THURBER ENGINEERING LTD.

April 27, 2020 File: 26141

Associated Engineering Ltd.
#500 - 2889 East 12th Avenue
Vancouver, BC,
V5M 4T5

Attention: Priscilla Tsang, P.Eng.

HIGHWAY 1 - 216 STREET TO 264 STREET WIDENING
GEOTECHNICAL INVESTIGATION FACTUAL REPORT

Dear Priscilla:

1. INTRODUCTION

Thurber was retained by Associated Engineering Ltd. to provide geotechnical design input for the Functional Design of the BC Ministry of Transportation and Infrastructure's (MoTI) Highway 1 - 216 Street to 264 Street Widening project. The major components of the project include:

- Widening of approximately 10 km of Highway 1 to accommodate eastbound and westbound HOV lanes between the 216 Street and the 264 Street Interchanges;
- Widening of Highway 1 to support westbound truck climbing lane between the 232 Street and the 216 Street Interchanges;
- Reconfiguration of the 232 Street Interchange including replacement of the existing underpass structure and a new NB to WB flyover;
- Demolition and reconstruction of the existing Glover Road underpass structure; and
- Demolition and reconstruction of the existing Canadian Pacific Railway (CPR) underpass structure.

This letter provides Thurber's factual geotechnical data collected for the project. It is a condition of this letter that Thurber's performance of its professional services is subject to the attached Statement of Limitations and Conditions.

2. EXISTING GEOTECHNICAL INFORMATION

Existing geotechnical information available for the project includes the following:

- *232nd Street and 72nd Avenue Intersection Upgrade* project completed by Thurber Engineering Ltd. on March 22, 2013. This letter includes seven test pits that were completed to depths of approximately 2.7 m to 3.0 m along the edge of the existing 232nd Street and 72nd Avenue embankments.

- *Highway 1 Eastbound 232nd to 264th Truck Climbing Lane Project 100% Design Geotechnical Recommendations* memo completed by Thurber on September 26, 2012. This report includes two test holes completed to approximately 20 m depth, one at each abutment for the 248th bridge replacement. 58 test pits were completed in the highway median to between 2 m and 5 m depth. Six solid stem auger and CPT holes were also completed within the highway median to depths between 15 m and 19 m (4 m to 18 for the CPTs).

- *Final Geotechnical Design Report – 232nd Street Grade Separation Overpass* completed by EXP on November 22, 2011. This report is for a grade separation north of the Highway 1 / 232nd Street Interchange; the subsurface conditions are similar to those encountered closer to the highway. The report includes three cone penetration tests (CPTs) to 40 m depth, four auger test holes completed to between 9 m and 18 m depth. Four Shelby tube samples were collected for consolidation, water content, and Atterberg limits testing.

- *Geotechnical Investigation Eastbound Climbing Lane Highway 1 – 232nd to 240th* completed by Golder Associates on January 23, 2009. The report includes 11 test pits completed to between 2.4 m and 5.5 m depth.

- *Geotechnical Report Highway 1 – 202 Street to 216 Street Highway Widening and 216 Street Interchange* completed by Tetra Tech EBA Inc. on June 28, 2016. The report includes geotechnical investigation and design recommendations for the Highway 1 widening west of this project site. The geotechnical investigation includes three CPTs completed to between 16.4 m and 21.5 m depth, one seismic CPT completed to 16.8 m depth, two mud-rotary test holes drilled to between 27 m and 30 m depth and 20 solid stem auger test holes drilled to between 3 m and 6 m depths. Numerous other historical test holes between 202 Street and 208 Street were included in the report.

- *Burnaby and Langley Freeway Sections of the Trans-Canada Highway* by Foundation of Canada Engineering Corporation and the BC Department of Highway on August 15, 1965. The report describes the conditions encountered during construction within the Burnaby and Langley Freeway sections and provides insight regarding construction techniques as well as field and laboratory testing.

- *Estimating Undrained Shear Strength of Clay from Cone Penetration Tests* thesis completed by James Greig in September 1985 as part of his Masters of Applied Science Degree. This thesis provides cone penetration testing and correlations between the CPT and undrained shear strength of the silty clay at both the CP Rail crossing and the 232nd Interchange.

The historical test holes, CPTs and test pits have been included on our Investigation Location Plan drawings (Dwg. 26141-1 to -6). The test hole logs, CPT logs and test pit logs are attached.

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3. SURFICIAL GEOLOGY

According to the published surficial geology (Open File 3511, Geological Map of the Vancouver Metropolitan Area, 1998) the project is characterized by the following soil units:

- from 216 street to 236 Street: Capilano Sediments: Raised marine, deltaic and fluvial deposits. Mainly marine silt loam to clay loam with minor sand, silt and stony glacio-marine material, up to 60+ m thick.
- from 236 street to 238 Street: Upland Peat to 8 m or more thick.
- from 238 street to 252 Street: Fort Langley Formation: proglacial deltaic gravel and sand.
- from 252 street to 264 Street: Fort Langley Formation: glaciomarine stony silt to loamy clay, 8 to 100 m thick.

4. GEOTECHNICAL INVESTIGATION

4.1 Overview

Thurber prepared a geotechnical investigation work plan for review by MoTI. The work plan comprised of solid stem auger test holes, cone penetration testing, and test pitting. Thurber completed the geotechnical investigation between November 12 and November 23, 2019 following approval of the work plan.

During the investigation, the soil conditions were logged in the field by qualified personnel from Thurber. Representative disturbed samples were collected and subjected to laboratory testing in Thurber's laboratory.

The completed investigation locations were determined in the field using a hand-held GPS unit Elevations were estimated based on survey drawings provided to Thurber by AE. The coordinates and elevations of completed investigation locations are provided on the test hole and test pit logs.

4.2 Test Holes and CPTs

Eight solid-stem auger test holes and cone penetration tests (CPTs) were completed through the shoulder of Highway 1 or on gravel pull-outs as shown on the attached Investigation Location Plans (Dwg. 26141-1 to -2). The CPTs were completed at each location to depths ranging between approximately 37 m to 50 m. Following completion of the CPT, a solid stem auger was used to drill to 20 m depth within the same hole.

The test holes were completed with a truck-mounted rig operated by Southlands Drilling Co. Ltd. The CPT profiling and dissipation testing were completed by Schwartz Soil Tech Inc. using pushing equipment mounted on the Southlands rigs. Test holes were backfilled with soil cuttings with bentonite seals in accordance with the BC Groundwater Protection Regulations. The asphalt surface was reinstated with cold patch asphalt equal in thickness to the existing asphalt, compacted in two lifts.

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4.3 In-Situ Testing and Sampling

In-situ testing was completed to assess soil parameters such as permeability, strength and relative density. In-situ test results are presented on the relevant test hole and CPT logs.

4.3.1 Cone Penetration Test (CPT)

Conventional CPT profiling was completed at eight locations (TH/CPT19-01 to -08). The CPT logs are attached. Soil descriptions on the CPT profiles were provided by Schwartz and are interpreted from the CPT data based on published correlations. These interpreted soil conditions should be considered approximate and may differ from the actual soil conditions.

4.3.2 Pore Pressure Dissipation (PPD)

The advancement of the CPT cone was halted at selected depths in each of the eight CPTs (TH/CPT19-01 to -08) to conduct PPD tests. The pore pressure variation was measured and recorded every second typically until 50% or more of the excess pore pressure had dissipated. The dissipation test results are attached.

4.4 Test Pitting

16 test pits were completed within the median of Highway 1 as shown on the attached Plans (Dwg. 26141-1 to -6). The test pits were completed to about 3 m depth using an excavator operated by Backhoes Unlimited. The test pits were primarily used to identify stripping thickness in locations where test holes were not drilled. The test pits were also used to investigate embankment foundation conditions and characterize proposed cut materials.

The excavated soil was backfilled and bucket compacted in the test pit excavation upon completion of the test pit.

5. LABORATORY TESTING

Disturbed samples retrieved from the investigation were returned to our Vancouver laboratory for routine visual classification and moisture content determination. Atterberg Limits were completed on select disturbed samples in our laboratory.

5.1 Soil Description and Classification

Samples were subject to routine classification assessment in our laboratory independent of the classification completed in the field. Classifications were based on visual and tactile assessment of samples in general accordance with the Canadian Foundation Engineering Manual (4th Edition). Soil samples were further classified under the Unified Soil Classification System (USCS) and the group symbols are reported in the comments column of the test hole logs.

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STATEMENT OF LIMITATIONS AND CONDITIONS

1. STANDARD OF CARE

This Report has been prepared in accordance with generally accepted engineering or environmental consulting practices in the applicable jurisdiction. No other warranty, expressed or implied, is intended or made.

2. COMPLETE REPORT

All documents, records, data and files, whether electronic or otherwise, generated as part of this assignment are a part of the Report, which is of a summary nature and is not intended to stand alone without reference to the instructions given to Thurber by the Client, communications between Thurber and the Client, and any other reports, proposals or documents prepared by Thurber for the Client relative to the specific site described herein, all of which together constitute the Report.

IN ORDER TO PROPERLY UNDERSTAND THE SUGGESTIONS, RECOMMENDATIONS AND OPINIONS EXPRESSED HEREIN, REFERENCE MUST BE MADE TO THE WHOLE OF THE REPORT. THURBER IS NOT RESPONSIBLE FOR USE BY ANY PARTY OF PORTIONS OF THE REPORT WITHOUT REFERENCE TO THE WHOLE REPORT.

3. BASIS OF REPORT

The Report has been prepared for the specific site, development, design objectives and purposes that were described to Thurber by the Client. The applicability and reliability of any of the findings, recommendations, suggestions, or opinions expressed in the Report, subject to the limitations provided herein, are only valid to the extent that the Report expressly addresses proposed development, design objectives and purposes, and then only to the extent that there has been no material alteration to or variation from any of the said descriptions provided to Thurber, unless Thurber is specifically requested by the Client to review and revise the Report in light of such alteration or variation.

4. USE OF THE REPORT

The information and opinions expressed in the Report, or any document forming part of the Report, are for the sole benefit of the Client. NO OTHER PARTY MAY USE OR RELY UPON THE REPORT OR ANY PORTION THEREOF WITHOUT THURBER'S WRITTEN CONSENT AND SUCH USE SHALL BE ON SUCH TERMS AND CONDITIONS AS THURBER MAY EXPRESSLY APPROVE. Ownership in and copyright for the contents of the Report belong to Thurber. Any use which a third party makes of the Report, is the sole responsibility of such third party. Thurber accepts no responsibility whatsoever for damages suffered by any third party resulting from use of the Report without Thurber's express written permission.

5. INTERPRETATION OF THE REPORT

a) Nature and Exactness of Soil and Contaminant Description: Classification and identification of soils, rocks, geological units, contaminant materials and quantities have been based on investigations performed in accordance with the standards set out in Paragraph 1. Classification and identification of these factors are judgmental in nature. Comprehensive sampling and testing programs implemented with the appropriate equipment by experienced personnel may fail to locate some conditions. All investigations utilizing the standards of Paragraph 1 will involve an inherent risk that some conditions will not be detected and all documents or records summarizing such investigations will be based on assumptions of what exists between the actual points sampled. Actual conditions may vary significantly between the points investigated and the Client and all other persons making use of such documents or records with our express written consent should be aware of this risk and the Report is delivered subject to the express condition that such risk is accepted by the Client and such other persons. Some conditions are subject to change over time and those making use of the Report should be aware of this possibility and understand that the Report only presents the conditions at the sampled points at the time of sampling. If special concerns exist, or the Client has special considerations or requirements, the Client should disclose them so that additional or special investigations may be undertaken which would not otherwise be within the scope of investigations made for the purposes of the Report.

b) Reliance on Provided Information: The evaluation and conclusions contained in the Report have been prepared on the basis of conditions in evidence at the time of site inspections and on the basis of information provided to Thurber. Thurber has relied in good faith upon representations, information and instructions provided by the Client and others concerning the site. Accordingly, Thurber does not accept responsibility for any deficiency, misstatement or inaccuracy contained in the Report as a result of misstatements, omissions, misrepresentations, or fraudulent acts of the Client or other persons providing information relied on by Thurber. Thurber is entitled to rely on such representations, information and instructions and is not required to carry out investigations to determine the truth or accuracy of such representations, information and instructions.

c) Design Services: The Report may form part of design and construction documents for information purposes even though it may have been issued prior to final design being completed. Thurber should be retained to review final design, project plans and related documents prior to construction to confirm that they are consistent with the intent of the Report. Any differences that may exist between the Report's recommendations and the final design detailed in the contract documents should be reported to Thurber immediately so that Thurber can address potential conflicts.

d) Construction Services: During construction Thurber should be retained to provide field reviews. Field reviews consist of performing sufficient and timely observations of encountered conditions in order to confirm and document that the site conditions do not materially differ from those interpreted conditions considered in the preparation of the report. Adequate field reviews are necessary for Thurber to provide letters of assurance, in accordance with the requirements of many regulatory authorities.

6. RELEASE OF POLLUTANTS OR HAZARDOUS SUBSTANCES

Geotechnical engineering and environmental consulting projects often have the potential to encounter pollutants or hazardous substances and the potential to cause the escape, release or dispersal of those substances. Thurber shall have no liability to the Client under any circumstances, for the escape, release or dispersal of pollutants or hazardous substances, unless such pollutants or hazardous substances have been specifically and accurately identified to Thurber by the Client prior to the commencement of Thurber's professional services.

7. INDEPENDENT JUDGEMENTS OF CLIENT

The information, interpretations and conclusions in the Report are based on Thurber's interpretation of conditions revealed through limited investigation conducted within a defined scope of services. Thurber does not accept responsibility for independent conclusions, interpretations, interpolations and/or decisions of the Client, or others who may come into possession of the Report, or any part thereof, which may be based on information contained in the Report. This restriction of liability includes but is not limited to decisions made to develop, purchase or sell land.

Plotted: December 23, 2019

NOTES:
1. BASE PLAN TAKEN FROM GOOGLE EARTH.
2. TEST HOLE AND TEST PIT LOCATIONS ARE APPROXIMATE.

LEGEND:

- TEST HOLE / CPT (THURBER 2019)
- TEST HOLE / AUGER HOLE (THURBER 2012)
- TEST HOLE / AUGER HOLE (MOTI 2011)
- AUGER HOLE / CPT (THURBER 2012)
- AUGER HOLE / CPT (EXP 2010)
- TEST PIT (THURBER 2019)
- TEST PIT (THURBER 2012 / 2013)
- TEST PIT (GOLDER 2009)

THURBER ENGINEERING LTD.

CLIENT: ASSOCIATED ENGINEERING LTD.

INVESTIGATION LOCATION PLAN

HIGHWAY 1
216 ST. TO 264 ST. WIDENING
LANGLEY, B.C.

DESIGNED	DRAWN	APPROVED
IFA	MOM	

DATE	SCALE
23/12/19	1:4000

PROJECT No.	DWG. No.	REV.
26141	1	0

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CANCEL PRINTS BEARING EARLIER NUMBER

Plotted: December 23, 2019

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DATE	SCALE
23/12/19	1:4000

PROJECT No.	DWG. No.	REV.
26141	2	0

CANCEL PRINTS BEARING EARLIER NUMBER

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Plotted: December 23, 2019

INSET
SCALE= 1:2000

NOTES:
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THURBER ENGINEERING LTD.

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INVESTIGATION LOCATION PLAN

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216 ST. TO 264 ST. WIDENING
LANGLEY, B.C.

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IFA	MOM	

DATE	SCALE
23/12/19	1:4000

PROJECT No.	DWG. No.	REV.
26141	3	0

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CANCEL PRINTS BEARING EARLIER NUMBER

Plotted: December 23, 2019

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- AUGER HOLE / CPT (EXP 2010)
- TEST PIT (THURBER 2019)
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THURBER ENGINEERING LTD.

CLIENT: ASSOCIATED ENGINEERING LTD.

INVESTIGATION LOCATION PLAN

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216 ST. TO 264 ST. WIDENING
LANGLEY, B.C.

