intrusion
					1.50			Orangish brown slightly clayey slightly sandy slightly cobbly GRAVEL with small boulders. Gravel is fine to coarse sub-angular to sub-rounded. Much harder gravel. Refusal at back of pit of large boulders. Weathered Isles of Scilly Intrusion
					3.10			End of Borehole at 3.100m

1 2 3 4 5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks

Groundwater not encountered.

AGS

Trial Pit Log

Project Name: Carn Thomas	Client: Kirkham Board	Date: 08/06/2023
Location: Isles of Scilly	Contractor: Karn Geoservices	
Project No. : 23119	Crew Name:	Equipment:

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP02	TP		KC	1:25	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								MADE GROUND: sandy gravel of crushed concrete and some granite
					0.25			Dark brown slightly clayey slightly sandy slightly cobbly GRAVEL of fine to coarse sub-angular to sub-rounded. Refusal at back of pit on large boulders of granite. Weathered Isles of Scilly Intrusion
					1.00			Orangish brown slightly clayey slightly sandy slightly cobbly GRAVEL with small boulders. Gravel is fine to coarse sub-angular to sub-rounded. Much harder digging. Refusal at back of pit on large boulders of granite. Weathered Isles of Scilly Intrusion
					2.90			End of Borehole at 2.900m

1 2 3 4 5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks

Groundwater not encountered.

Trial Pit Log

Project Name: Carn Thomas	Client: Kirkham Board	Date: 08/06/2023
Location: Isles of Scilly	Contractor: Karn Geoservices	
Project No. : 23119	Crew Name:	Equipment:

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP03	TP		KC	1:25	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Shrubs over dark brown slightly clayey slightly cobbly sandy GRAVEL of fine to coarse sub-angular to sub-rounded granite. Weathered Isles of Scilly Intrusion
					0.80			Orangish brown slightly clayey slightly sandy slightly cobbly GRAVEL with small boulders. Gravel is fine to coarse sub-angular to sub-rounded granite. Weathered Isles of Scilly Intrusion
					3.60			End of Borehole at 3.600m

1
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Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks

Groundwater not encountered.

Trial Pit Log

Project Name: Carn Thomas	Client: Kirkham Board	Date: 08/06/2023
Location: Isles of Scilly	Contractor: Karn Geoservices	
Project No. : 23119	Crew Name:	Equipment:

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP04	TP		KC	1:25	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Shrubs over dark brown slightly clayey slightly cobbly sandy GRAVEL of fine to coarse sub-angular to sub-rounded granite. Weathered Isles of Scilly Formation
					0.70			Orangish brown slightly clayey slightly sandy slightly cobbly GRAVEL with small boulders. Gravel is fine to coarse sub-angular to sub-rounded granite. Refusal at back of pit on large boulders of granite. Weathered Isles of Scilly Intrusion
					5.00			End of Borehole at 5.000m

1 2 3 4 5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks

Groundwater not encountred.

AGS

Trial Pit Log

Project Name: Carn Thomas	Client: Kirkham Board	Date: 08/06/2023
Location: Isles of Scilly	Contractor: Karn Geoservices	
Project No. : 23119	Crew Name:	Equipment:

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP05	TP		KC	1:25	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Shrubs over dark brown slightly clayey slightly sandy cobbly GRAVEL with occasional small boulder. Gravel is fine to coarse sub-angular to sub-rounded granite. Weathered Isles of Scilly Intrusion
					2.30			Orangish brown slightly clayey slightly sandy slightly cobbly GRAVEL with small boulders. Gravel is fine to coarse sub-angular to sub-rounded granite. Refusal at back of pit on large boulders of granite. Weathered Isles of Scilly Intrusion
					2.50			End of Borehole at 2.500m

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Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks

Groundwater not encountered.

Trial Pit Log

Project Name: Carn Thomas	Client: Kirkham Board	Date: 08/06/2023
Location: Isles of Scilly	Contractor: Karn Geoservices	
Project No. : 23119	Crew Name:	Equipment:

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP06	TP		KC	1:25	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Shrubs over dark brown slightly clayey slightly sandy cobbly GRAVEL with occasional small boulder. Gravel is fine to coarse sub-angular to sub-rounded granite. Weathered Isles of Scilly Intrusion
					0.50			Orangish brown slightly clayey slightly sandy slightly cobbly GRAVEL with small boulders. Gravel is fine to coarse sub-angular to sub-rounded granite. Refusal at back of pit on large boulders of granite. Weathered Isles of Scilly Intrusion
					1.90			End of Borehole at 1.900m

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Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks

Groundwater not encountered.

Trial Pit Log

Project Name: Carn Thomas	Client: Kirkham Board	Date: 08/06/2023
Location: Isles of Scilly	Contractor: Karn Geoservices	
Project No. : 23119	Crew Name:	Equipment:

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP07	TP		KC	1:25	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.05			MADE GROUND: gravel of crushed concrete Dark brown slightly clayey slightly gravelly SAND with small boulders. Gravel is fine to coarse. Weathered Isles of Scilly Formation
					1.50			Orangish brown slightly clayey slightly sandy slightly cobbly GRAVEL with small boulders. Gravel is fine to coarse. Refusal at back of pit on large boulders of granite. Weathered Isles of Scilly Intrusion
					2.90			End of Borehole at 2.900m

1
2
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5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks

Groundwater not encountered.

Date Drawn: 13-06-2023	Scale: NTS	Title: Exploratory Hole Photographs
KARN GEOSERVICES		Project: Carn Thomas
		Client: Kirkham Board
		Job No.: 23119

Date Drawn: 13-06-2023	Scale: NTS	Title: Exploratory Hole Photographs
KARN GEOSERVICES		Project: Carn Thomas
		Client: Kirkham Board
		Job No.: 23119

Date Drawn: 13-06-2023	Scale: NTS	Title: Exploratory Hole Photographs
KARN GEOSERVICES		Project: Carn Thomas
		Client: Kirkham Board
		Job No.: 23119

Date Drawn: 13-06-2023	Scale: NTS	Title: Exploratory Hole Photographs
KARN GEOSERVICES		Project: Carn Thomas
		Client: Kirkham Board
		Job No.: 23119

Date Drawn: 13-06-2023	Scale: NTS	Title: Exploratory Hole Photographs
KARN GEOSERVICES		Project: Carn Thomas
		Client: Kirkham Board
		Job No.: 23119

Date Drawn: 13-06-2023	Scale: NTS	Title: Exploratory Hole Photographs
KARN GEOSERVICES		Project: Carn Thomas
		Client: Kirkham Board
		Job No.: 23119

Date Drawn: 13-06-2023	Scale: NTS	Title: Exploratory Hole Photographs
KARN GEOSERVICES		Project: Carn Thomas
		Client: Kirkham Board
		Job No.: 23119

KARN
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Appendix 3

HEAD OFFICE
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REGISTERED OFFICE 9 BROAD STREET TRURO CORNWALL TR1 1JD UK
KARN GEOSERVICES LTD ~ Registered in the United Kingdom and Wales Company Registration No. 13414537

Laboratory Report

UKAS TESTING 2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES A PHENNA GROUP COMPANY

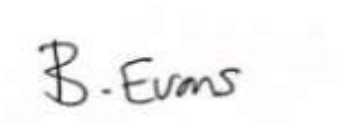
Contract Number: 67151

Client Ref: **23135**
Client PO: **23135**

Date Received: **19-06-2023**
Date Completed: **29-06-2023**
Report Date: **29-06-2023**

Client: **Karn Geoservices Limited**
9 Broad Street,
Truro
TR1 1JD

This report has been checked and approved by:



Brendan Evans
Office Administrator

Contract Title: **IOS**
For the attention of: **Mike Austin**

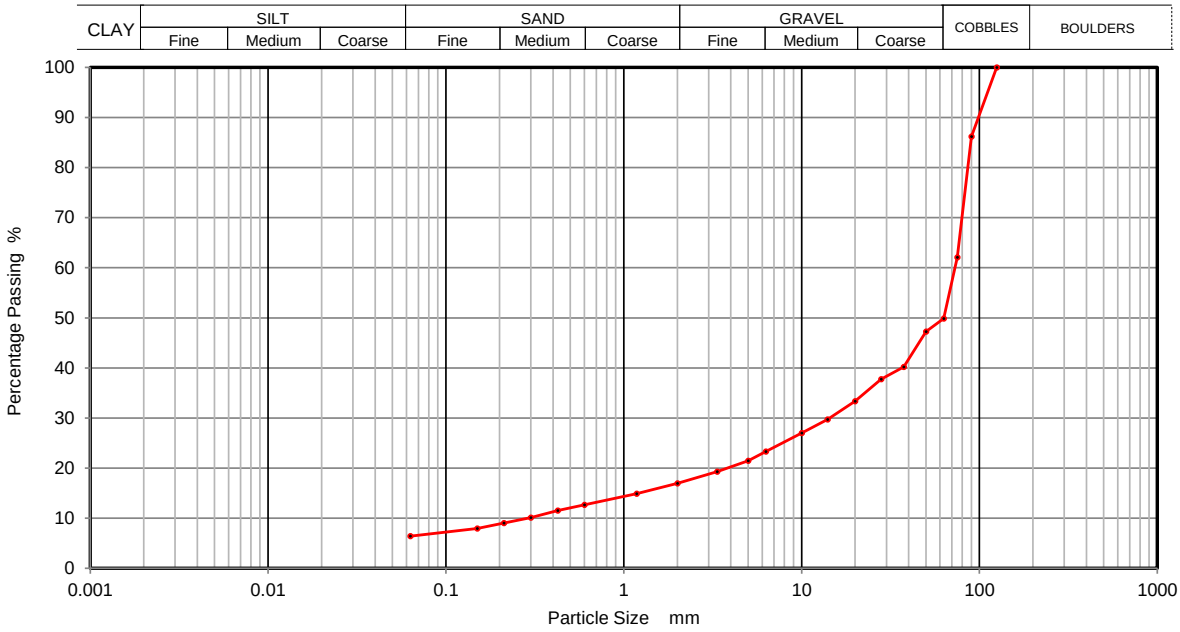
Test Description	Qty
PSD Wet Sieve method BS 1377:1990 - Part 2 : 9.2 - * UKAS	3
Consolidated Drained Peak Shear Strength - set of 3 - 60 x 60mm Shear Box Specimens by Direct Shearing (3 days) BS 1377:1990 - Part 7 : 4 - * UKAS	3
Disposal of samples for job	1