DESIGNED	DRAWN	APPROVED
IFA	MOM	

DATE	SCALE
23/12/19	1:4000

PROJECT No.	DWG. No.	REV.
26141	4	0

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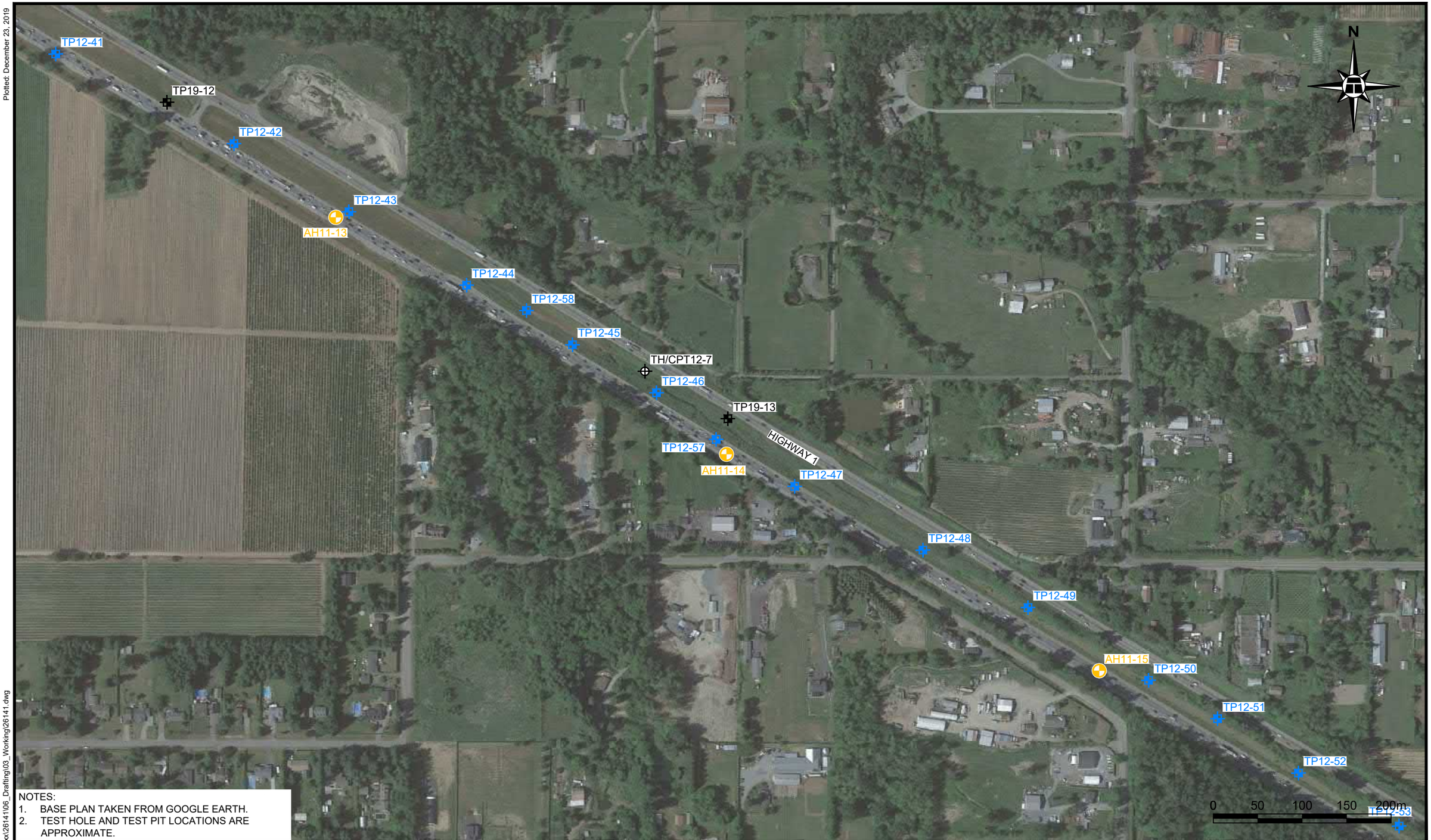
CANCEL PRINTS BEARING EARLIER NUMBER

Plotted: December 23, 2019



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THURBER ENGINEERING LTD.

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INVESTIGATION LOCATION PLAN

HIGHWAY 1
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LANGLEY, B.C.

DESIGNED	DRAWN	APPROVED
IFA	MOM	

DATE	SCALE
23/12/19	1:4000

PROJECT No.	DWG. No.	REV.
26141	5	0

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CANCEL PRINTS BEARING EARLIER NUMBER

Plotted: December 23, 2019

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- AUGER HOLE / CPT (EXP 2010)
- TEST PIT (THURBER 2019)
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THURBER ENGINEERING LTD.

CLIENT: ASSOCIATED ENGINEERING LTD.

INVESTIGATION LOCATION PLAN

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LANGLEY, B.C.

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IFA	MOM	

DATE	SCALE
23/12/19	1:4000

PROJECT No.	DWG. No.	REV.
26141	6	0

CANCEL PRINTS BEARING EARLIER NUMBER

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THURBER

2019 Thurber Test Hole Logs

SUMMARY LOG

Drill Hole #: **TH19-01**

Ministry of Transportation and Infrastructure

Project: **Highway 1 - 216 Street to 264 Street Widening**

Location: Langley, B.C.

Prepared by: 26141
Thurber Engineering Ltd.

Logged by: IFA Reviewed by: CJC

Datum: 10U Alignment:

Northing/Easting: 5443585 , 529088 Station/Offset:

Elevation: 12.01 m

Date(s) Drilled: November 15, 2019

Drilling Company: Southland Drilling

Driller: Jeremy Levy

Drill Make/Model: Truck Drill #8

Drilling Method: Solid Stem Auger

DEPTH (m)	DRILLING DETAILS	Pocket Penetrometer / Shear Strength (kPa) 100 200 300 400; DYNAMIC CONE (BLOWS/300 mm); Natural Vane (KPa) / Remold Vane (KPa); SPT "N" (BLOWS/300 mm); W_P% W% W_L% 20 40 60 80	SAMPLE TYPE	SAMPLE NO	RECOVERY (%)	SOIL SYMBOL	SOIL DESCRIPTION	CLASSIFICATION	COMMENTS TESTING Drillers Estimate {G % S % F %}	ELEVATION (m)
0							ASPHALT (305 mm thick).			12
							0.3m			
		5.2		1			Grey-brown, gravelly SAND (ROADBASE).	SP		
							0.91m			
1		46.8		2			Firm to stiff, grey-brown, silty CLAY to SILT and CLAY with a trace of oxidation and organics.			11
2								CH		10
		63.4		3					Atterberg (Sa#3): PL:29% LL:78%	
3							3.1m			9
							Very soft to soft, grey, silty CLAY to SILT and CLAY with traces of oxidation and organics.			
4		44.6		4						8
								CH		
5										7
		47		5						
6							6.1m			6
							End of hole at required depth. Hole open to 3.1 m depth. No water observed upon completion of drilling.			
7										5
8										4
9										3
10										

Legend

Sample Type: A-Auger; C-Core; G-Grab; V-Vane; L#-Lab Sample; S-Split Spoon; O-Odex (air rotary); W-Wash (mud return); T-Shelby Tube

Final Depth of Hole: 6.1 m

Depth to Top of Rock:

SUMMARY LOG

Drill Hole #: **TH19-02**

Ministry of Transportation and Infrastructure

Project: **Highway 1 - 216 Street to 264 Street Widening**

Location: Langley, B.C.

Prepared by: 26141 Thurber Engineering Ltd.

Logged by: IFA Reviewed by: CJC

Datum: 10U Alignment:

Northing/Easting: 5443541 , 529049 Station/Offset:

Elevation: 12.01 m

Date(s) Drilled: November 15, 2019

Drilling Company: Southland Drilling

Driller: Jeremy Levy

Drill Make/Model: Truck Drill #8

Drilling Method: Solid Stem Auger

DEPTH (m)	DRILLING DETAILS	Pocket Penetrometer / Shear Strength (kPa) 100 200 300 400; DYNAMIC CONE (BLOWS/300 mm); Natural Vane (KPa) / Remold Vane (KPa); SPT "N" (BLOWS/300 mm); W_P% W% W_L% 20 40 60 80	SAMPLE TYPE	SAMPLE NO	RECOVERY (%)	SOIL SYMBOL	SOIL DESCRIPTION	CLASSIFICATION	COMMENTS TESTING Drillers Estimate {G % S % F %}	ELEVATION (m)
0							ASPHALT (150 mm thick). 0.15m Brown SAND and GRAVEL (ROADBASE). 0.46m - 50 mm thick layer of silty SAND at 0.2 m depth	SP-SM/GP-GM		12
1		4:4		1			Stiff to very stiff, grey-brown, silty CLAY to SILT and CLAY with traces of oxidation and organics.			11
1		47.7		2						
2								CH		10
2		60		3			- firm to stiff below 2.3 m depth			
3										9
3							Soft to firm, grey, silty CLAY to SILT and CLAY. 3.35m			
4		47.1		4					Atterberg (Sa#4): PL:28% LL:70%	8
4							- soft to very soft, below 4.4 m depth			
5								CL/CH		7
5		37.7		5						
6							End of hole at required depth. 6.1m Hole open to 0.9 m depth. No water observed upon completion of drilling.			6
7										5
8										4
9										3
10										

Legend

Sample Type: A-Auger; C-Core; G-Grab; V-Vane; L#-Lab Sample; S-Split Spoon; O-Odex (air rotary); W-Wash (mud return); T-Shelby Tube

Final Depth of Hole: 6.1 m

Depth to Top of Rock:

MOT-SOIL-REV2-TEL MOD 26141 MOTI.GPJ MOT-DRAFT-REV2.GDT 7/1/20

SUMMARY LOG

Drill Hole #: **TH19-03**

Ministry of Transportation and Infrastructure

Project: **Highway 1 - 216 Street to 264 Street Widening**

Location: Langley, B.C.

Prepared by: 26141
Thurber Engineering Ltd.

Logged by: IFA Reviewed by: CJC

Datum: 10U Alignment:

Northing/Easting: 5443114 , 529781 Station/Offset:

Elevation: 13.01 m

Date(s) Drilled: November 16, 2019

Drilling Company: Southland Drilling

Driller: Jeremy Levy

Drill Make/Model: Truck Drill #8

Drilling Method: Solid Stem Auger

DEPTH (m)	DRILLING DETAILS	Pocket Penetrometer / Shear Strength (kPa) 100 200 300 400; DYNAMIC CONE (BLOWS/300 mm); Natural Vane (KPa) / Remold Vane (KPa); SPT "N" (BLOWS/300 mm); W_P% W% W_L% 20 40 60 80	SAMPLE TYPE	SAMPLE NO	RECOVERY (%)	SOIL SYMBOL	SOIL DESCRIPTION	CLASSIFICATION	COMMENTS TESTING Drillers Estimate {G % S % F %}	ELEVATION (m)
0		8.2		1			ASPHALT (150 mm thick). 0.15m Grey-brown, gravelly SAND (ROADBASE).	SP-SM		13
1		13.1		2			0.76m Compact to dense, grey-brown SAND with traces of silt and gravel.	SP-SM		12
2							2.13m			11
3		44.1		3			Very soft to soft, grey, silty CLAY to SILT and CLAY with a trace to some sand.	CH/CL		10
4		36.1		4						9
5		28.5		5					Atterberg (Sa#5): PL:16% LL:30%	8
6							6.1m End of hole at required depth. Hole open to 0.8 m depth. Water observed at 0.8 m depth upon completion of drilling.			7
7										6
8										5
9										4
10										

Legend

Sample Type: A-Auger; C-Core; G-Grab; V-Vane; L#-Lab Sample; S-Split Spoon; O-Odex (air rotary); W-Wash (mud return); T-Shelby Tube

Final Depth of Hole: 6.1 m

Depth to Top of Rock:

SUMMARY LOG

Drill Hole #: **TH19-04**

Ministry of Transportation and Infrastructure

Project: **Highway 1 - 216 Street to 264 Street Widening**

Location: Langley, B.C.

Prepared by: 26141
Thurber Engineering Ltd.

Logged by: IFA Reviewed by: CJC

Datum: 10U Alignment:

Northing/Easting: 5443124 , 529860 Station/Offset:

Elevation: 12.01 m

Date(s) Drilled: November 14, 2019
Drilling Company: Southland Drilling
Driller: Jeremy Levy
Drill Make/Model: Truck Drill #8
Drilling Method: Solid Stem Auger

DEPTH (m)	DRILLING DETAILS	Pocket Penetrometer / Shear Strength (kPa) 100 200 300 400; DYNAMIC CONE (BLOWS/300 mm); Natural Vane (KPa) / Remold Vane (KPa); SPT "N" (BLOWS/300 mm); W_P% W% W_L% 20 40 60 80	SAMPLE TYPE	SAMPLE NO	RECOVERY (%)	SOIL SYMBOL	SOIL DESCRIPTION	CLASSIFICATION	COMMENTS TESTING Drillers Estimate {G % S % F %}	ELEVATION (m)
0							ASPHALT (175 mm thick). 0.18m			12
							Grey-brown, gravelly SAND (ROADBASE).	SP		
1		9.4		1						11
				2			1.37m			
2		27					Very soft to soft, grey, silty CLAY to SILT and CLAY with a trace to some sand.			10
		34.7		3						
3										9
								ML/CL		
4		38.7		4					Atterberg (Sa#4): PL:18% LL:38%	8
5										7
		46.1		5						
6							6.1m			6
							End of hole at required depth. Hole open to 0.6 m depth. No water observed upon completion of drilling.			
7										5
8										4
9										3
10										

Legend
Sample Type:
A-Auger C-Core G-Grab V-Vane
L#-Lab Sample S-Split Spoon O-Odex (air rotary) W-Wash (mud return) T-Shelby Tube

Final Depth of Hole: 6.1 m
Depth to Top of Rock:

MOT-SOIL-REV2-TEL MOD 26141 MOTI.GPJ MOT-DRAFT-REV2.GDT 7/1/20

SUMMARY LOG

Drill Hole #: **TH19-05**

Ministry of Transportation and Infrastructure

Project: **Highway 1 - 216 Street to 264 Street Widening**

Location: Langley, B.C.

Prepared by: 26141
Thurber Engineering Ltd.

Logged by: IFA Reviewed by: CJC

Datum: 10U Alignment:

Northing/Easting: 5442028 , 530571 Station/Offset:

Elevation: 23.99 m

Date(s) Drilled: November 13, 2019

Drilling Company: Southland Drilling

Driller: Jeremy Levy

Drill Make/Model: Truck Drill #8

Drilling Method: Solid Stem Auger

DEPTH (m)	DRILLING DETAILS	Pocket Penetrometer / Shear Strength (kPa) 100 200 300 400; DYNAMIC CONE (BLOWS/300 mm); Natural Vane (KPa) / Remold Vane (KPa); SPT "N" (BLOWS/300 mm); W_P% W% W_L% 20 40 60 80	SAMPLE TYPE	SAMPLE NO	RECOVERY (%)	SOIL SYMBOL	SOIL DESCRIPTION	CLASSIFICATION	COMMENTS TESTING Drillers Estimate {G % S % F %}	ELEVATION (m)
0							ASPHALT (100 mm thick). 0.1m Brown-grey SAND and GRAVEL (ROADBASE).	GP/SP		23
1		7.9		1			0.91m Stiff to very stiff, brown-grey, silty CLAY to SILT and CLAY.			22
2		30		2			- firm to stiff, grey below 1.5 m depth	CH/CL		21
3		33.6		3			- soft below 2.7 m depth 3.05m Very soft to soft, grey, silty CLAY to SILT and CLAY with a trace of sand.			20
4		43.9		4				CL/CH		19
5		44.6		5					Atterberg (Sa#5): PL:20% LL:42%	18
6							6.1m End of hole at required depth. Hole open to 2.7 m depth. Water observed at 0.9 m depth upon completion of drilling.			17
7										16
8										15
9										
10										

Legend

Sample Type: A-Auger; C-Core; G-Grab; V-Vane; L#-Lab Sample; S-Split Spoon; O-Odex (air rotary); W-Wash (mud return); T-Shelby Tube

Final Depth of Hole: 6.1 m

Depth to Top of Rock:

SUMMARY LOG

Drill Hole #: **TH19-06**

Ministry of Transportation and Infrastructure

Project: **Highway 1 - 216 Street to 264 Street Widening**

Location: Langley, B.C.

Prepared by: 26141
Thurber Engineering Ltd.

Logged by: IFA Reviewed by: CJC

Datum: 10U Alignment:

Northing/Easting: 5442726 , 530572 Station/Offset:

Elevation: 23.99 m

Date(s) Drilled: November 13, 2019
Drilling Company: Southland Drilling
Driller: Jeremy Levy
Drill Make/Model: Truck Drill #8
Drilling Method: Solid Stem Auger

DEPTH (m)	DRILLING DETAILS	Pocket Penetrometer / Shear Strength (kPa) 100 200 300 400; DYNAMIC CONE (BLOWS/300 mm); Natural Vane (KPa) / Remold Vane (KPa); SPT "N" (BLOWS/300 mm); W_P% W% W_L% 20 40 60 80	SAMPLE TYPE	SAMPLE NO	RECOVERY (%)	SOIL SYMBOL	SOIL DESCRIPTION	CLASSIFICATION	COMMENTS TESTING Drillers Estimate {G % S % F %}	ELEVATION (m)
0							ASPHALT (100 mm thick). 0.1m Brown SAND and GRAVEL with some silt (ROADBASE).			23
1		6.6		1				GP/SP		22
2		24.2		2			1.22m Firm, brown-grey, silty CLAY to SILT and CLAY with a trace to some sand.	CL/CH		21
3		43.1		3			1.52m Very soft to soft, grey, silty CLAY to SILT and CLAY.			20
4		39.3		4				CH/CL	Atterberg (Sa#4): PL:20% LL:42%	19
5		46.1		5						18
6							6.1m End of hole at required depth. Hole open to 3.1 m depth. Water observed at 0.9 m depth upon completion of drilling.			17
7										16
8										15
9										
10										

Legend
Sample Type:
A-Auger C-Core G-Grab V-Vane
L#-Lab Sample S-Split Spoon O-Odex (air rotary) W-Wash (mud return) T-Shelby Tube

Final Depth of Hole: 6.1 m
Depth to Top of Rock:

MOT-SOIL-REV2-TEL MOD 26141 MOTI.GPJ MOT-DRAFT-REV2.GDT 7/1/20

SUMMARY LOG

Drill Hole #: **TH19-07**

Ministry of Transportation and Infrastructure

Project: **Highway 1 - 216 Street to 264 Street Widening**

Location: Langley, B.C.