Notes: **Observations and Interpretations are outside the UKAS Accreditation**
*** - denotes test included in laboratory scope of accreditation**
 # - denotes test carried out by approved contractor
@ - denotes non accredited tests

Approved Signatories:
Brendan Evans (Office Administrator) - Darren Bourne (Quality Senior Technician) - Paul Evans (Director)
Richard John (Quality/Technical Manager) - Shaun Jones (Laboratory manager) - Shaun Thomas (Site Manager)
Wayne Honey (Human Resources/ Health and Safety Manager)

GEO Site & Testing Services Ltd
Units 3-4, Heol Aur, Dafen, Llanelli, Carmarthenshire, Wales SA14 8QN
Tel: 01554 784040 Fax: 01554 784041 info@gstl.co.uk gstl.co.uk

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION** **BS 1377 Part 2:1990** **Wet Sieve, Clause 9.2**	Contract Number	67151
		Borehole/Pit No.	TP01
Project Name	IOS	Sample No.	
Soil Description	Brown silty/clayey fine to coarse sandy fine to coarse GRAVEL (with cobbles)	Depth Top	
		Depth Base	
Date Tested	28/06/2023	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	86		
75	62		
63	50		
50	47		
37.5	40		
28	38		
20	33		
14	30		
10	27		
6.3	23		
5	21		
3.35	19		
2	17		
1.18	15		
0.6	13		
0.425	12		
0.3	10		
0.212	9		
0.15	8		
0.063	6		

Sample Proportions	% dry mass
Cobbles	50
Gravel	33
Sand	11
Silt and Clay	6

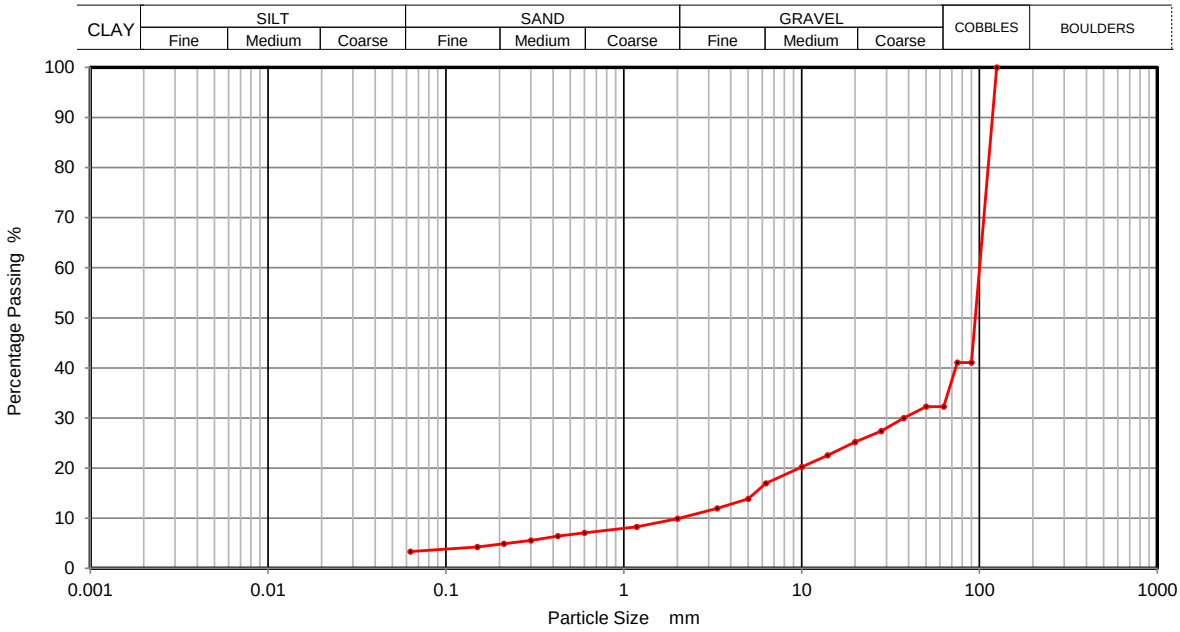
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
David Edwards

UKAS TESTING 2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION** **BS 1377 Part 2:1990** **Wet Sieve, Clause 9.2**	Contract Number	67151
		Borehole/Pit No.	TP02
Project Name	IOS	Sample No.	
Soil Description	Brown slightly silty/clayey fine to coarse sandy fine to coarse GRAVEL (with cobbles)	Depth Top	
		Depth Base	
Date Tested	28/06/2023	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	41		
75	41		
63	32		
50	32		
37.5	30		
28	27		
20	25		
14	23		
10	20		
6.3	17		
5	14		
3.35	12		
2	10		
1.18	8		
0.6	7		
0.425	6		
0.3	6		
0.212	5		
0.15	4		
0.063	3		

Sample Proportions	% dry mass
Cobbles	68
Gravel	22
Sand	7
Silt and Clay	3

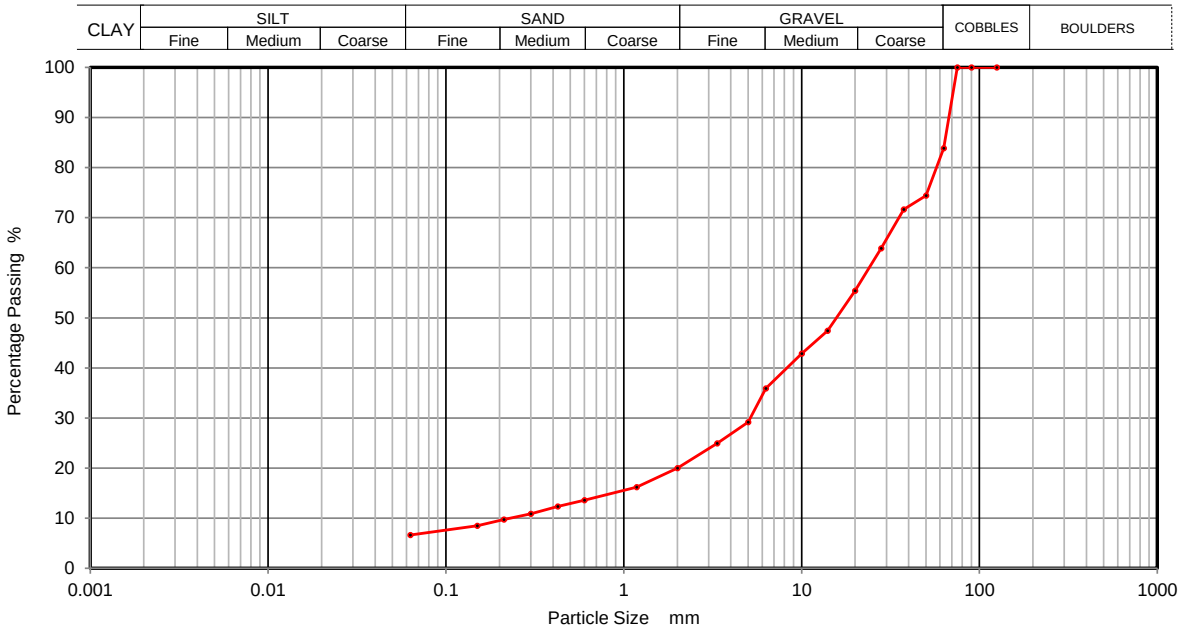
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
David Edwards

UKAS TESTING 2788

GSTL GEOTECHNICAL SITE & TESTING LABORATORIES	**PARTICLE SIZE DISTRIBUTION** **BS 1377 Part 2:1990** **Wet Sieve, Clause 9.2**	Contract Number	67151
		Borehole/Pit No.	TP03
Project Name	IOS	Sample No.	
Soil Description	Brown silty/clayey fine to coarse sandy fine to coarse GRAVEL (with cobbles)	Depth Top	
		Depth Base	
Date Tested	28/06/2023	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	84		
50	74		
37.5	72		
28	64		
20	55		
14	47		
10	43		
6.3	36		
5	29		
3.35	25		
2	20		
1.18	16		
0.6	14		
0.425	12		
0.3	11		
0.212	10		
0.15	8		
0.063	7		