Date(s) Drilled: November 14, 2019

Drilling Company: Southland Drilling

Driller: Jeremy Levy

Drill Make/Model: Truck Drill #8

Drilling Method: Solid Stem Auger

Prepared by: 26141 Thurber Engineering Ltd.

Logged by: IFA Reviewed by: CJC

Datum: 10U Alignment:

Northing/Easting: 5442825 , 530506 Station/Offset:

Elevation: 26.0 m

DEPTH (m)	DRILLING DETAILS	Pocket Penetrometer / Shear Strength (kPa) 100 200 300 400; DYNAMIC CONE (BLOWS/300 mm); Natural Vane (KPa) / Remold Vane (KPa); SPT "N" (BLOWS/300 mm); W_P% W% W_L% 20 40 60 80	SAMPLE TYPE	SAMPLE NO	RECOVERY (%)	SOIL SYMBOL	SOIL DESCRIPTION	CLASSIFICATION	COMMENTS TESTING Drillers Estimate {G % S % F %}	ELEVATION (m)
0		4:6		1			Brown, moist SAND and GRAVEL to gravelly SAND (ROADBASE).	GW-GM/SW-SM		25
							0.46m			
1		38:6		2			Stiff to very stiff, brown-grey SILT and CLAY to silty CLAY with traces of sand and organics.			24
2		37:5		3				CH/CL		23
3										
4		63:8		4			4.11m Very soft to soft, grey SILT and CLAY to silty CLAY with a trace of oxidation.		Atterberg (Sa#4): PL:27% LL:71%	22
5		64:4		5			- a trace of black-dark grey organic staining below 5.7 m depth	CL/CH		21
6							6.1m End of hole at required depth. Hole open to 1.5 m depth. No water observed upon completion of drilling.			20
7										19
8										18
9										17
10										

Legend

Sample Type: A-Auger; C-Core; G-Grab; V-Vane; L#-Lab Sample; S-Split Spoon; O-Odex (air rotary); W-Wash (mud return); T-Shelby Tube

Final Depth of Hole: 6.1 m

Depth to Top of Rock:

SUMMARY LOG

Drill Hole #: **TH19-08**

Ministry of Transportation and Infrastructure

Project: **Highway 1 - 216 Street to 264 Street Widening**
Location: Langley, B.C.

Prepared by: 26141
Thurber Engineering Ltd.

Logged by: IFA Reviewed by: CJC

Datum: 10U Alignment:
Northing/Easting: 5442660 , 530515 Station/Offset:
Elevation: 23.01 m

Date(s) Drilled: November 12, 2019
Drilling Company: Southland Drilling
Driller: Jeremy Levy
Drill Make/Model: Truck Drill #8
Drilling Method: Solid Stem Auger

DEPTH (m)	DRILLING DETAILS	✕Pocket Penetrometer ✕Shear Strength (kPa) 100 200 300 400; ✳DYNAMIC CONE (BLOWS/300 mm)✳; + Natural Vane (KPa) ⊕ Remold Vane (KPa); ▲SPT "N" (BLOWS/300 mm)▲; W_P% W% W_L% 20 40 60 80	SAMPLE TYPE	SAMPLE NO	RECOVERY (%)	SOIL SYMBOL	SOIL DESCRIPTION	CLASSIFICATION	COMMENTS TESTING Drillers Estimate {G % S % F %}	ELEVATION (m)
0							ASPHALT (200 mm thick).			
							0.2m Brown-grey, gravelly SAND (ROADBASE).	SP-SM		
		13.7		1			0.61m Soft to firm, grey-brown, silty CLAY to SILT and CLAY with traces of sand and oxidation.	CL/CH		
1		37.7		2						22
							1.52m Soft, grey, silty CLAY to SILT and CLAY.			
2		37.3		3					Atterberg (Sa#3): PL:22% LL:48%	21
3							- very soft below 3.1 m depth			20
		39.7		4				CL/CH		
4										19
5										18
		44.4		5						
6							6.1m End of hole at required depth. Hole open to 0.6 m depth. Water observed at 0.6 m depth upon completion of drilling.			17
7										16
8										15
9										14
10										

Legend
Sample Type:
A-Auger C-Core G-Grab V-Vane
L#-Lab Sample S-Split Spoon O-Odex (air rotary) W-Wash (mud return) T-Shelby Tube

Final Depth of Hole: 6.1 m
Depth to Top of Rock:

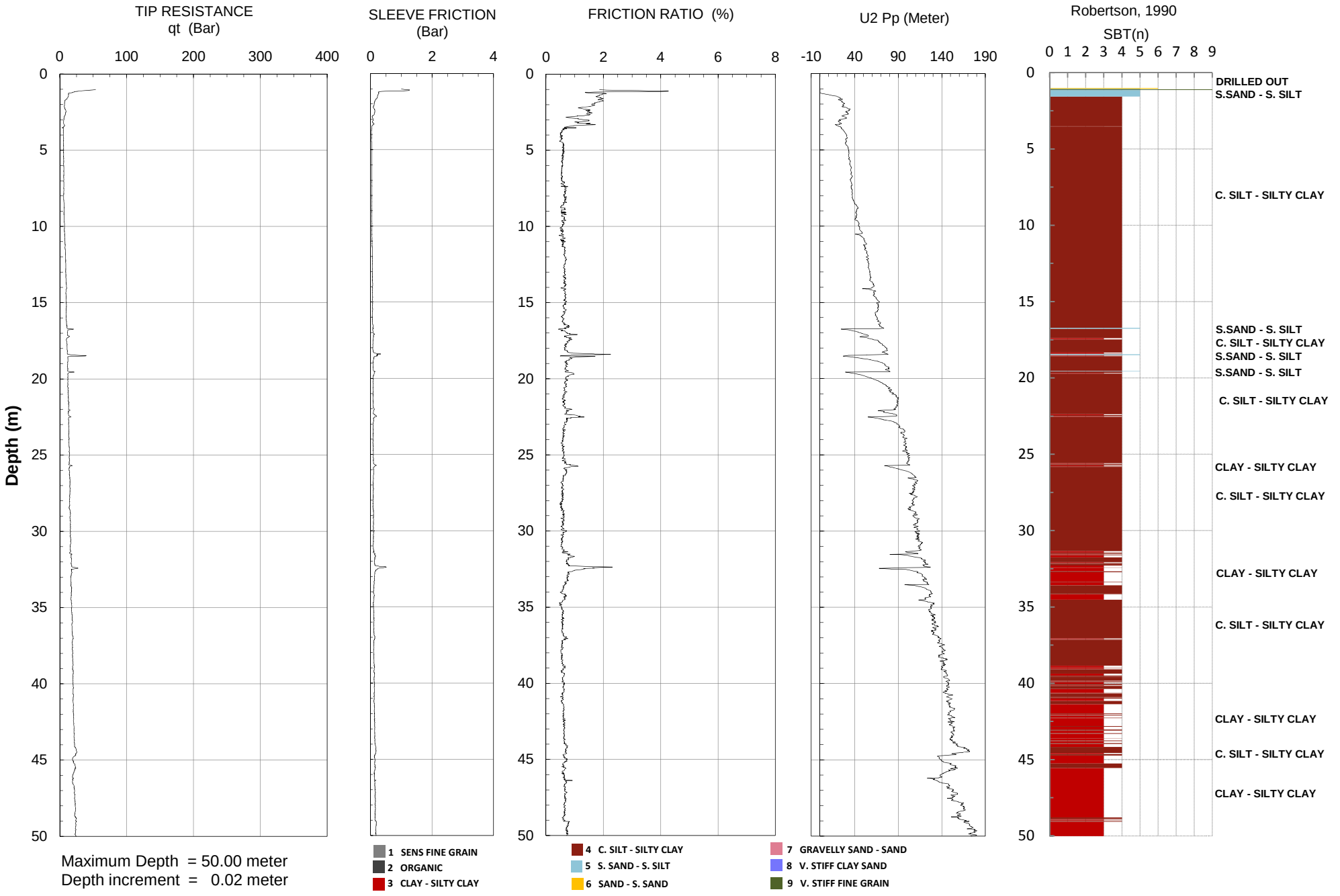
2019 Thurber CPT Logs

Thurber Engineering

Operator: Schwartz Soil Technical
Sounding: CPT19 - 01
Cone ID: DPG1427

Date: November 14 - 15, 2019
Site: Hwy No 1 - 216 to 264 Street
Thurber project no: 26141

Schwartz SOIL TECH



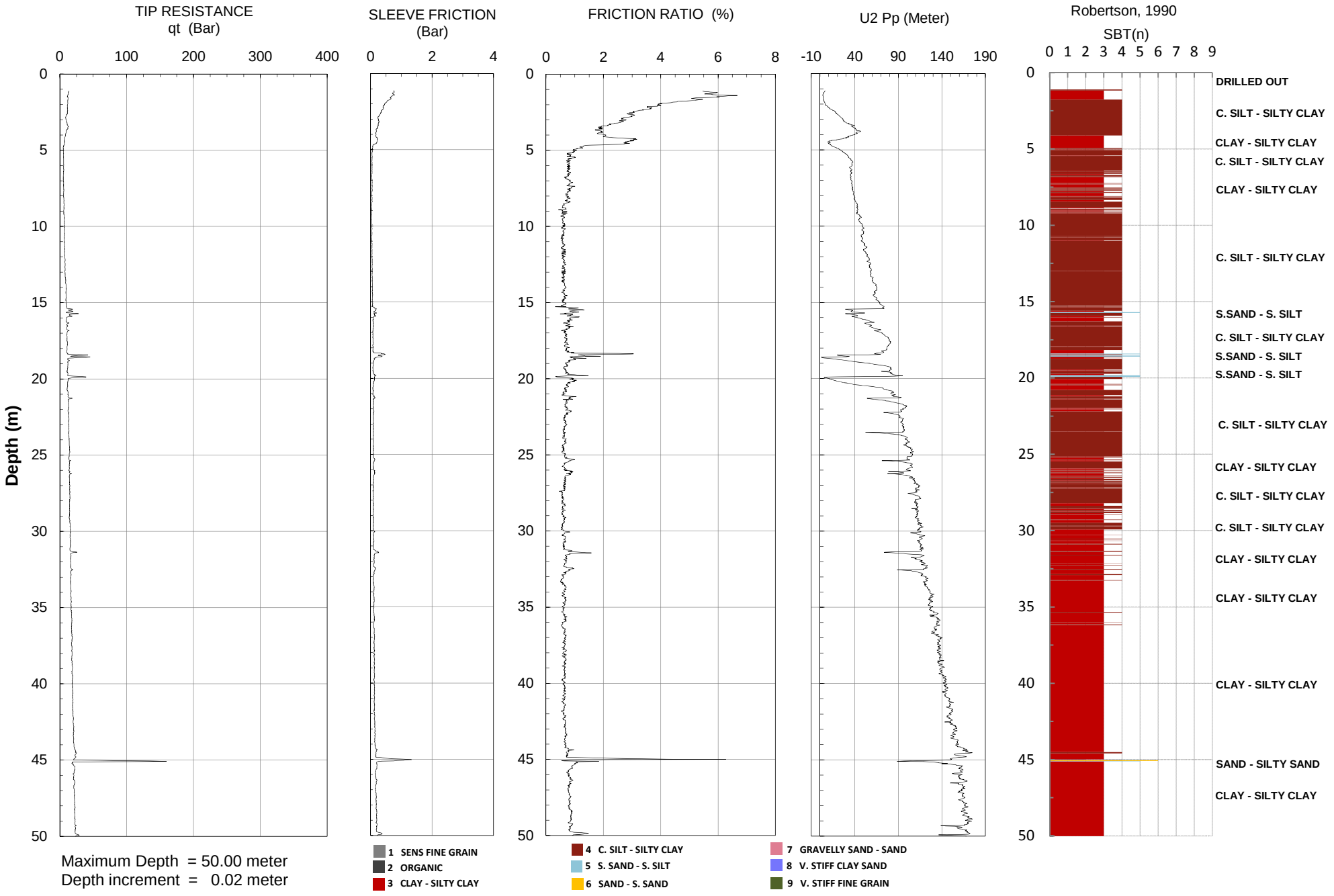
Maximum Depth = 50.00 meter
Depth increment = 0.02 meter

Thurber Engineering

Operator: Schwartz Soil Technical
Sounding: CPT19 - 02
Cone ID: DPG1427

Date: November 15 - 16, 2019
Site: Hwy No 1 - 216 to 264 Street
Thurber project no: 26141

Schwartz SOIL TECH



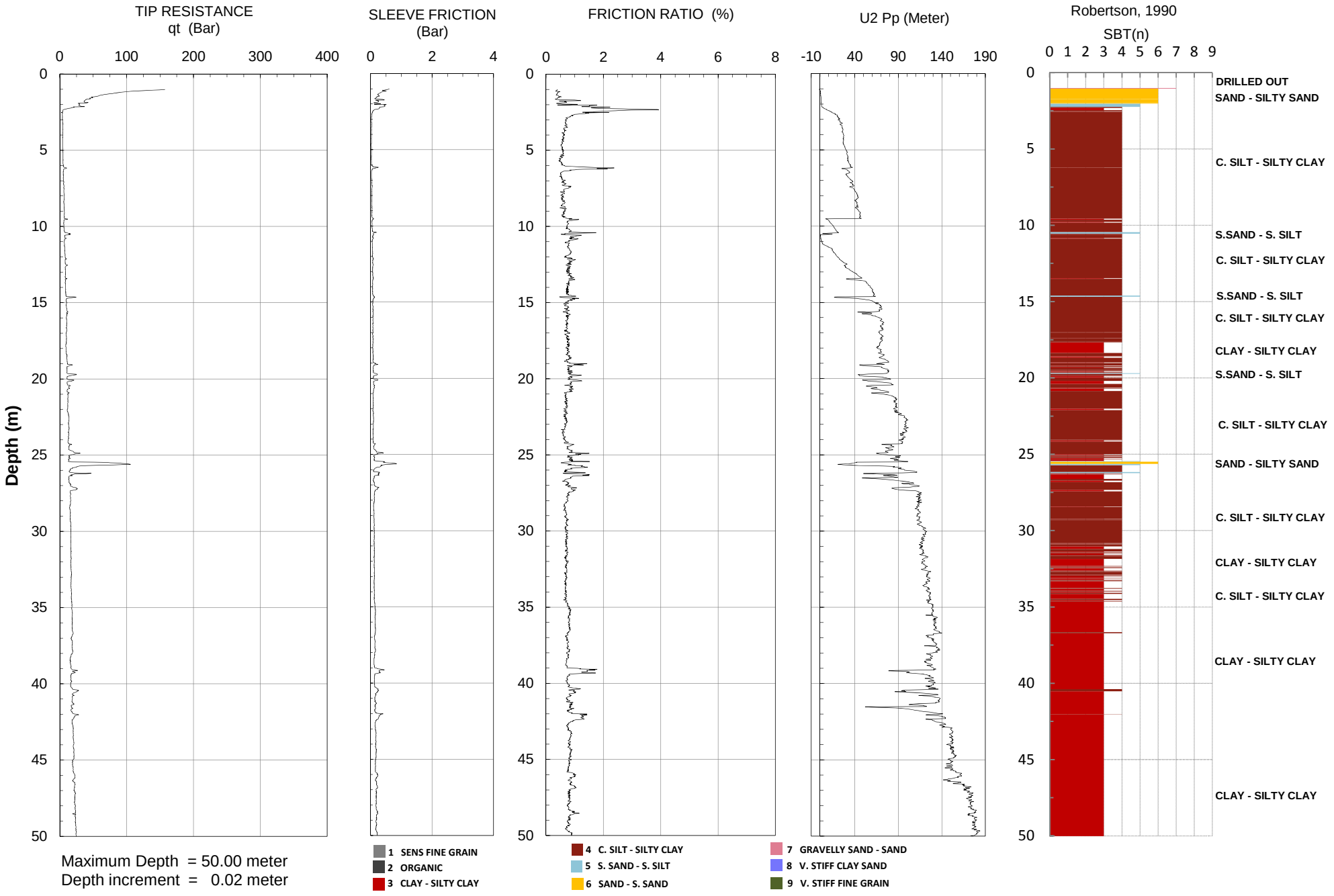
Maximum Depth = 50.00 meter
Depth increment = 0.02 meter