Sample Proportions	% dry mass
Cobbles	16
Gravel	64
Sand	13
Silt and Clay	7

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator
David Edwards

UKAS TESTING 2788

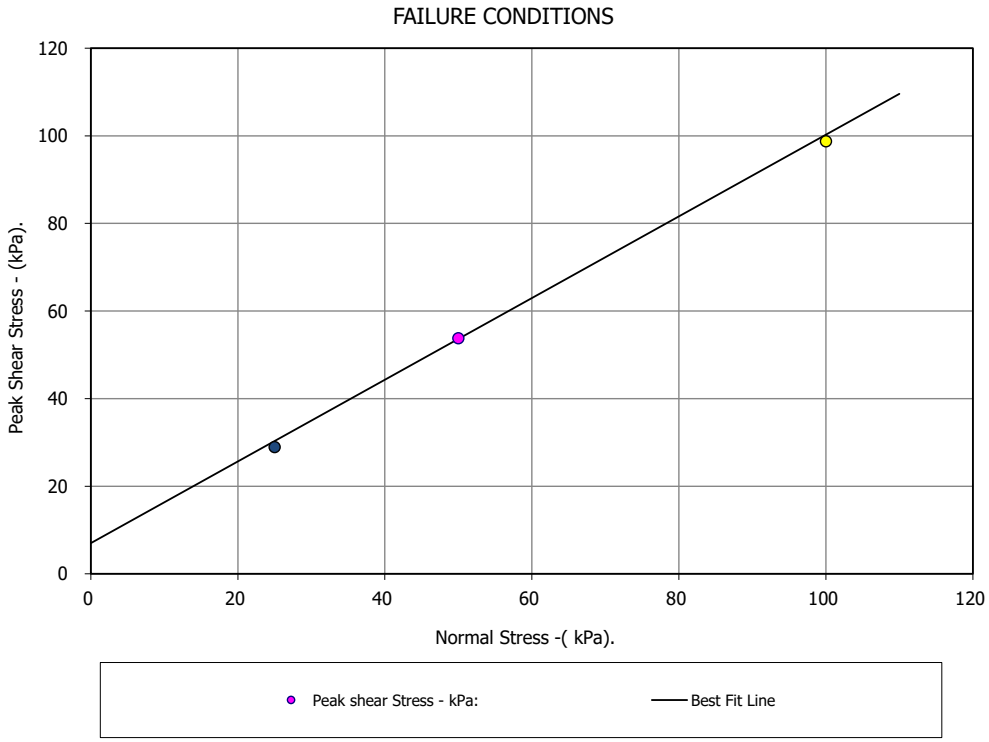
Borehole Number:	TP01	Depth from (m):	0.00
Sample Number :		Depth to (m):	

Sample Type:	B
Particle Density - Mg/m3:	2.65 (Assumed)
Specimen Tested:	Submerged, Remoulded (Light Tamping) Material above 2mm removed.

Sample Description:
Brown silty SAND

STAGE	**1**	**2**	**3**
Initial Conditions			
Height - mm:	24.98	24.98	24.98
Length - mm:	60.00	60.00	60.00
Moisture Content - %:	19	19	19
Bulk Density - Mg/m3:	1.91	1.91	1.91
Dry Density - Mg/m3:	1.61	1.61	1.61
Voids Ratio:	0.6509	0.6499	0.6504
Degree of Saturation - %:	76.94	77.07	77.00
Normal Pressure- kPa	25	50	100
Consolidation			
Consolidated Height - mm:	24.93	24.74	24.20
Shear			
Rate of Horizontal Displacement (mm/min)	0.500	0.500	0.500
Horizontal Displacement at Peak Shear Stress (mm)	2.61	3.25	4.24
Peak shear Stress - kPa:	29	54	99

PEAK	
Angle of Shearing Resistance:(θ)	**43.0**
Effective Cohesion - kPa:	**7.0**



Contract No.:
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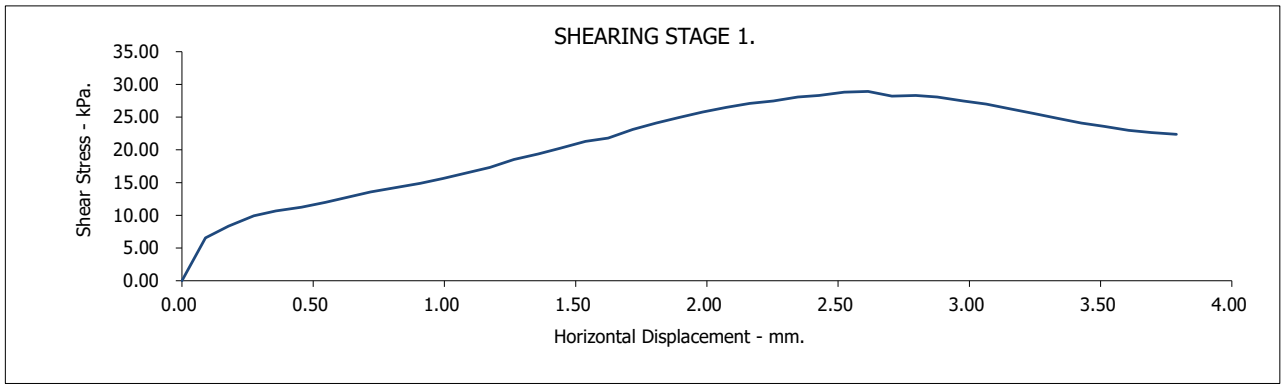
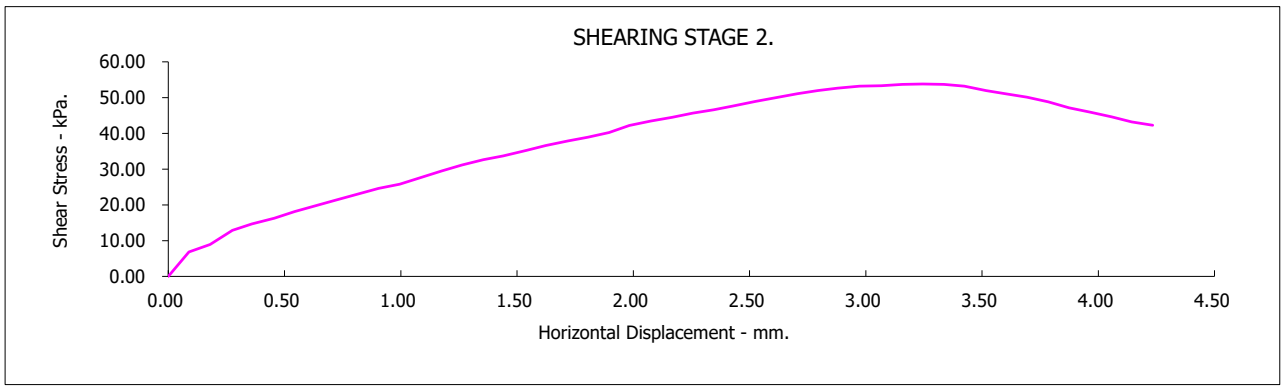
IOS

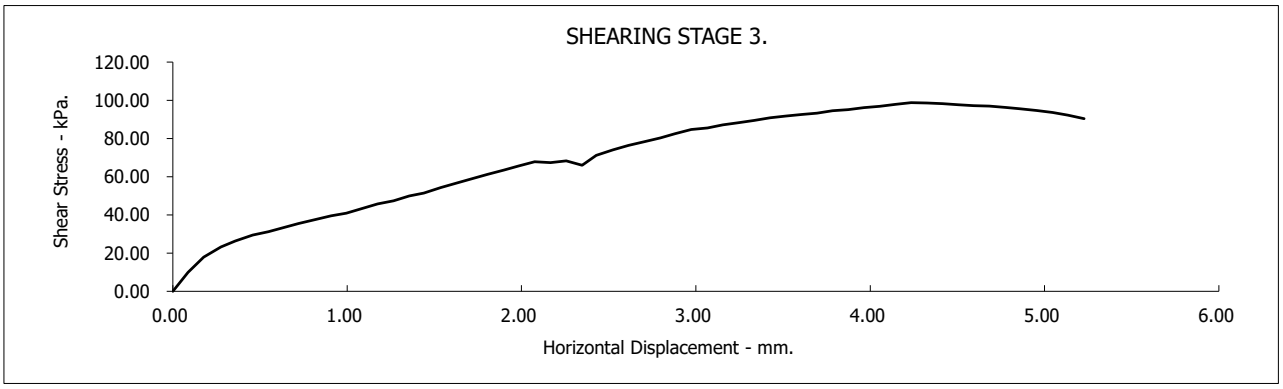
Client Ref Number:

23135.00

Borehole Number: TP01 Depth from (m): 0.00
Sample Number : Depth to (m):