Thurber Engineering

Operator: Schwartz Soil Technical
Sounding: CPT19 - 03
Cone ID: DPG1427

Date: November 15 - 16, 2019
Site: Hwy No 1 - 216 to 264 Street
Thurber project no: 26141

Schwartz SOIL TECH



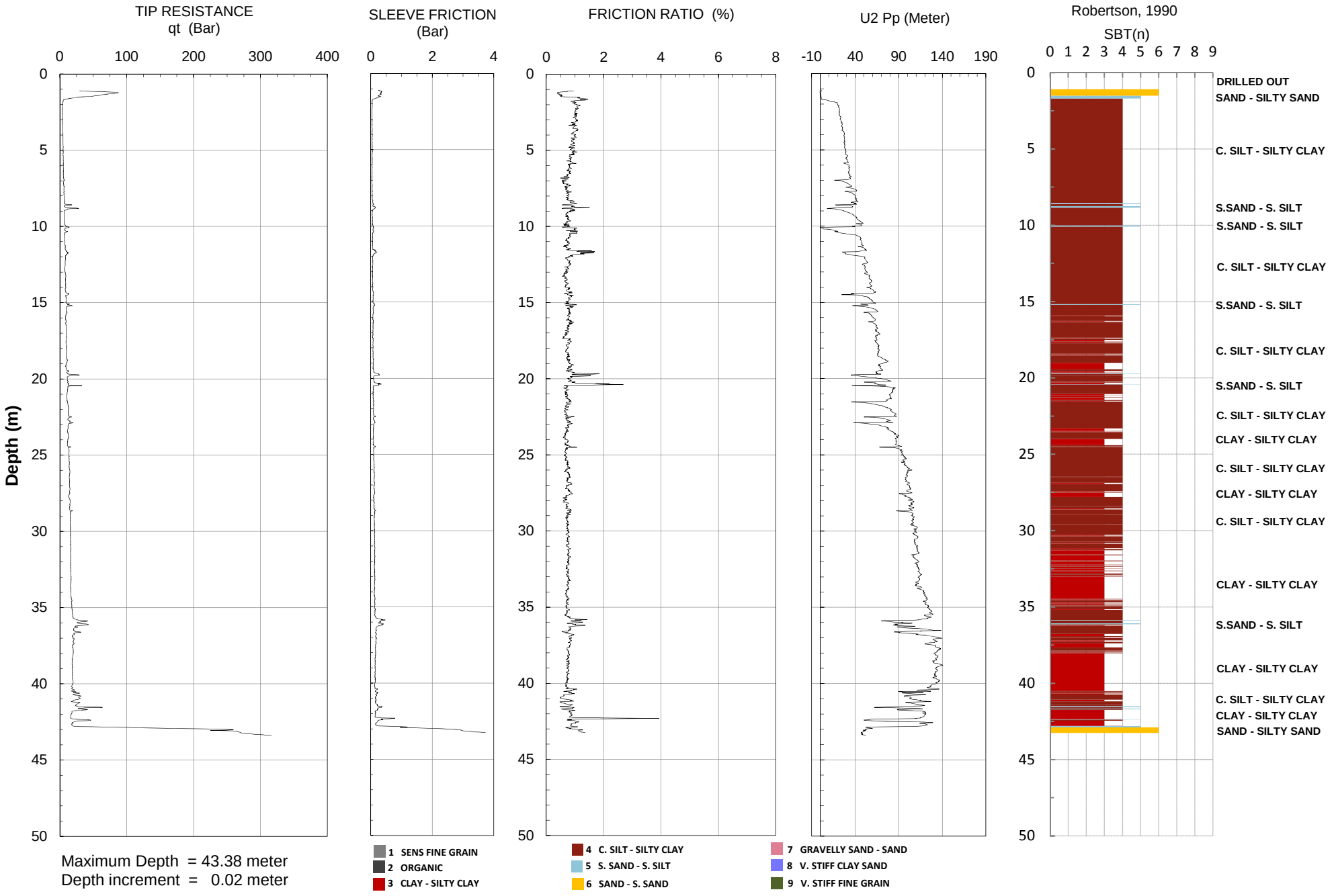
Maximum Depth = 50.00 meter
Depth increment = 0.02 meter

Thurber Engineering

Operator: Schwartz Soil Technical
Sounding: CPT19 - 04
Cone ID: DPG1427

Date: November 14 - 15, 2019
Site: Hwy No 1 - 216 to 264 Street
Thurber project no: 26141

Schwartz SOIL TECH



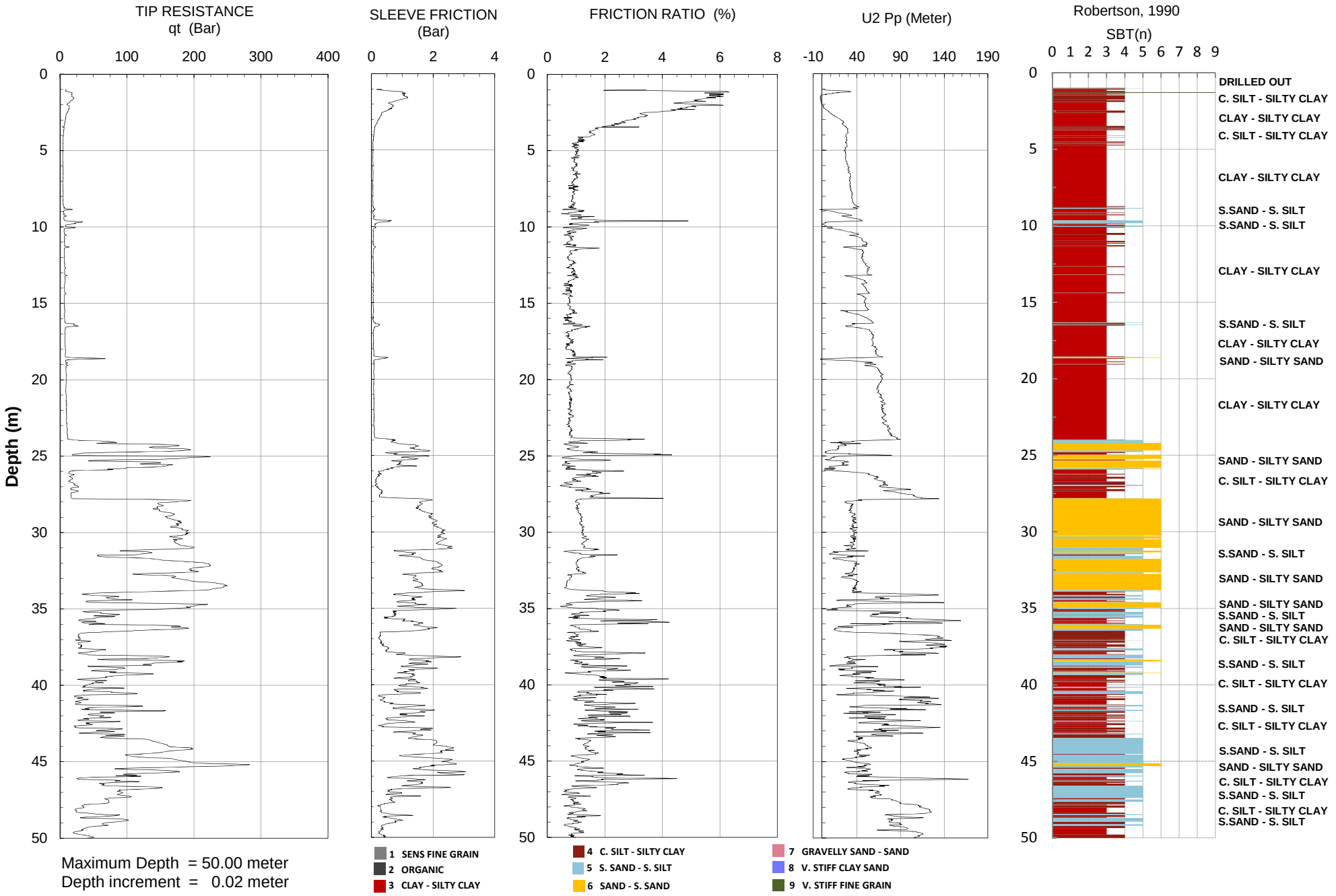
Maximum Depth = 43.38 meter
Depth increment = 0.02 meter

Thurber Engineering

Operator: Schwartz Soil Technical
Sounding: CPT19 - 05
Cone ID: DPG1427

Date: November 12 - 13, 2019
Site: Hwy No 1 - 216 to 264 Street
Thurber project no: 26141

Schwartz SOIL TECH



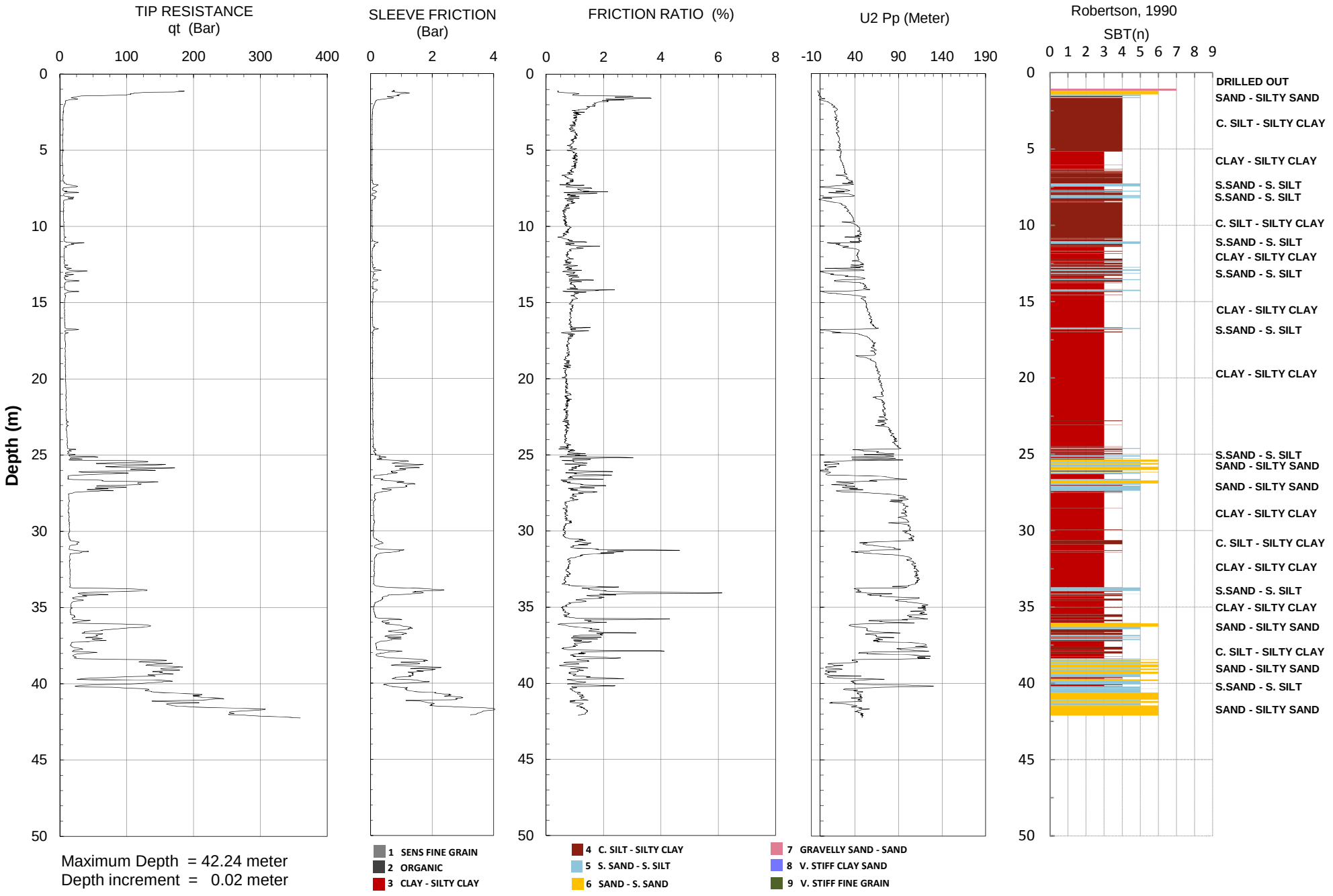
Maximum Depth = 50.00 meter
Depth increment = 0.02 meter

Thurber Engineering

Operator: Schwartz Soil Technical
Sounding: CPT19 - 06
Cone ID: DPG1427

Date: November 13 - 14, 2019
Site: Hwy No 1 - 216 to 264 Street
Thurber project no: 26141

Schwartz SOIL TECH



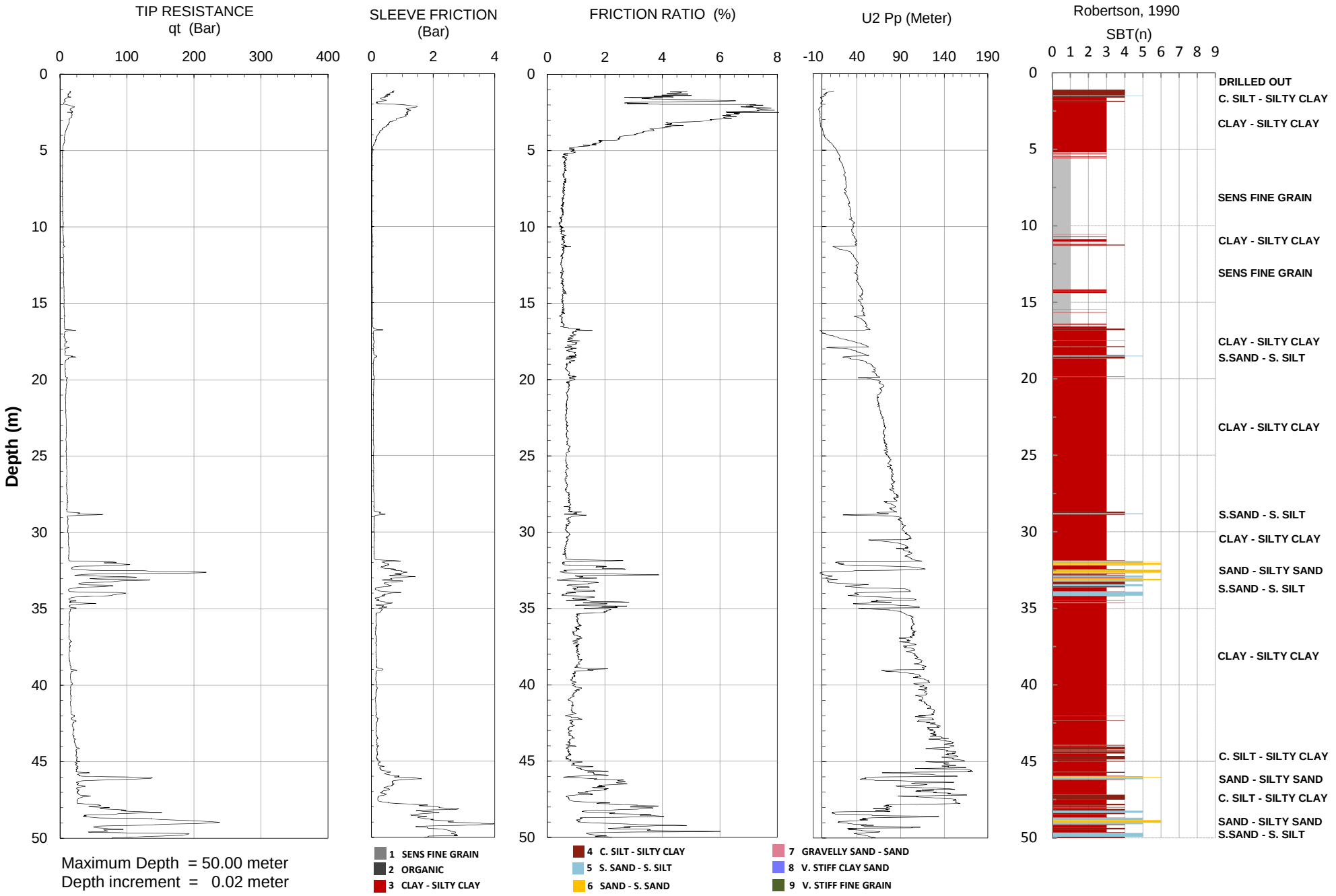
Maximum Depth = 42.24 meter
Depth increment = 0.02 meter

Thurber Engineering

Operator: Schwartz Soil Technical
Sounding: CPT19 - 07
Cone ID: DPG1427

Date: November 13 - 14, 2019
Site: Hwy No 1 - 216 to 264 Street
Thurber project no: 26141

Schwartz SOIL TECH



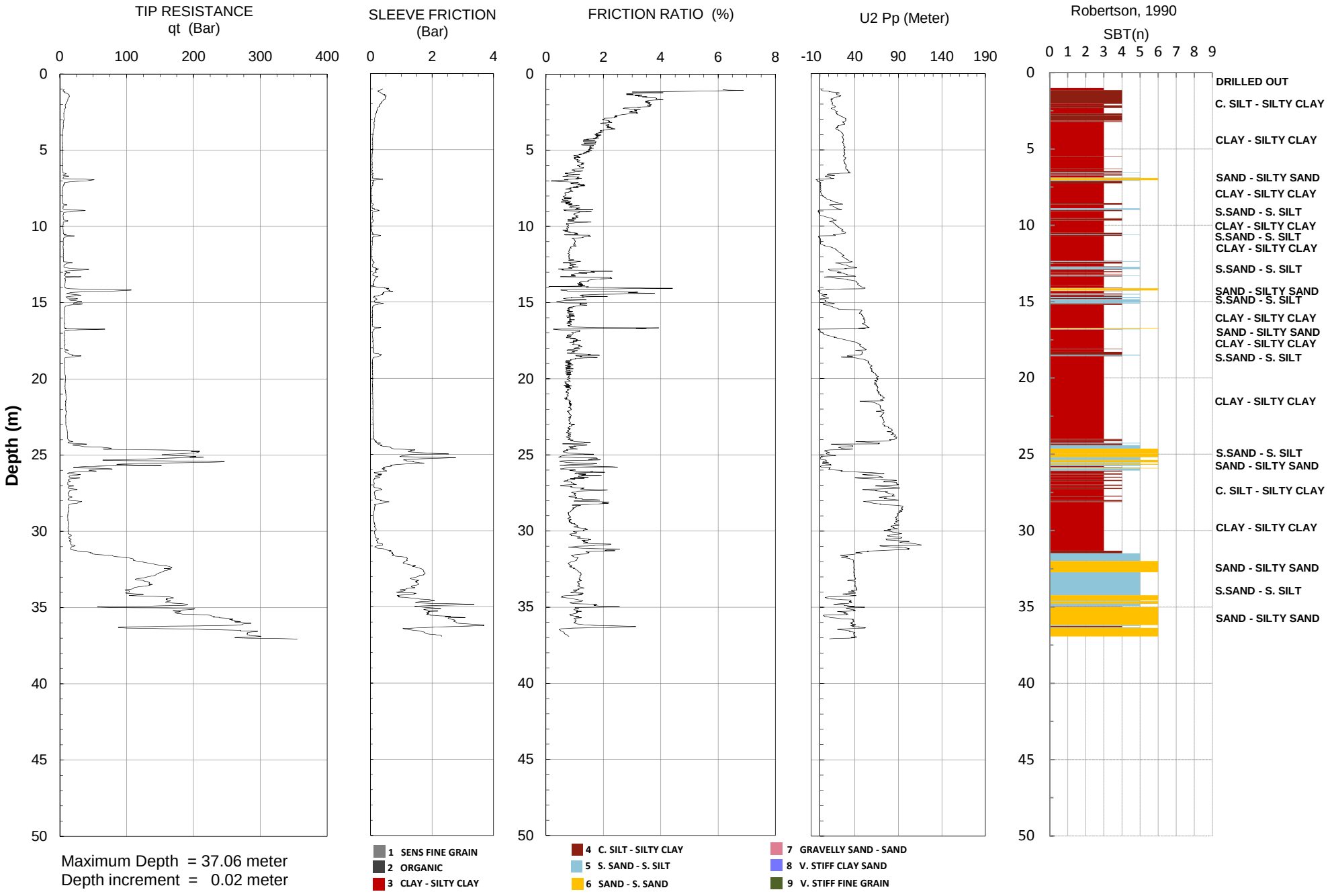
Maximum Depth = 50.00 meter
Depth increment = 0.02 meter

Thurber Engineering

Operator: Schwartz Soil Technical
Sounding: CPT19 - 08
Cone ID: DPG1427

Date: November 12 - 13, 2019
Site: Hwy No 1 - 216 to 264 Street
Thurber project no: 26141

Schwartz SOIL TECH



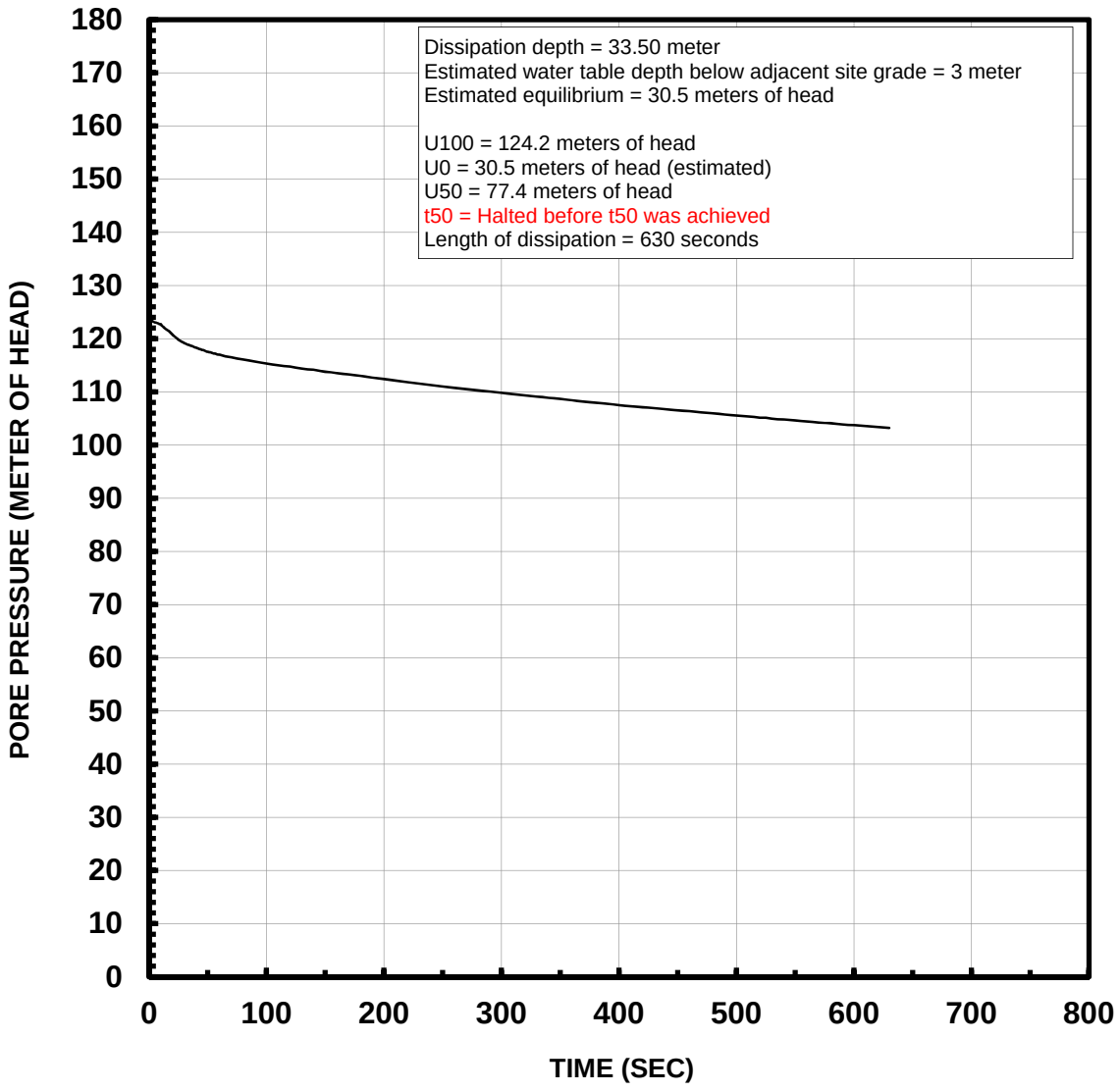
Maximum Depth = 37.06 meter
Depth increment = 0.02 meter

THURBER

2019 Thurber CPT Dissipation Tests

THURBER ENGINEERING

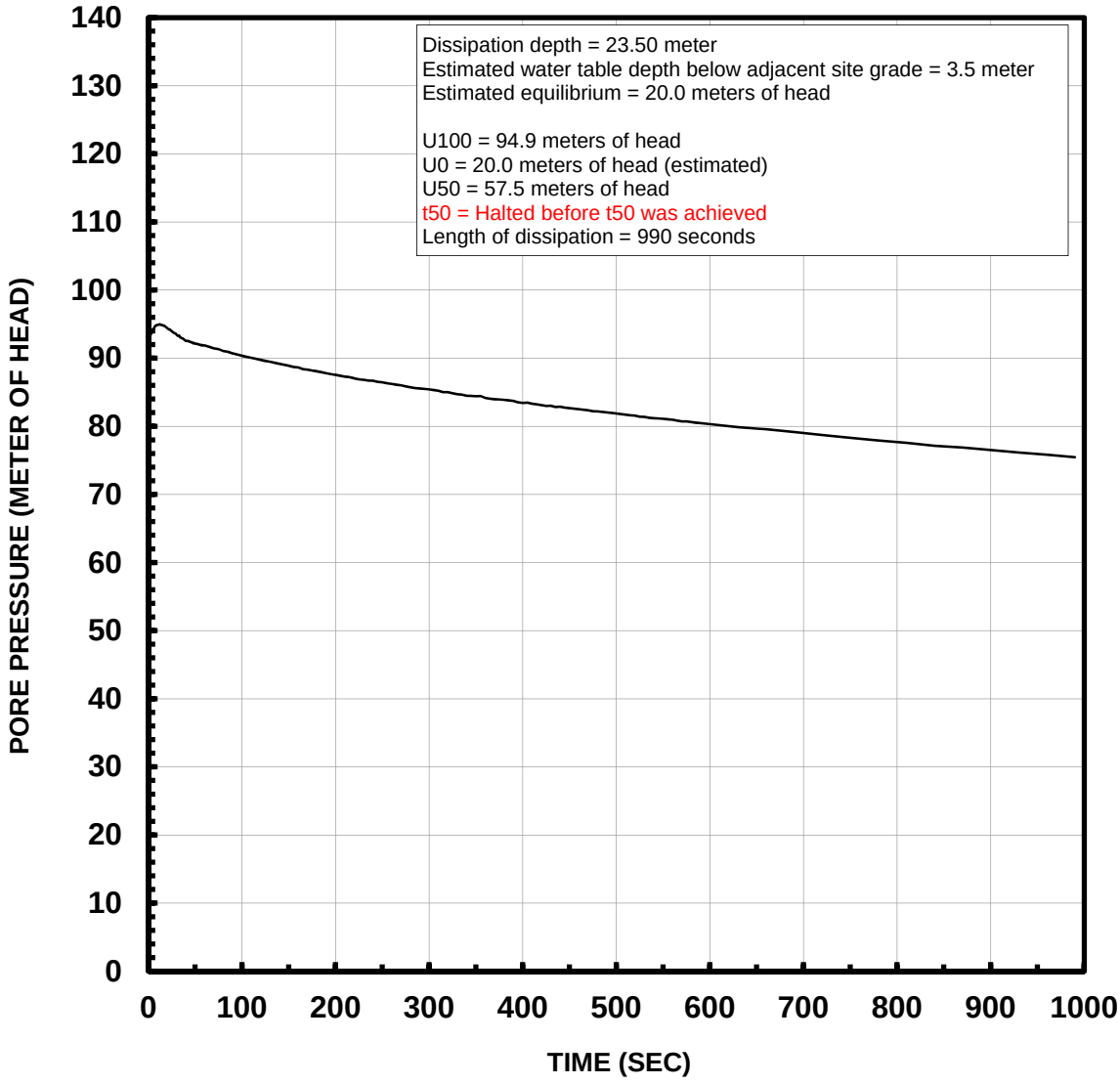
U2 PORE PRESSURE DISSIPATION
HWY NO 1 - 216 TO 264 STREET
CPT19 - 01 33.50 METER DEPTH
NOVEMBER 14 - 15, 2019



Schwartz SOIL TECH

THURBER ENGINEERING

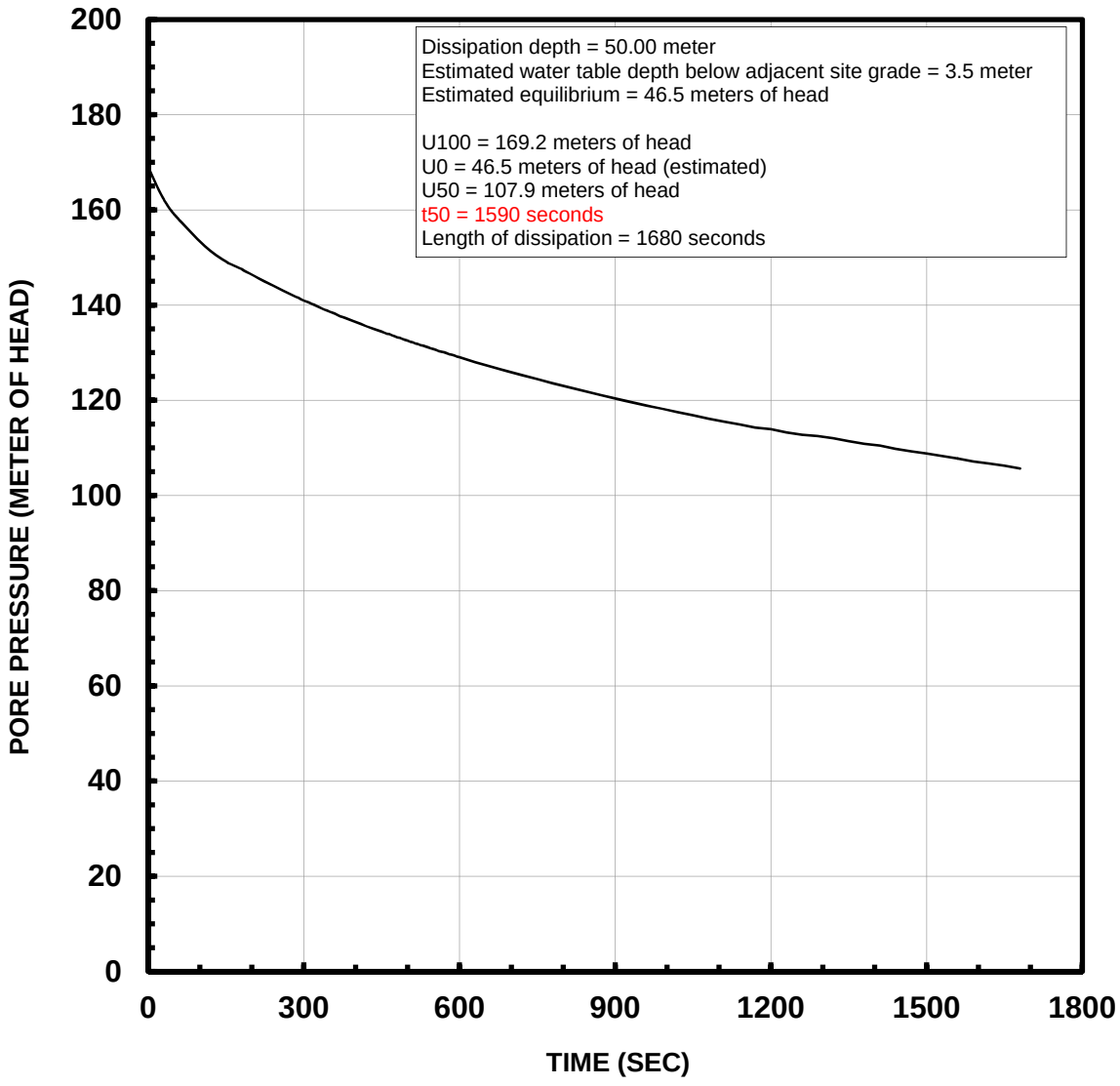
U2 PORE PRESSURE DISSIPATION
HWY NO 1 - 216 TO 264 STREET
CPT19 - 02 23.50 METER DEPTH
NOVEMBER 14 - 15, 2019