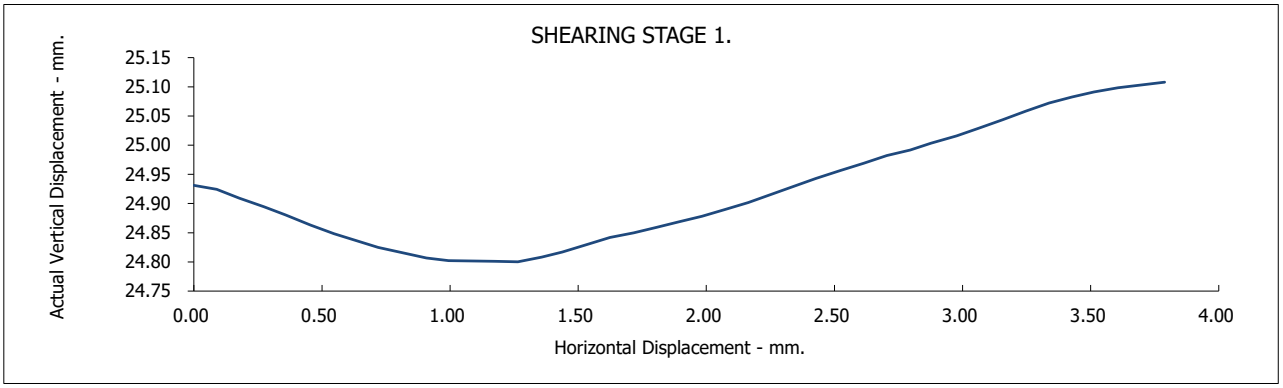
IOS

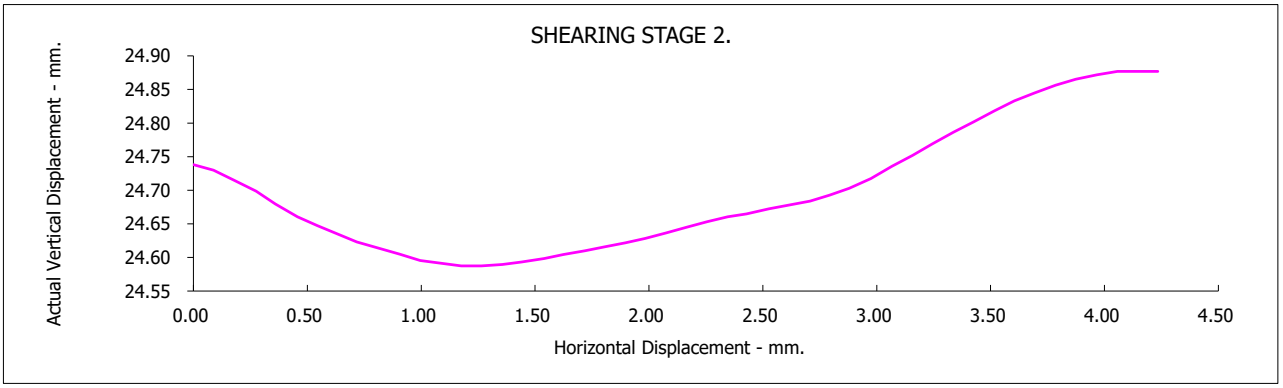
Contract No.: **67151**

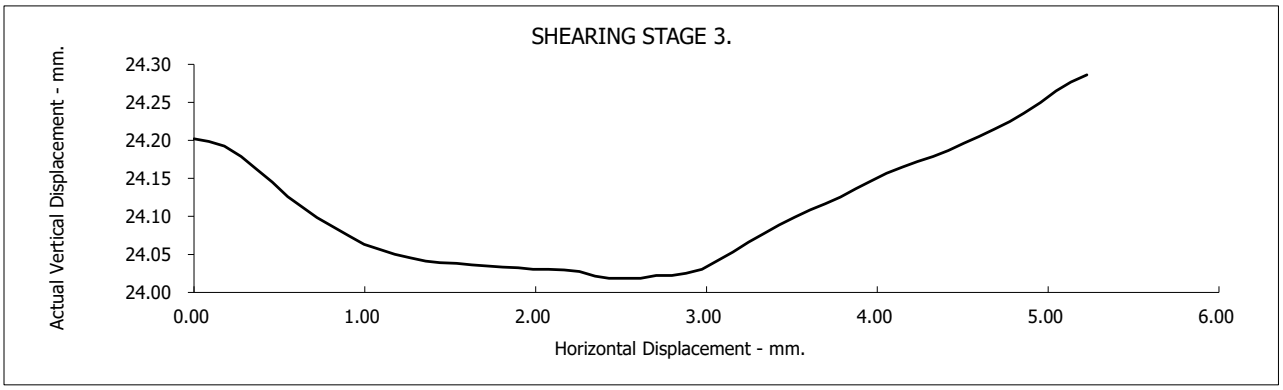
Client Ref Number: **23135.00**

Figure.

Borehole Number: TP01 Depth from (m): 0.00
Sample Number : Depth to (m):







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Client Ref Number:
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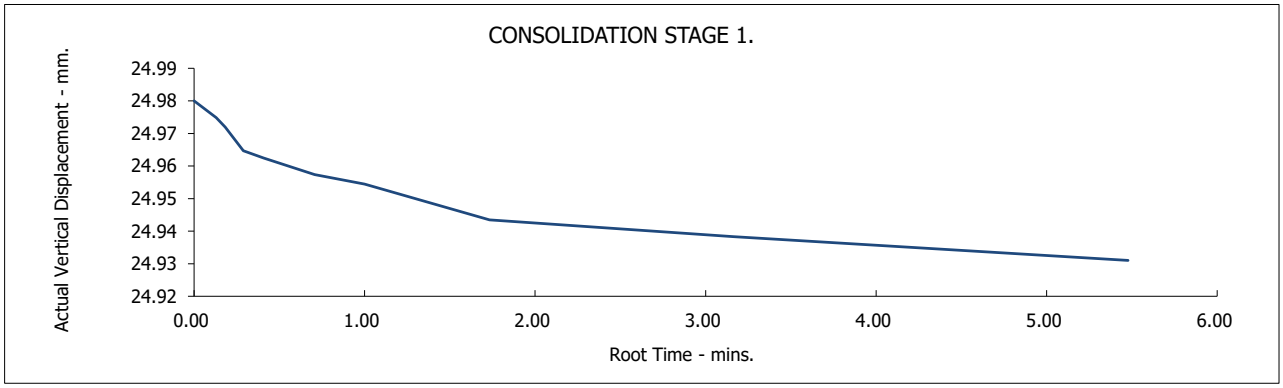
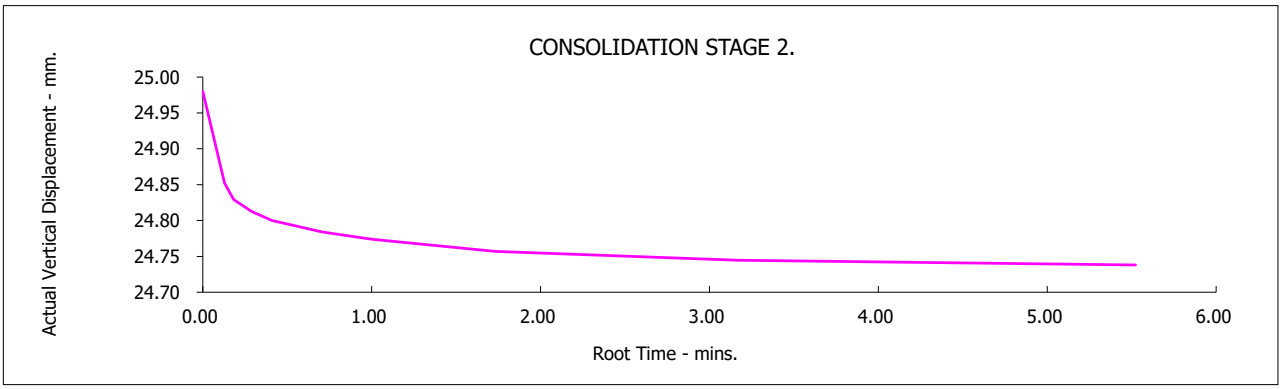
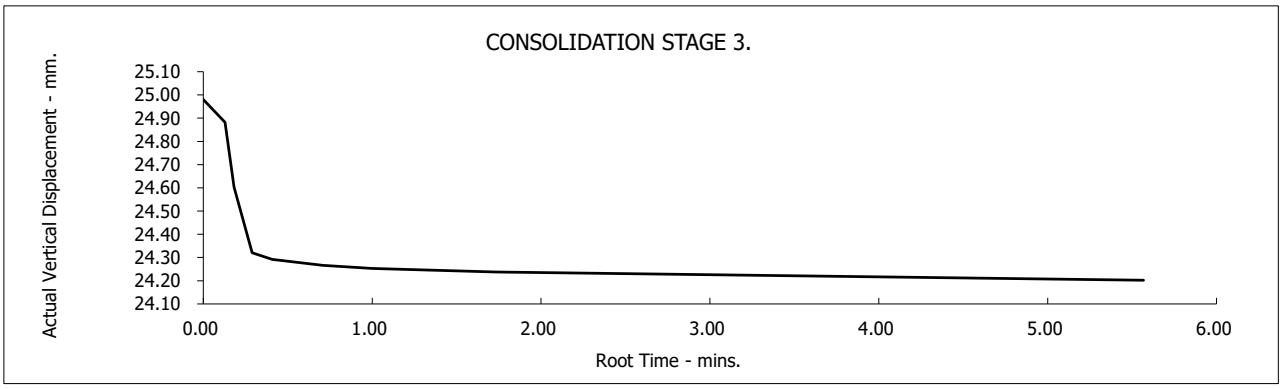
Borehole Number: TP01 Depth from (m): 0.00
Sample Number : Depth to (m):