Schwartz SOIL TECH

THURBER ENGINEERING

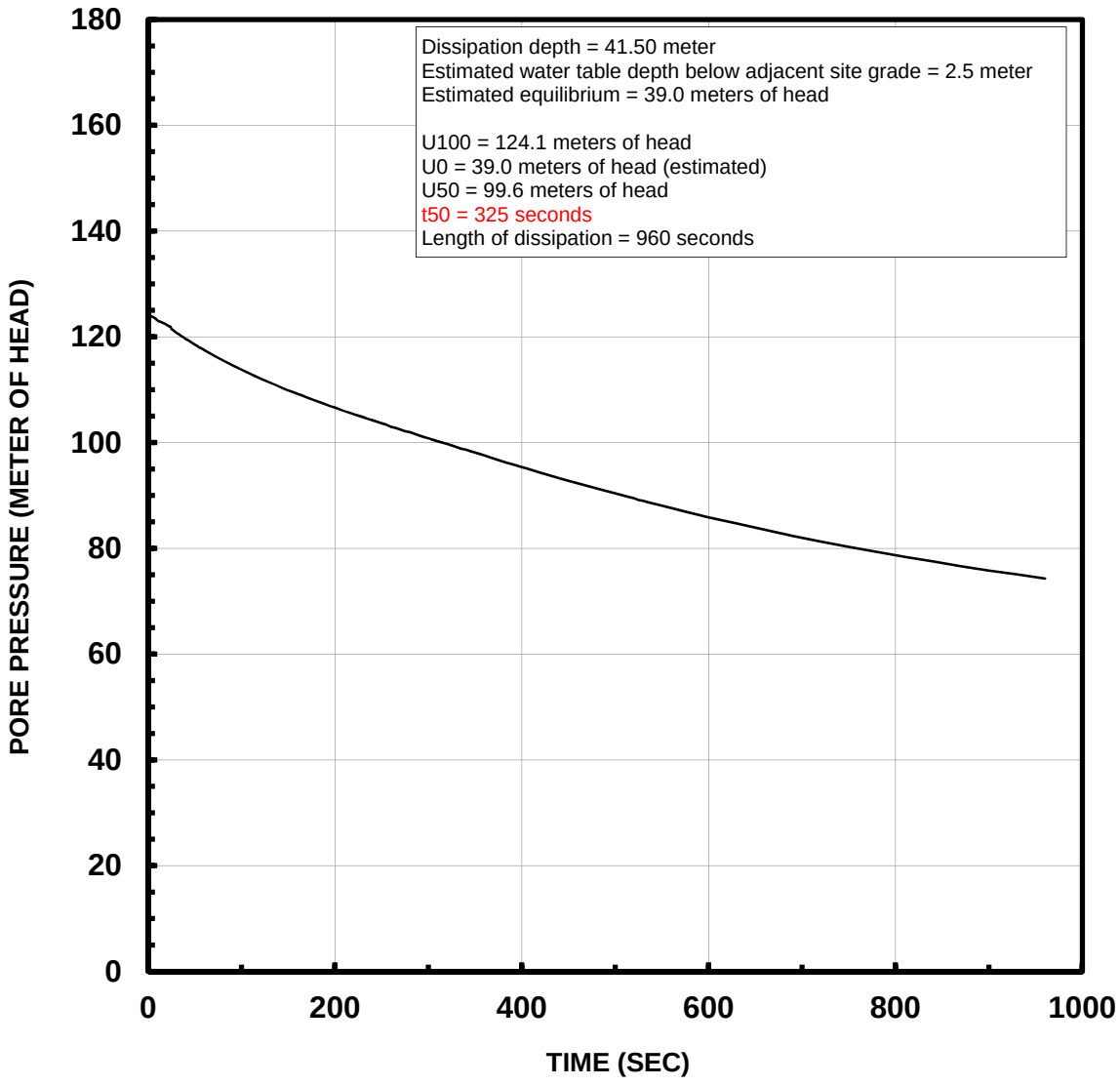
U2 PORE PRESSURE DISSIPATION
HWY NO 1 - 216 TO 264 STREET
CPT19 - 02 50.00 METER DEPTH
NOVEMBER 15 - 16, 2019



Schwartz SOIL TECH

THURBER ENGINEERING

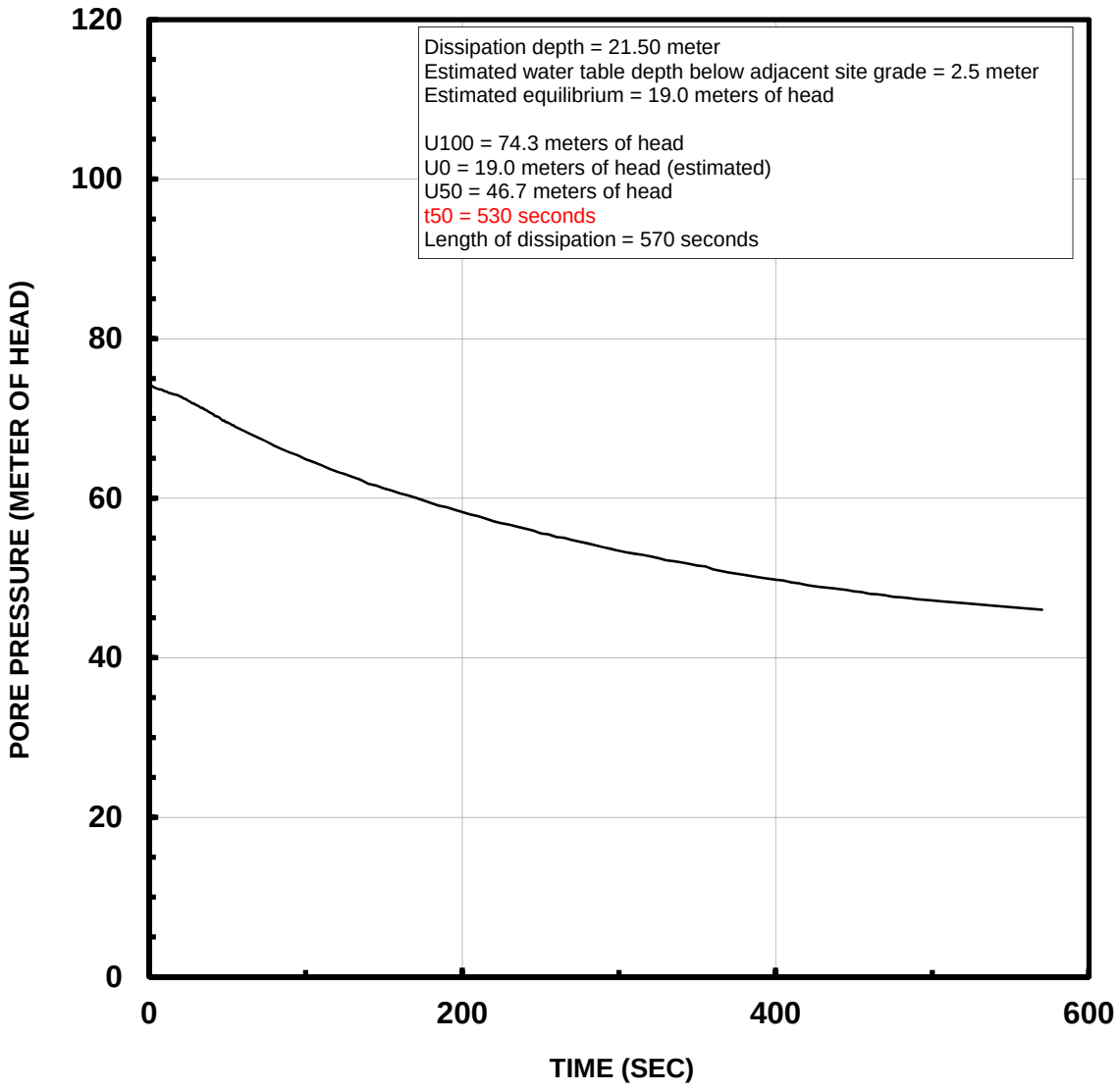
U2 PORE PRESSURE DISSIPATION
HWY NO 1 - 216 TO 264 STREET
CPT19 - 03 41.50 METER DEPTH
NOVEMBER 15 - 16, 2019



Schwartz SOIL TECH

THURBER ENGINEERING

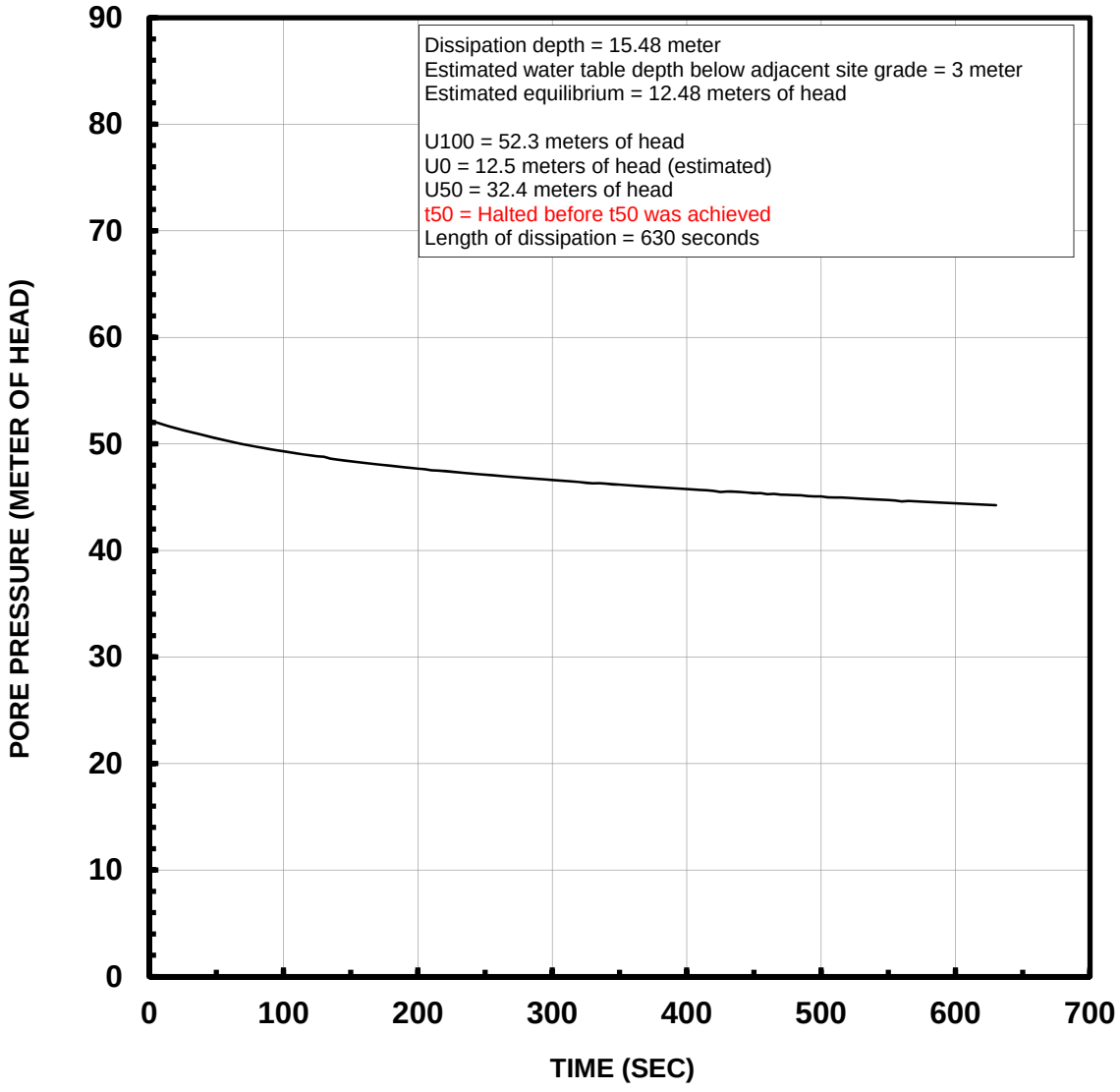
U2 PORE PRESSURE DISSIPATION
HWY NO 1 - 216 TO 264 STREET
CPT19 - 04 21.50 METER DEPTH
NOVEMBER 14 - 15, 2019



Schwartz SOIL TECH

THURBER ENGINEERING

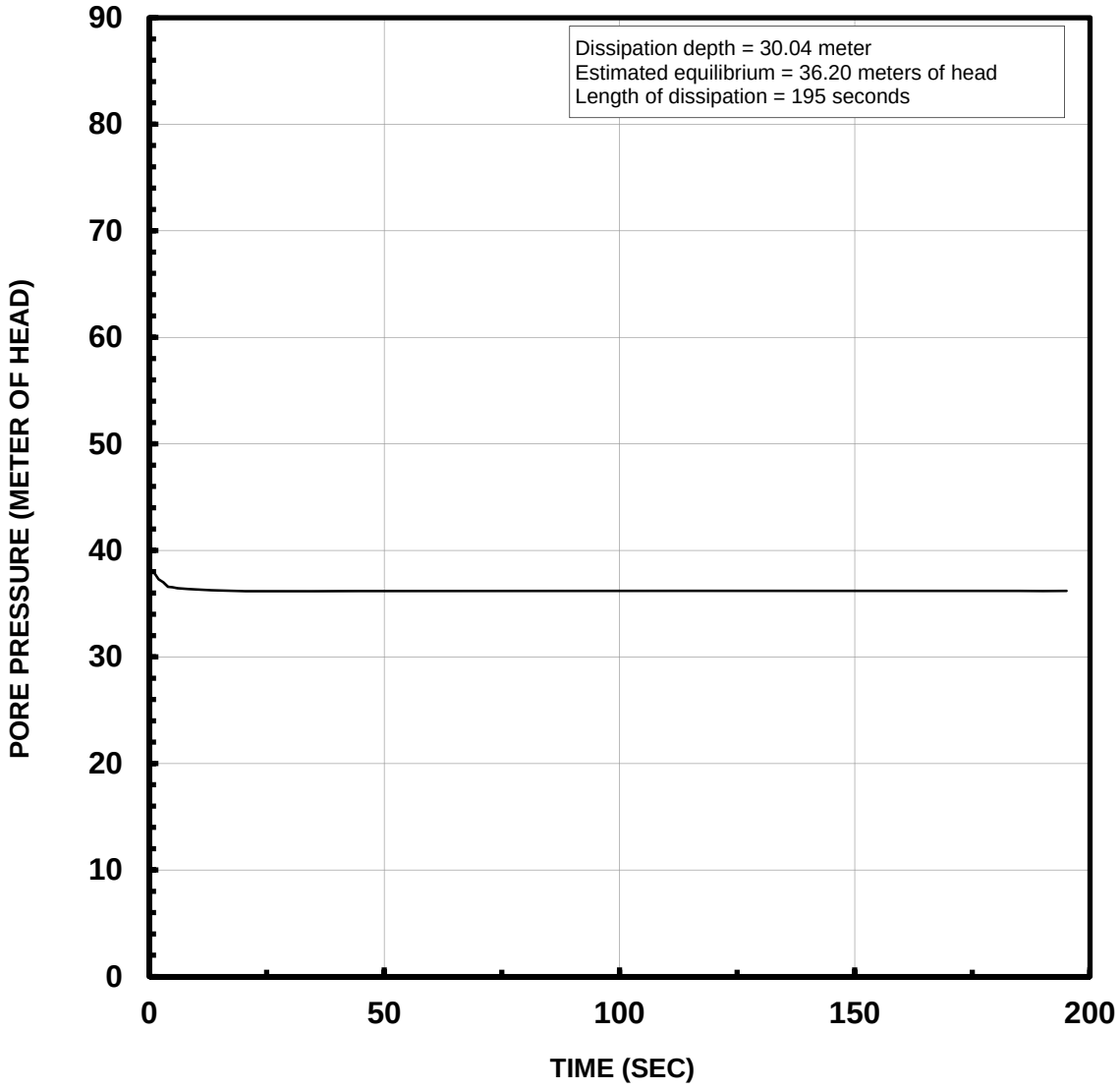
U2 PORE PRESSURE DISSIPATION
HWY NO 1 - 216 TO 264 STREET
CPT19 - 05 15.48 METER DEPTH
NOVEMBER 12 - 13, 2019



Schwartz
SOIL TECH

THURBER ENGINEERING

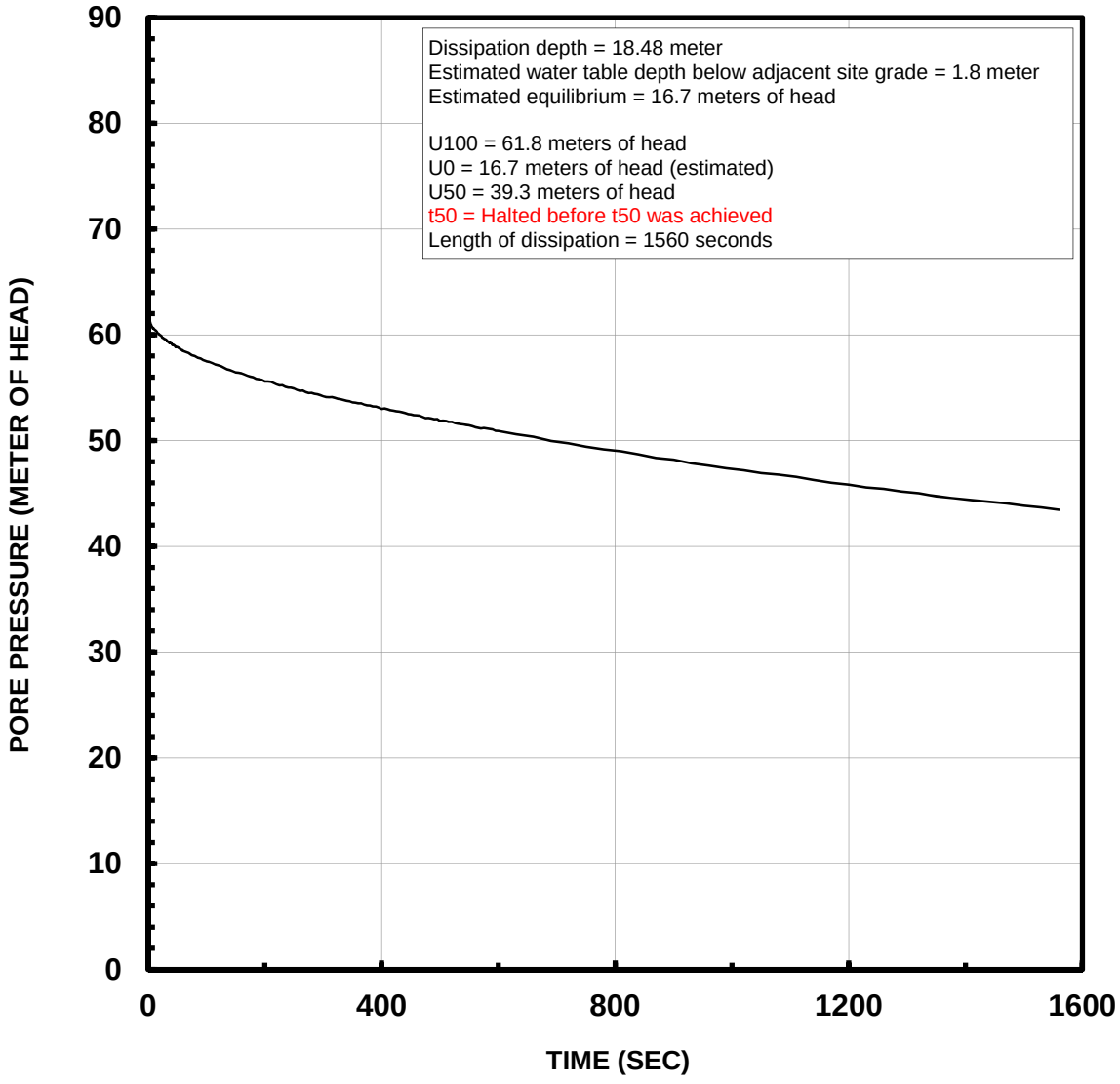
U2 PORE PRESSURE DISSIPATION
HWY NO 1 - 216 TO 264 STREET
CPT19 - 05 30.04 METER DEPTH
NOVEMBER 12 - 13, 2019



Schwartz
SOIL TECH

THURBER ENGINEERING

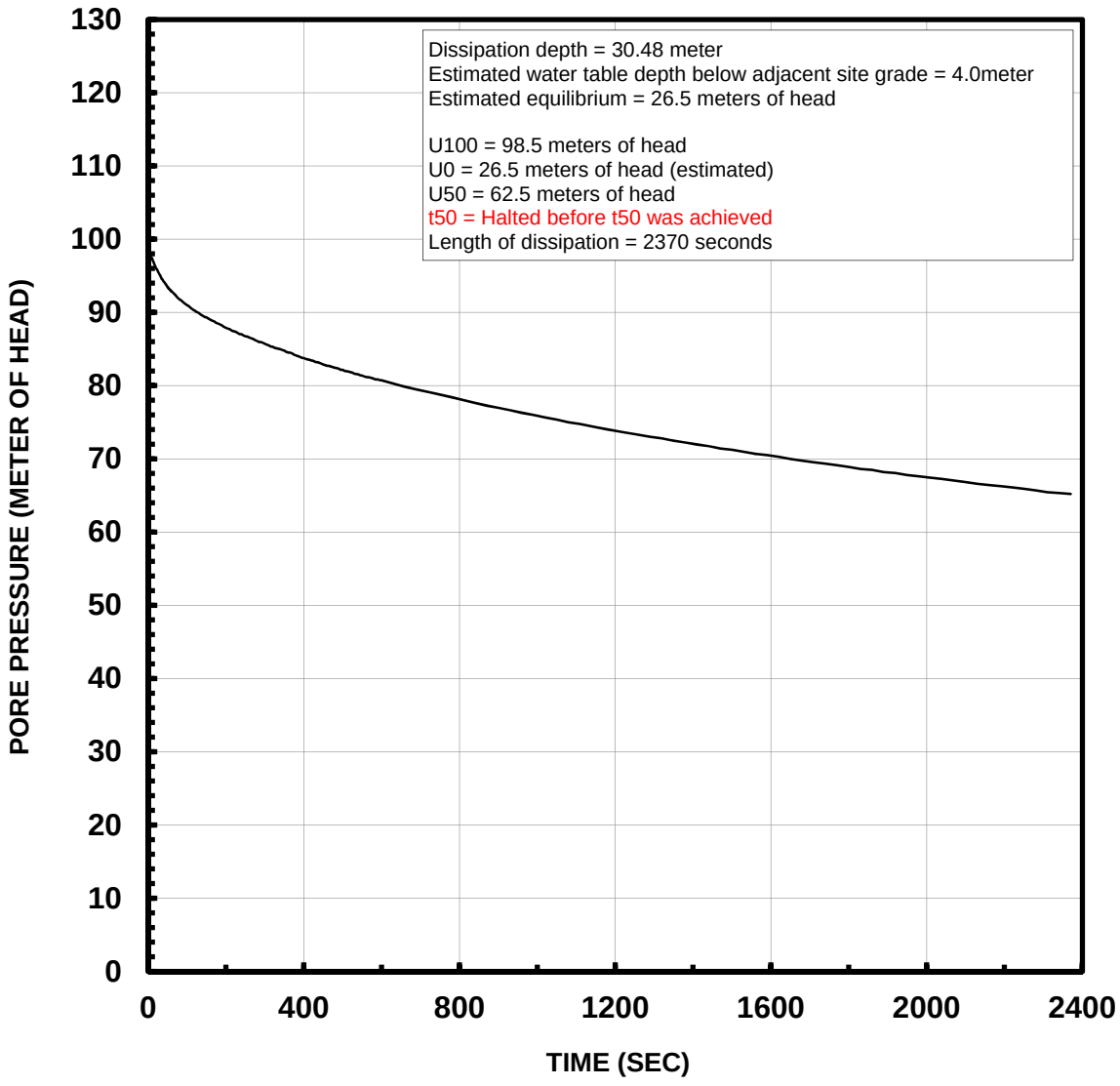
U2 PORE PRESSURE DISSIPATION
HWY NO 1 - 216 TO 264 STREET
CPT19 - 06 18.48 METER DEPTH
NOVEMBER 13 - 14, 2019



Schwartz SOIL TECH

THURBER ENGINEERING

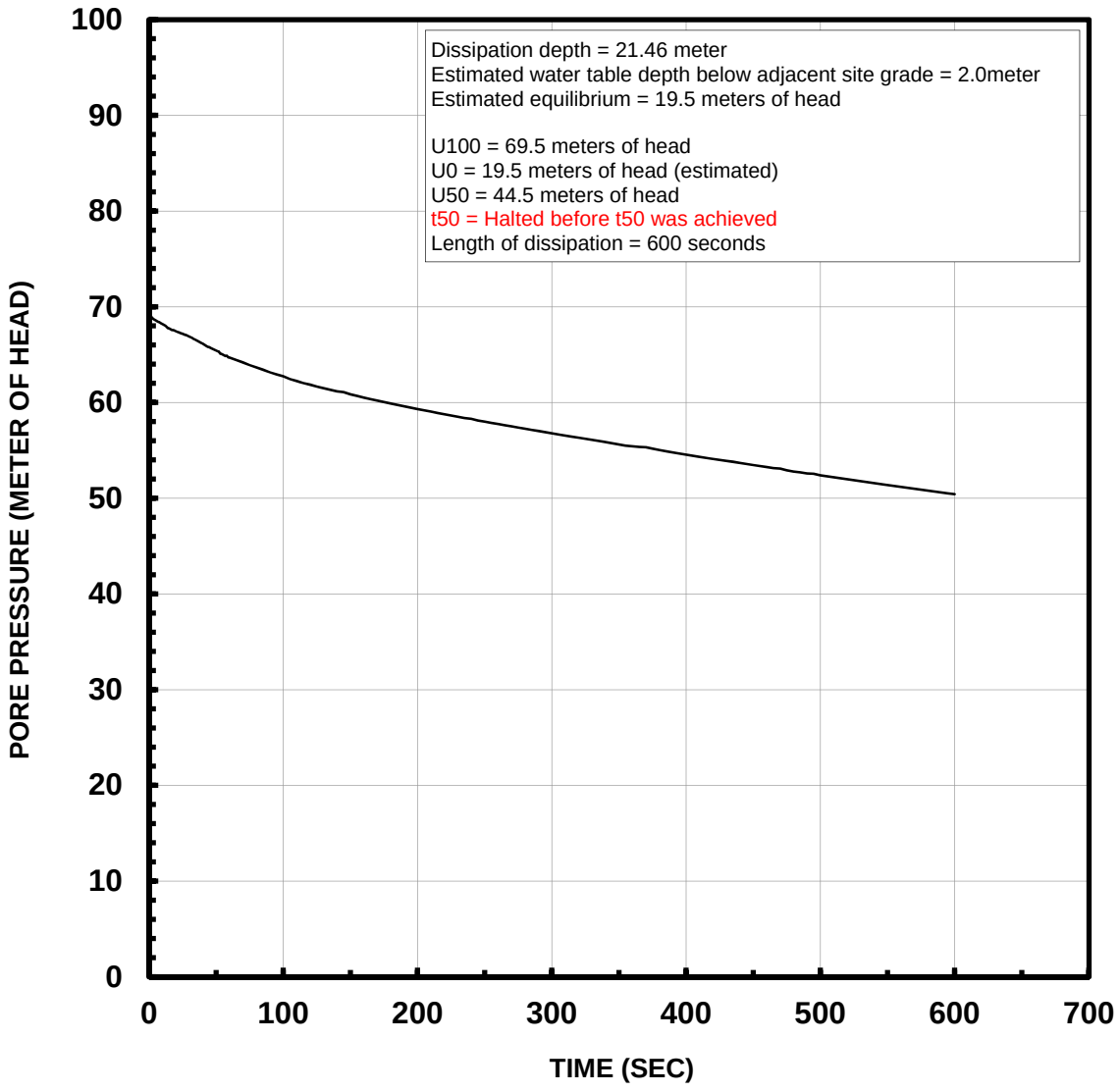
U2 PORE PRESSURE DISSIPATION
HWY NO 1 - 216 TO 264 STREET
CPT19 - 07 30.48 METER DEPTH
NOVEMBER 13 - 14, 2019



Schwartz SOIL TECH

THURBER ENGINEERING

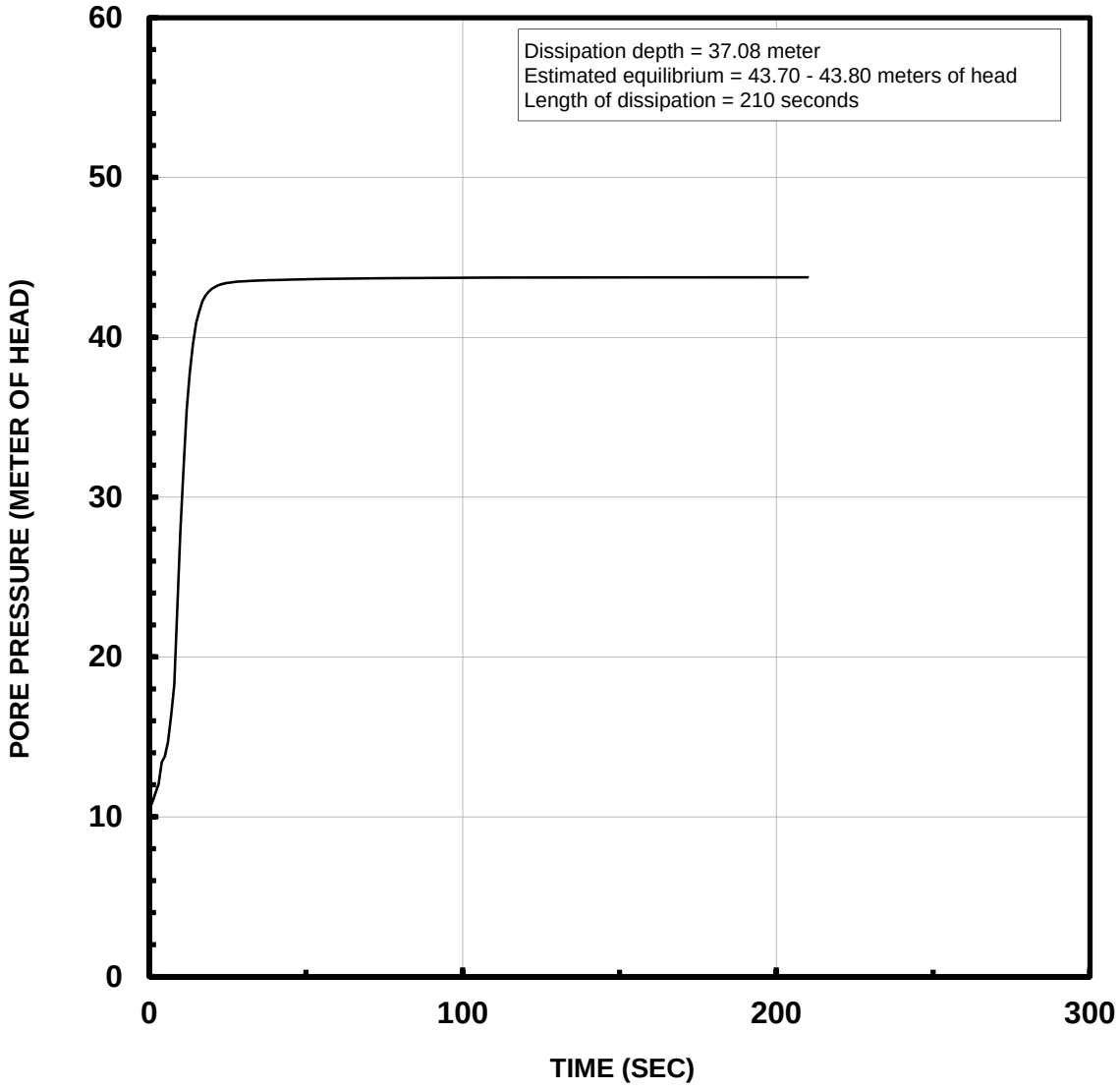
U2 PORE PRESSURE DISSIPATION
HWY NO 1 - 216 TO 264 STREET
CPT19 - 08 21.46 METER DEPTH
NOVEMBER 12 - 13, 2019



Schwartz SOIL TECH

THURBER ENGINEERING

U2 PORE PRESSURE DISSIPATION
HWY NO 1 - 216 TO 264 STREET
CPT19 - 08 37.08 METER DEPTH
NOVEMBER 12 - 13, 2019



Schwartz
SOIL TECH

THURBER

2019 Thurber Test Pit Logs

TEST PIT LOG

Test Pit #: **TP19-01**

Ministry of Transportation and Infrastructure

Project: **Highway 1 - 216 Street to 264 Street Widening**

Location: Langley, B.C.

Date(s) Drilled: November 21, 2019

Excavating Company: Backhoes Unlimited

Prepared by: 26141
Thurber Engineering Ltd.

Datum: 10U

Alignment:

Operator: Andrew Flitten

Northing/Easting: 5443704 , 528838

Station/Offset:

Excavator: JD75G

Logged by: IFA Reviewed by: CJC

Elevation: 16.0 m

DEPTH (m)	DRILLING DETAILS	Pocket Penetrometer / Shear Strength (kPa) 100 200 300 400; DYNAMIC CONE (BLOWS/300 mm); Natural Vane (KPa) / Remold Vane (KPa); SPT "N" (BLOWS/300 mm); W_P% W% W_L% 20 40 60 80	SAMPLE TYPE	SAMPLE NO	RECOVERY (%)	SOIL SYMBOL	SOIL DESCRIPTION	CLASSIFICATION	COMMENTS TESTING Drillers Estimate *{G % S % F %}*	ELEVATION (m)
0							Brown TOPSOIL.			16
							0.3m			
		30.7		1			Stiff, grey, silty CLAY to SILT and CLAY with some mottling and a trace of organics.	CL/CH		
							0.46m			
1		39.3		2			Firm to stiff, brown-grey CLAY and SILT with traces of oxidation and organics.			15
								CH/CL		
2										14
		61.2		3						
3							3.05m			13
							End of test pit at required depth. Test pit open to 3.1 m depth. No seepage observed.			
4										12
5										11
6										10
7										9
8										8
9										7
10										

Legend

Sample Type: A-Auger; C-Core; G-Grab; V-Vane; L#-Lab Sample; S-Split Spoon; O-Odex (air rotary); W-Wash (mud return); T-Shelby Tube

Final Depth of Hole: 3.0 m

Depth to Top of Rock:

MOT-SOIL-REV2-TEL MOD 26141 MOTI.GPJ MOT-DRAFT-REV2.GDT 7/1/20

TEST PIT LOG

Test Pit #: **TP19-02**

Ministry of Transportation and Infrastructure

Project: **Highway 1 - 216 Street to 264 Street Widening**

Location: Langley, B.C.