UKAS TESTING 2788

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Contract No.: **67151**

Client Ref Number: **23135.00**

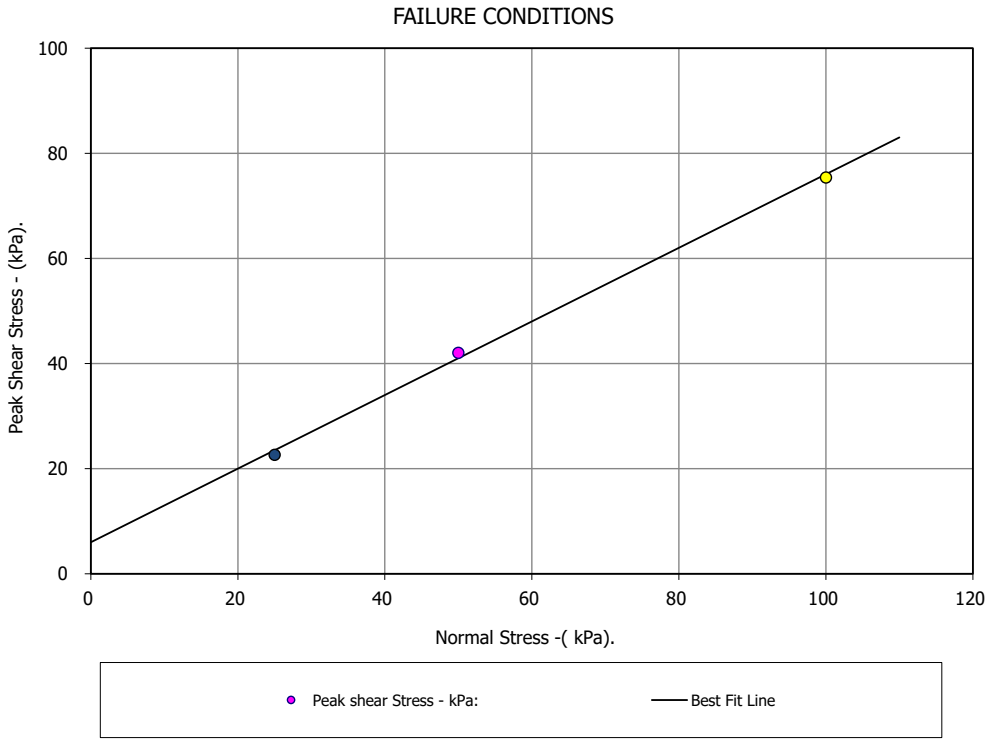
Borehole Number:	TP02	Depth from (m):	0.00
Sample Number :		Depth to (m):	

Sample Type:	B
Particle Density - Mg/m3:	2.65 (Assumed)
Specimen Tested:	Submerged, Remoulded (Light Tamping) Material above 2mm removed.

Sample Description:
Brown silty SAND

STAGE	**1**	**2**	**3**
Initial Conditions			
Height - mm:	25.03	25.03	25.03
Length - mm:	60.00	60.00	60.00
Moisture Content - %:	18	18	18
Bulk Density - Mg/m3:	1.70	1.69	1.70
Dry Density - Mg/m3:	1.44	1.43	1.43
Voids Ratio:	0.8453	0.8485	0.8478
Degree of Saturation - %:	57.07	56.85	56.90
Normal Pressure- kPa	25	50	100
Consolidation			
Consolidated Height - mm:	24.49	23.85	24.09
Shear			
Rate of Horizontal Displacement (mm/min)	0.500	0.500	0.500
Horizontal Displacement at Peak Shear Stress (mm)	2.07	2.80	3.97
Peak shear Stress - kPa:	23	42	75

PEAK	
Angle of Shearing Resistance:(θ)	**35.0**
Effective Cohesion - kPa:	**6.0**



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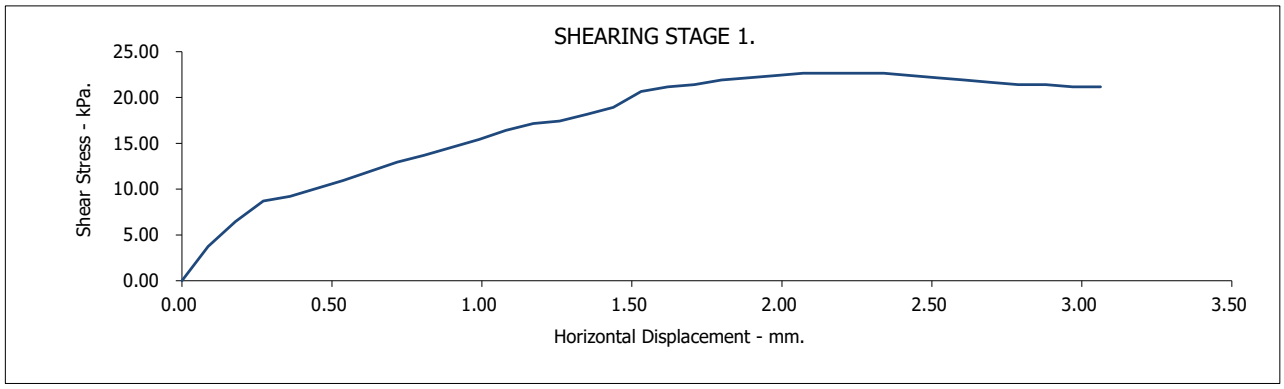
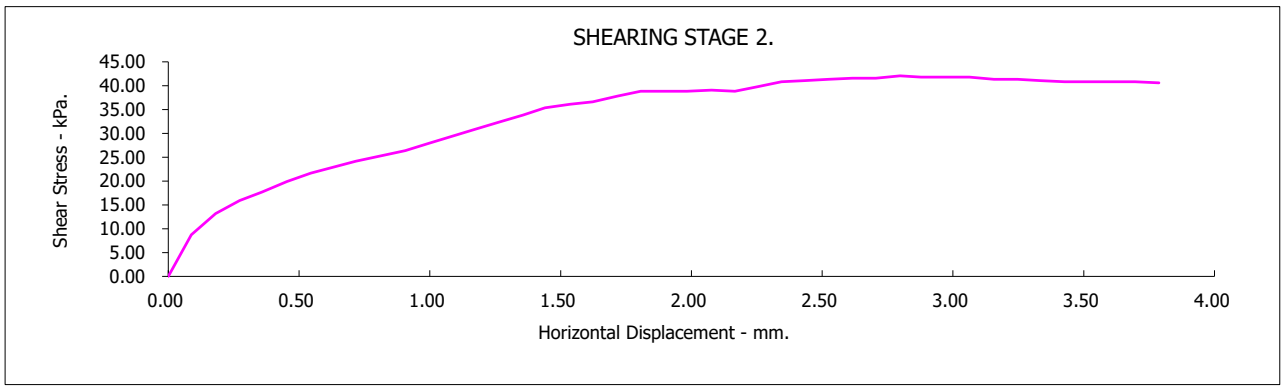
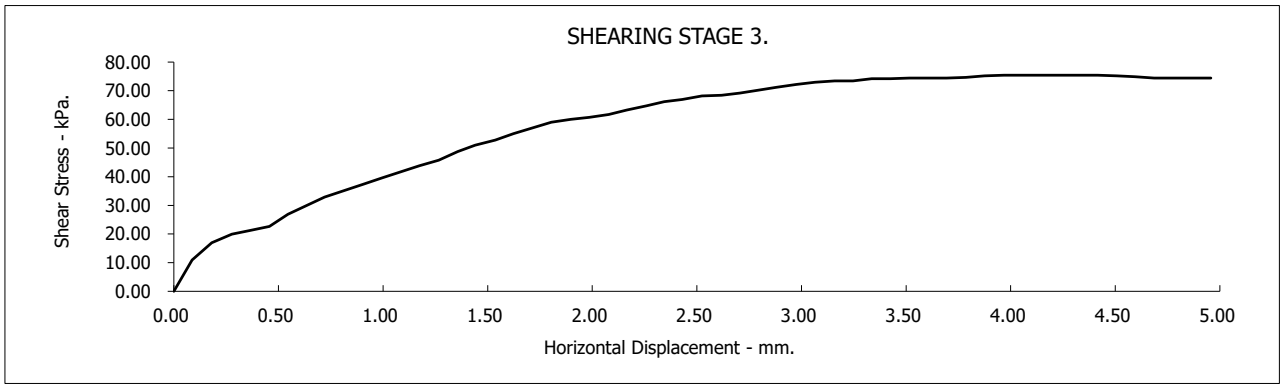
Client Ref Number:

23135.00

Borehole Number: TP02 Depth from (m): 0.00
Sample Number : Depth to (m):







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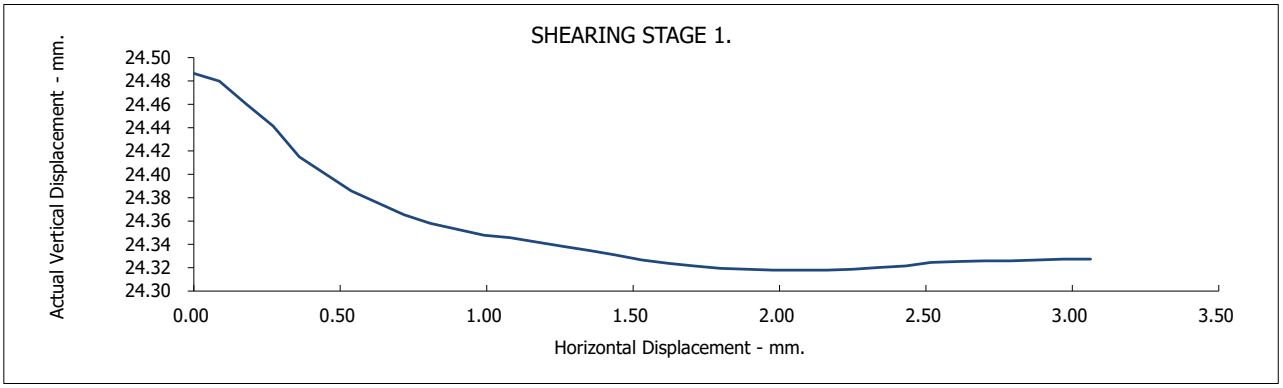
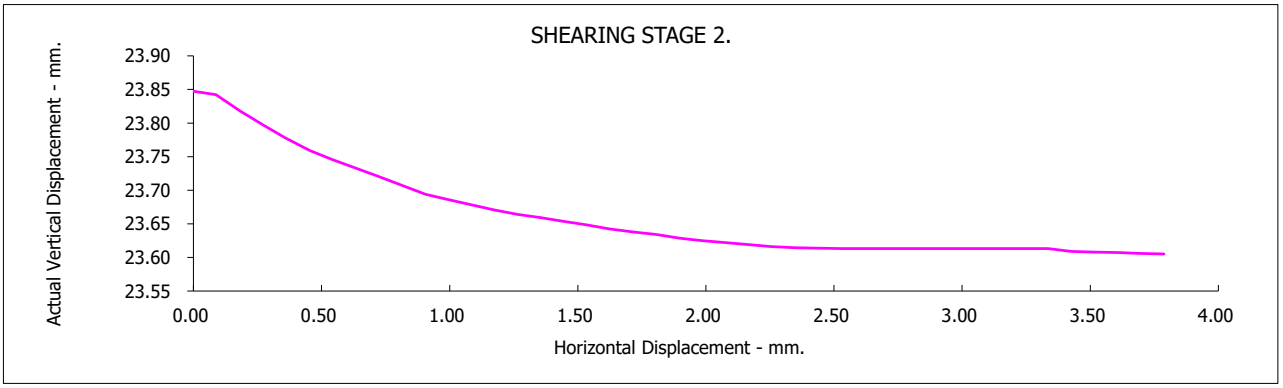
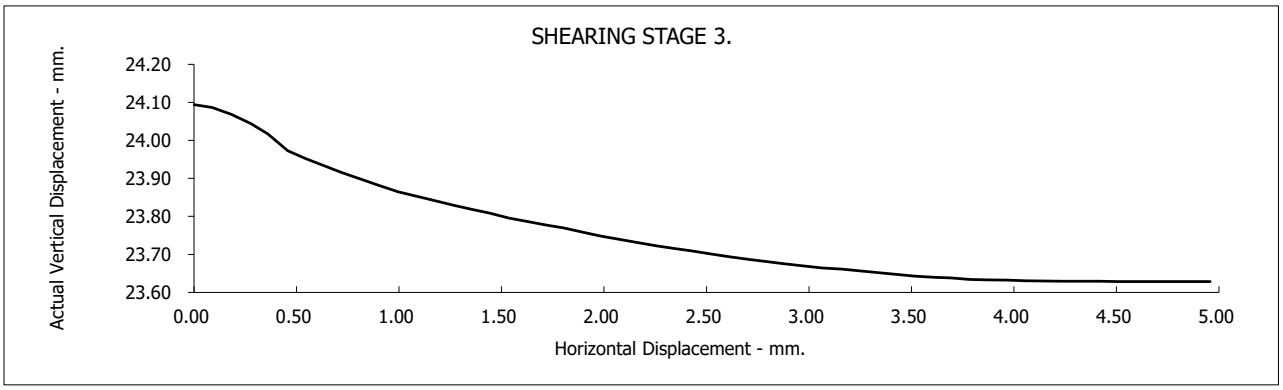
Client Ref Number: **23135.00**

Figure.

Borehole Number: TP02 Depth from (m): 0.00
Sample Number : Depth to (m):







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Client Ref Number:
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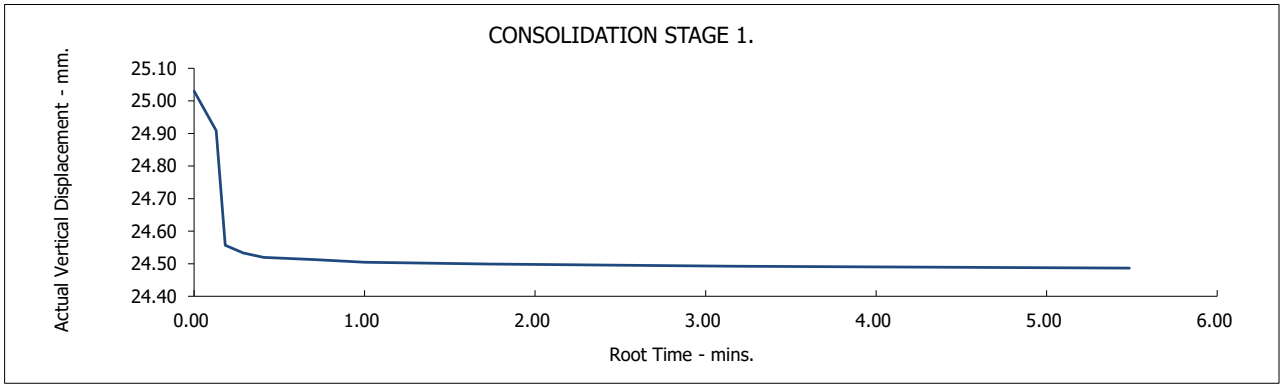
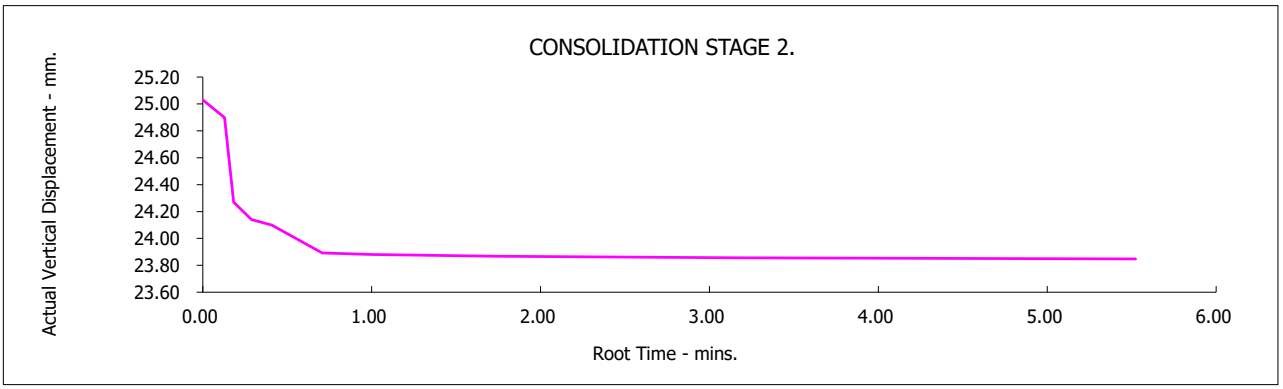
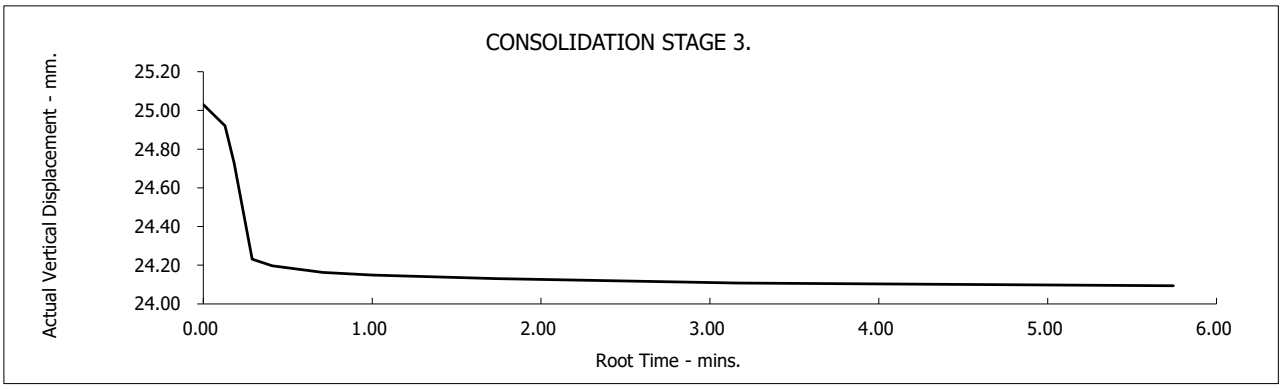
Borehole Number: TP02 Depth from (m): 0.00
Sample Number : Depth to (m):







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Contract No.: **67151**

Client Ref Number: **23135.00**

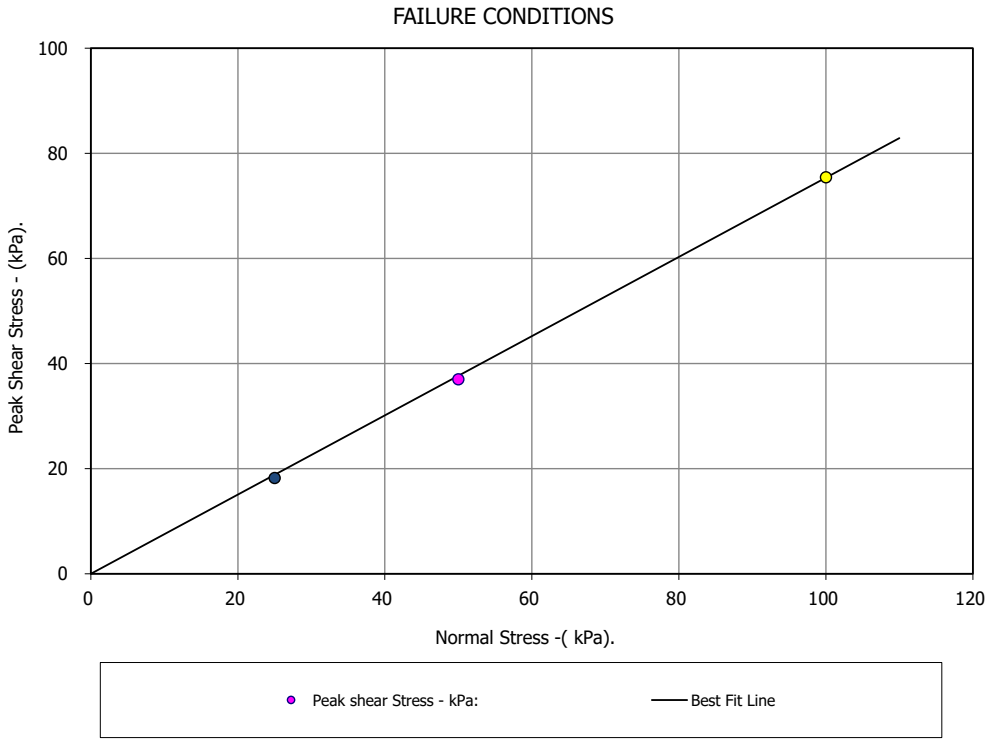
Borehole Number:	TP03	Depth from (m):	0.00
Sample Number :		Depth to (m):	

Sample Type:	B
Particle Density - Mg/m3:	2.65 (Assumed)
Specimen Tested:	Submerged, Remoulded (Light Tamping) Material above 2mm removed.

Sample Description:
Brown silty SAND

STAGE	**1**	**2**	**3**
Initial Conditions			
Height - mm:	23.30	23.30	23.30
Length - mm:	60.00	60.00	60.00
Moisture Content - %:	18	18	18
Bulk Density - Mg/m3:	1.47	1.47	1.47
Dry Density - Mg/m3:	1.25	1.25	1.25
Voids Ratio:	1.1251	1.1211	1.1220
Degree of Saturation - %:	42.25	42.40	42.36
Normal Pressure- kPa	25	50	100
Consolidation			
Consolidated Height - mm:	22.31	21.98	21.23
Shear			
Rate of Horizontal Displacement (mm/min)	0.500	0.500	0.500
Horizontal Displacement at Peak Shear Stress (mm)	3.51	5.94	7.48
Peak shear Stress - kPa:	18	37	75

PEAK	
Angle of Shearing Resistance:(θ)	**37.0**
Effective Cohesion - kPa:	**0.0**



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Client Ref Number:
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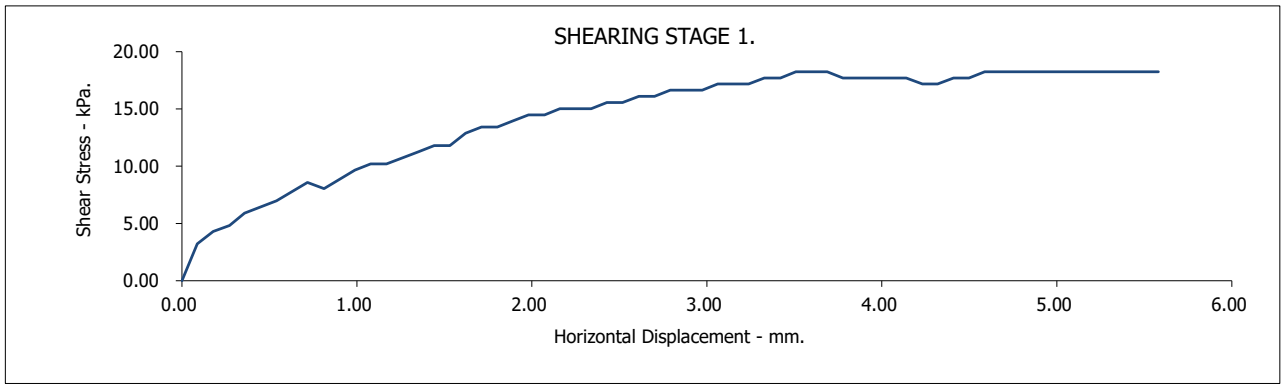
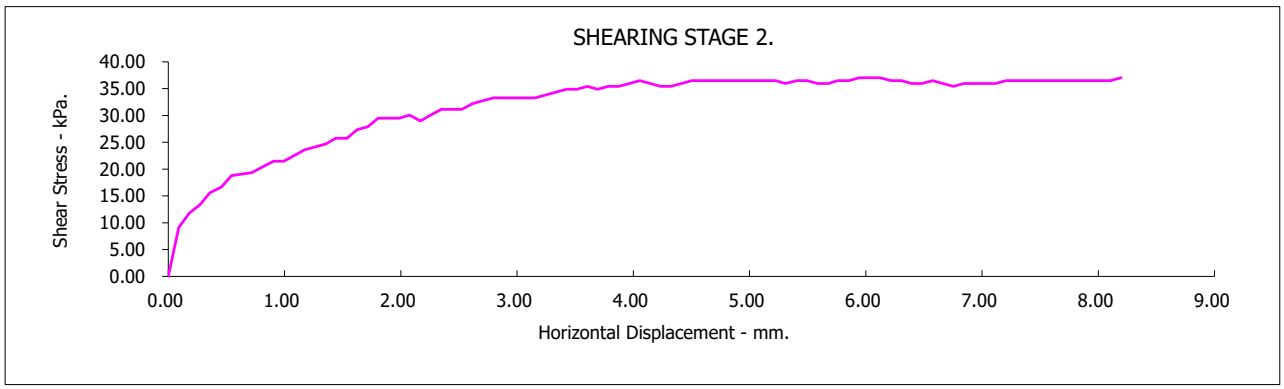
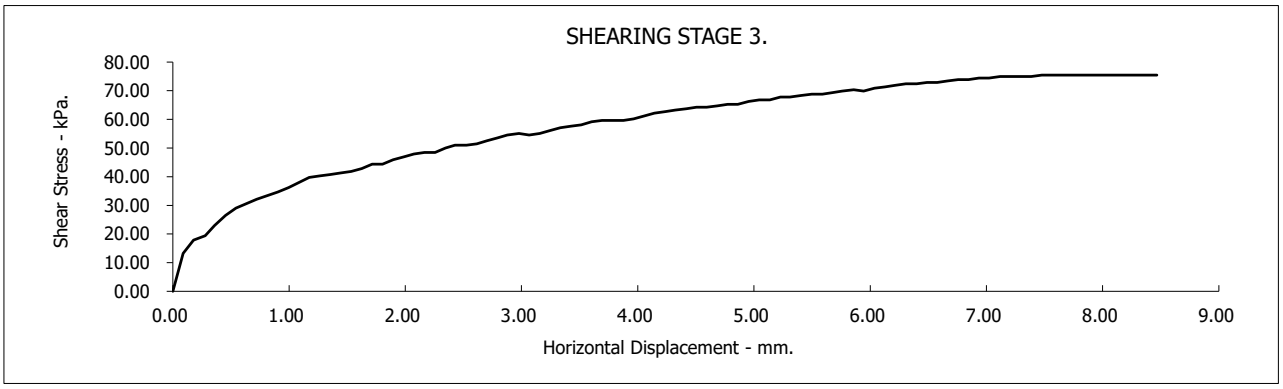
Borehole Number: TP03 Depth from (m): 0.00
Sample Number : Depth to (m):







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Client Ref Number:
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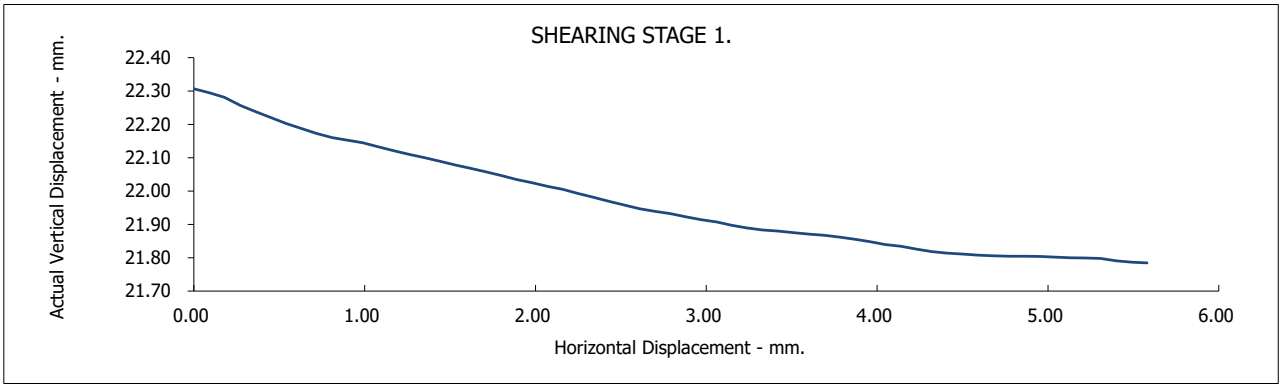
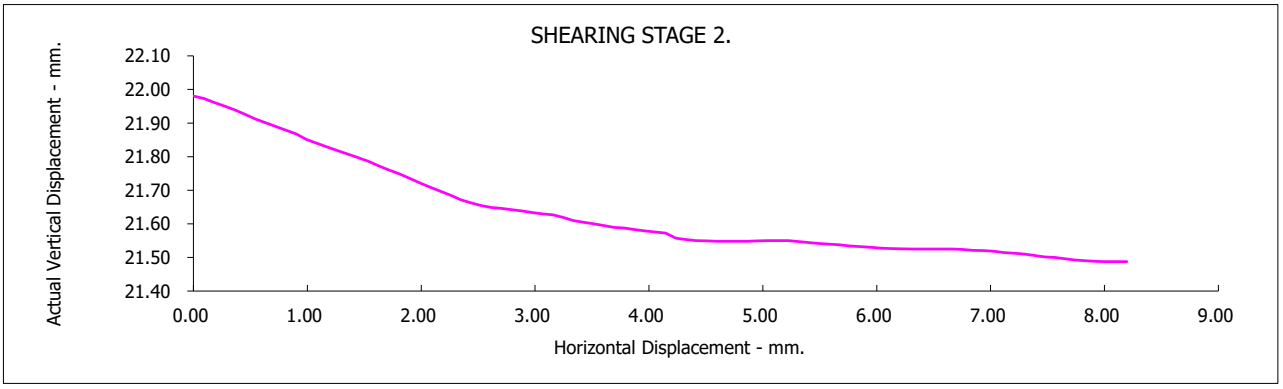
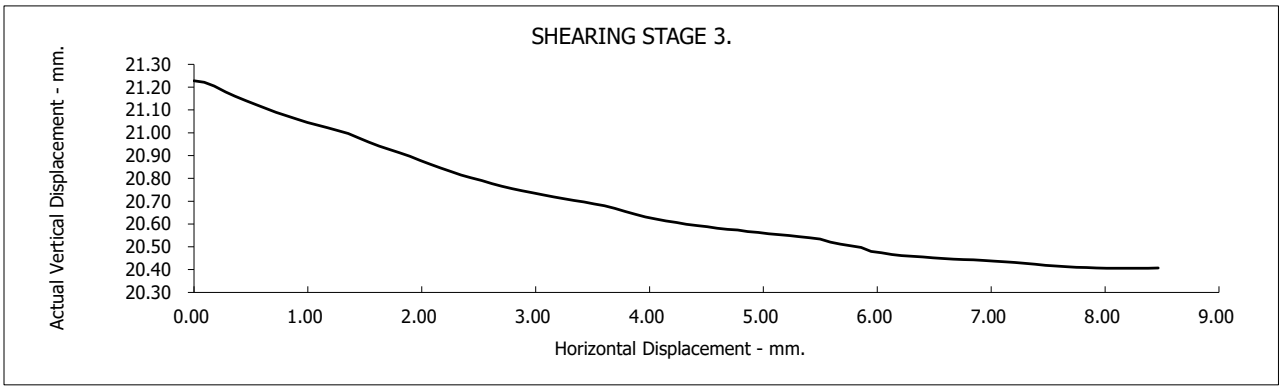
Figure.

Borehole Number: TP03 Depth from (m): 0.00
Sample Number : Depth to (m):







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Client Ref Number:
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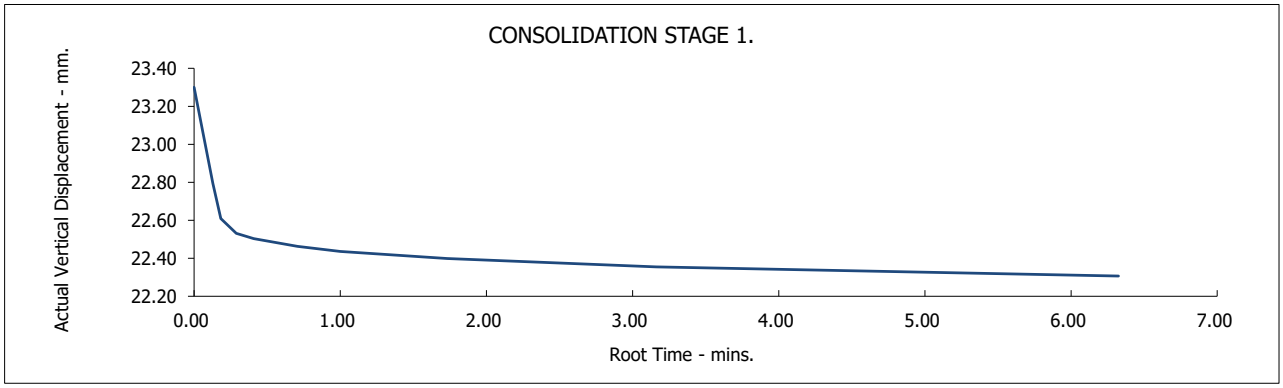
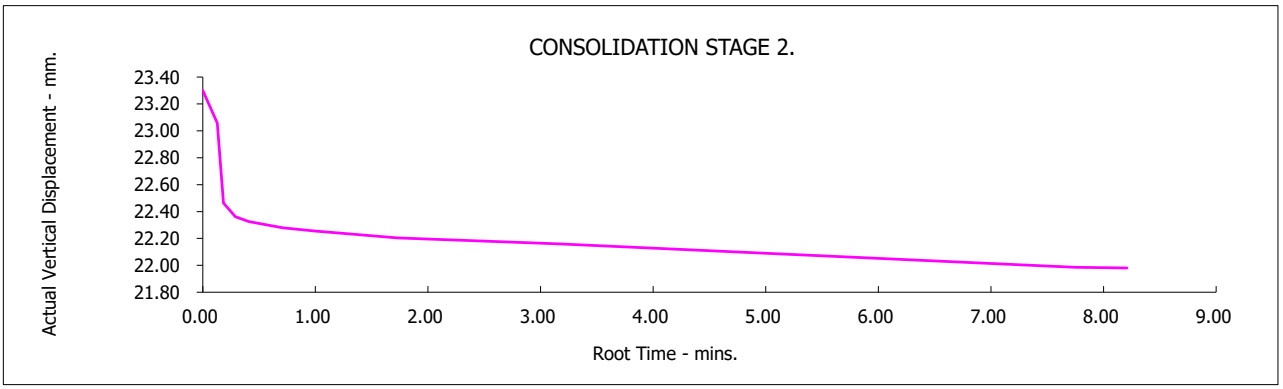
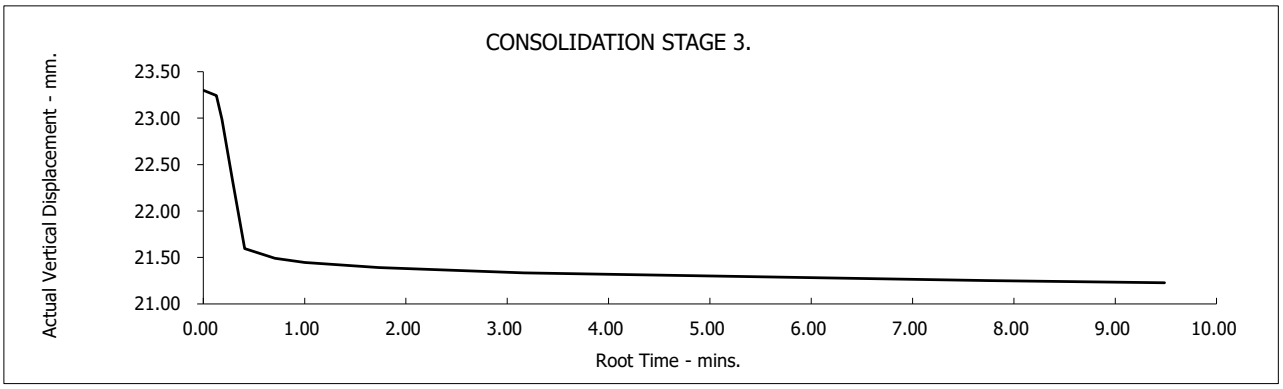
Borehole Number: TP03 Depth from (m): 0.00
Sample Number : Depth to (m):







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