Date(s) Drilled: November 21, 2019

Excavating Company: Backhoes Unlimited

Prepared by: 26141 Thurber Engineering Ltd.

Datum: 10U

Alignment:

Operator: Andrew Flitten

Northing/Easting: 5443527 , 529129

Station/Offset:

Excavator: JD75G

Logged by: IFA Reviewed by: CJC

Elevation: 13.01 m

DEPTH (m)	DRILLING DETAILS	Pocket Penetrometer / Shear Strength (kPa) 100 200 300 400; DYNAMIC CONE (BLOWS/300 mm); Natural Vane (KPa) / Remold Vane (KPa); SPT "N" (BLOWS/300 mm); W_P% W% W_L% 20 40 60 80	SAMPLE TYPE	SAMPLE NO	RECOVERY (%)	SOIL SYMBOL	SOIL DESCRIPTION	CLASSIFICATION	COMMENTS TESTING Drillers Estimate *{G % S % F %}*	ELEVATION (m)
0							Brown TOPSOIL.			13
							0.3m			
		42.3		1			Soft to firm, brown-grey, silty CLAY to SILT and CLAY with some mottling and a trace of organics.			
1										12
		42.1		2				CH/CL		
2							- firm to stiff, no mottling below 1.5 m depth			11
							2.59m			
		59.8		3			Soft, grey SILT and CLAY with traces of organics and oxidation.	CH		
3							3.05m			10
							End of test pit at required depth. Test pit open to 3.1 m depth. Seepage observed at 3.1 m depth.			
4										9
5										8
6										7
7										6
8										5
9										4
10										

Legend

Sample Type: A-Auger; C-Core; G-Grab; V-Vane; L#-Lab Sample; S-Split Spoon; O-Odex (air rotary); W-Wash (mud return); T-Shelby Tube

Final Depth of Hole: 3.0 m

Depth to Top of Rock:

TEST PIT LOG

Test Pit #: **TP19-03**

Ministry of Transportation and Infrastructure

Project: **Highway 1 - 216 Street to 264 Street Widening**

Location: Langley, B.C.

Date(s) Drilled: November 21, 2019

Excavating Company: Backhoes Unlimited

Prepared by: 26141 Thurber Engineering Ltd.

Datum: 10U

Alignment:

Operator: Andrew Flitten

Northing/Easting: 5443385 , 529373

Station/Offset:

Excavator: JD75G

Logged by: IFA Reviewed by: CJC

Elevation: 12.01 m

DEPTH (m)	DRILLING DETAILS	Pocket Penetrometer / Shear Strength (kPa) 100 200 300 400; DYNAMIC CONE (BLOWS/300 mm); Natural Vane (KPa) / Remold Vane (KPa); SPT "N" (BLOWS/300 mm); W_P% W% W_L% 20 40 60 80	SAMPLE TYPE	SAMPLE NO	RECOVERY (%)	SOIL SYMBOL	SOIL DESCRIPTION	CLASSIFICATION	COMMENTS TESTING Drillers Estimate {G % S % F %}	ELEVATION (m)
0							Brown TOPSOIL.			12
							0.15m			
							Soft, grey-brown, silty CLAY to SILT and CLAY with traces of oxidation and organics.	CL/CH		
1		47.7		1						11
							0.91m			
							Soft to very soft, grey CLAY and SILT with traces of oxidation and organics.			
2		56.9		2				CH		10
3		60		3						9
							3.05m			
							End of test pit at required depth. Test pit open to 3.1 m depth. Seepage observed at 2.1 m depth.			
4										8
5										7
6										6
7										5
8										4
9										3
10										

Legend

Sample Type: A-Auger; C-Core; G-Grab; V-Vane; L#-Lab Sample; S-Split Spoon; O-Odex (air rotary); W-Wash (mud return); T-Shelby Tube

Final Depth of Hole: 3.0 m

Depth to Top of Rock:

TEST PIT LOG

Test Pit #: **TP19-04**

Ministry of Transportation and Infrastructure

Project: **Highway 1 - 216 Street to 264 Street Widening**

Location: Langley, B.C.

Date(s) Drilled: November 21, 2019

Excavating Company: Backhoes Unlimited

Prepared by: 26141
Thurber Engineering Ltd.

Datum: 10U

Alignment:

Operator: Andrew Flitten

Northing/Easting: 5443331 , 529465

Station/Offset:

Excavator: JD75G

Logged by: IFA Reviewed by: CJC

Elevation: 11.0 m

DEPTH (m)	DRILLING DETAILS	Pocket Penetrometer / Shear Strength (kPa) 100 200 300 400; DYNAMIC CONE (BLOWS/300 mm); Natural Vane (KPa) / Remold Vane (KPa); SPT "N" (BLOWS/300 mm); W_P% W% W_L% 20 40 60 80	SAMPLE TYPE	SAMPLE NO	RECOVERY (%)	SOIL SYMBOL	SOIL DESCRIPTION	CLASSIFICATION	COMMENTS TESTING Drillers Estimate *{G % S % F %}*	ELEVATION (m)
0		4:6		1			Brown TOPSOIL.			10
							0.15m Grey, brown SAND with a trace of silt (FILL).	SW-SM/GW-GM		
1		7:3		2						
							1.37m Soft to firm, brown-grey, silty CLAY to SILT and CLAY with traces of oxidation and organics.	CH		9
2										
		57:7		3						8
3							3.05m End of test pit at required depth. Test pit open to 3.1 m depth. Seepage observed at 1.4 m depth.			
4										7
5										6
6										5
7										4
8										3
9										2
10										

Legend
Sample Type:
A-Auger; C-Core; G-Grab; V-Vane; L#-Lab Sample; S-Split Spoon; O-Odex (air rotary); W-Wash (mud return); T-Shelby Tube

Final Depth of Hole: 3.0 m
Depth to Top of Rock:

TEST PIT LOG

Test Pit #: **TP19-05**

Ministry of Transportation and Infrastructure

Project: **Highway 1 - 216 Street to 264 Street Widening**
Location: Langley, B.C.

Date(s) Drilled: November 22, 2019
Excavating Company: Backhoes Unlimited
Operator: Andrew Flitten
Excavator: JD75G

Prepared by: 26141 Thurber Engineering Ltd.
Logged by: IFA Reviewed by: CJC

Datum: 10U
Northing/Easting: 5442943 , 530104
Elevation: 15.0 m
Alignment:
Station/Offset:

DEPTH (m)	DRILLING DETAILS	Pocket Penetrometer / Shear Strength (kPa) 100 200 300 400; DYNAMIC CONE (BLOWS/300 mm); Natural Vane (KPa) / Remold Vane (KPa); SPT "N" (BLOWS/300 mm); W_P% W% W_L% 20 40 60 80	SAMPLE TYPE	SAMPLE NO	RECOVERY (%)	SOIL SYMBOL	SOIL DESCRIPTION	CLASSIFICATION	COMMENTS TESTING Drillers Estimate *{G % S % F %}*	ELEVATION (m)
0							Brown TOPSOIL.			15
							0.15m Stiff to very stiff, grey-brown, silty CLAY to SILT and CLAY with a trace of oxidation.	CL/CH		
1		31.6		1						14
							1.07m Firm, grey CLAY and SILT with traces of organics and grey sand seams.			
		31.9		2			- soft to very soft below 1.5 m depth	CH/CL		13
2										
		36.5		3						12
3							3.05m End of test pit at required depth. Test pit open to 3.1 m depth. Seepage observed at 1.5 m depth.			
4										11
5										10
6										9
7										8
8										7
9										6
10										

Legend
Sample Type:
A-Auger; C-Core; G-Grab; V-Vane
L#-Lab Sample; S-Split Spoon; O-Odex (air rotary); W-Wash (mud return); T-Shelby Tube

Final Depth of Hole: 3.0 m
Depth to Top of Rock:

TEST PIT LOG

Test Pit #: **TP19-06**

Ministry of Transportation and Infrastructure

Project: **Highway 1 - 216 Street to 264 Street Widening**

Location: Langley, B.C.

Date(s) Drilled: November 22, 2019

Excavating Company: Backhoes Unlimited

Prepared by: 26141 Thurber Engineering Ltd.

Datum: 10U

Alignment:

Operator: Andrew Flitten

Northing/Easting: 5442796 , 530368

Station/Offset:

Excavator: JD75G

Logged by: IFA Reviewed by: CJC

Elevation: 23.01 m

DEPTH (m)	DRILLING DETAILS	Pocket Penetrometer / Shear Strength (kPa) 100 200 300 400; DYNAMIC CONE (BLOWS/300 mm); Natural Vane (KPa) ⊕ Remold Vane (KPa); SPT "N" (BLOWS/300 mm); W_P% W% W_L% 20 40 60 80	SAMPLE TYPE	SAMPLE NO	RECOVERY (%)	SOIL SYMBOL	SOIL DESCRIPTION	CLASSIFICATION	COMMENTS TESTING Drillers Estimate {G % S % F %}	ELEVATION (m)
0							Brown TOPSOIL. 0.15m			23
		32.3		1			Stiff, brown-grey, mottled, silty CLAY to SILT and CLAY with a trace of organics.	CL/CH		
1							1.22m			22
		41		2			Soft, dark brown CLAY and SILT with some organic silt.	CH/OH		
2							2.13m			21
		74.8		3			Dark brown, sandy WOOD fragments with some organic silt. 2.44m	SM/WOOD		
							Firm, grey-brown mottled, silty CLAY to SILT and CLAY with a trace of organics.	CL/CH		
3		43.8		4			3.05m			20
							End of test pit at required depth. Test pit open to 3.1 m depth. Seepage observed at 2.4 m depth.			
4										19
5										18
6										17
7										16
8										15
9										14
10										

Legend

Sample Type: A-Auger; C-Core; G-Grab; V-Vane; L#-Lab Sample; S-Split Spoon; O-Odex (air rotary); W-Wash (mud return); T-Shelby Tube

Final Depth of Hole: 3.0 m

Depth to Top of Rock:

TEST PIT LOG

Test Pit #: **TP19-07**

Ministry of Transportation and Infrastructure

Project: **Highway 1 - 216 Street to 264 Street Widening**
Location: Langley, B.C.

Date(s) Drilled: November 22, 2019
Excavating Company: Backhoes Unlimited
Operator: Andrew Flitten
Excavator: JD75G

Prepared by: 26141 Thurber Engineering Ltd.
Logged by: IFA Reviewed by: CJC

Datum: 10U
Northing/Easting: 5442235 , 531341
Elevation: 31.0 m
Alignment:
Station/Offset:

DEPTH (m)	DRILLING DETAILS	Pocket Penetrometer / Shear Strength (kPa) 100 200 300 400; DYNAMIC CONE (BLOWS/300 mm); Natural Vane (KPa) ⊕ Remold Vane (KPa); SPT "N" (BLOWS/300 mm); W_P% W% W_L% 20 40 60 80	SAMPLE TYPE	SAMPLE NO	RECOVERY (%)	SOIL SYMBOL	SOIL DESCRIPTION	CLASSIFICATION	COMMENTS TESTING Drillers Estimate {G % S % F %}	ELEVATION (m)
0							Brown TOPSOIL.			31
							0.61m			
1		34.4		1			Very soft to soft, grey-brown, mottled, clayey SILT to CLAY and SILT with some organic silt and organics.	CL/OL		30
2		40.3		2			2.13m			29
							Soft to firm, grey, silty CLAY to SILT and CLAY with a trace of organics.	CH/CL		
3		38.7		3			3.05m			28
							End of test pit at required depth. Test pit open to 3.1 m depth. Seepage observed at 2.1 m depth.			
4										27
5										26
6										25
7										24
8										23
9										22
10										

Legend
Sample Type:
A-Auger; C-Core; G-Grab; V-Vane
L#-Lab Sample; S-Split Spoon; O-Odex (air rotary); W-Wash (mud return); T-Shelby Tube

Final Depth of Hole: 3.0 m
Depth to Top of Rock:

MOT-SOIL-REV2-TEL MOD 26141 MOTI.GPJ MOT-DRAFT-REV2.GDT 7/1/20

TEST PIT LOG

Test Pit #: **TP19-08**

Ministry of Transportation and Infrastructure

Project: **Highway 1 - 216 Street to 264 Street Widening**

Location: Langley, B.C.

Date(s) Drilled: November 22, 2019

Excavating Company: Backhoes Unlimited

Prepared by: 26141 Thurber Engineering Ltd.

Datum: 10U

Alignment:

Operator: Andrew Flitten

Northing/Easting: 5442150 , 531486

Station/Offset:

Excavator: JD75G

Logged by: IFA Reviewed by: CJC

Elevation: 36.0 m

DEPTH (m)	DRILLING DETAILS	Pocket Penetrometer / Shear Strength (kPa) 100 200 300 400; DYNAMIC CONE (BLOWS/300 mm); Natural Vane (KPa) / Remold Vane (KPa); SPT "N" (BLOWS/300 mm); W_P% W% W_L% 20 40 60 80	SAMPLE TYPE	SAMPLE NO	RECOVERY (%)	SOIL SYMBOL	SOIL DESCRIPTION	CLASSIFICATION	COMMENTS TESTING Drillers Estimate *{G % S % F %}*	ELEVATION (m)
0							Brown TOPSOIL.			36
							0.15m Very soft, dark brown, friable ORGANIC SILT with some sand and organics and a trace of woodwaste.			
1		138.4		1						35
							- trace to some silt and sand in lumps below 1.5 m depth	OH		
2		57.3		2						34
							- some rootlets below 2.7 m depth			
3		99.6		3			3.05m End of test pit at required depth. Test pit open to 3.1 m depth. No seepage observed.			33
4										32
5										31
6										30
7										29
8										28
9										27
10										

Legend

Sample Type: A-Auger; C-Core; G-Grab; V-Vane; L#-Lab Sample; S-Split Spoon; O-Odex (air rotary); W-Wash (mud return); T-Shelby Tube

Final Depth of Hole: 3.0 m

Depth to Top of Rock:

TEST PIT LOG

Test Pit #: **TP19-09**

Ministry of Transportation and Infrastructure

Project: **Highway 1 - 216 Street to 264 Street Widening**

Location: Langley, B.C.

Date(s) Drilled: November 22, 2019

Excavating Company: Backhoes Unlimited

Prepared by: 26141 Thurber Engineering Ltd.

Datum: 10U

Alignment:

Operator: Andrew Flitten

Northing/Easting: 5442090 , 531575

Station/Offset:

Excavator: JD75G

Logged by: IFA Reviewed by: CJC

Elevation: 39.99 m

DEPTH (m)	DRILLING DETAILS	Pocket Penetrometer / Shear Strength (kPa) 100 200 300 400; DYNAMIC CONE (BLOWS/300 mm); Natural Vane (KPa) ⊕ Remold Vane (KPa); SPT "N" (BLOWS/300 mm); W_P% W% W_L% 20 40 60 80	SAMPLE TYPE	SAMPLE NO	RECOVERY (%)	SOIL SYMBOL	SOIL DESCRIPTION	CLASSIFICATION	COMMENTS TESTING Drillers Estimate *{G % S % F %}*	ELEVATION (m)
0		87		1			Dark brown TOPSOIL.	OH		
							0.61m			
1		7.4		2			Grey-brown SAND with a trace of silt.			39
							- some gravel below 1.5 m depth	SP		
2										38
		9.6		3						
3							3.05m			37
							End of test pit at required depth. Test pit open to 3.1 m depth. No seepage observed.			
4										36
5										35
6										34
7										33
8										32
9										31
10										

Legend

Sample Type: A-Auger; C-Core; G-Grab; V-Vane; L#-Lab Sample; S-Split Spoon; O-Odex (air rotary); W-Wash (mud return); T-Shelby Tube

Final Depth of Hole: 3.0 m

Depth to Top of Rock:

TEST PIT LOG

Test Pit #: **TP19-10**

Ministry of Transportation and Infrastructure

Project: **Highway 1 - 216 Street to 264 Street Widening**

Location: Langley, B.C.

Date(s) Drilled: November 22, 2019

Excavating Company: Backhoes Unlimited

Prepared by: 26141 Thurber Engineering Ltd.

Datum: 10U

Alignment:

Operator: Andrew Flitten

Northing/Easting: 5441147 , 533178

Station/Offset:

Excavator: JD75G

Logged by: IFA Reviewed by: CJC

Elevation: 54.99 m

DEPTH (m)	DRILLING DETAILS	Pocket Penetrometer / Shear Strength (kPa) 100 200 300 400; DYNAMIC CONE (BLOWS/300 mm); Natural Vane (KPa) / Remold Vane (KPa); SPT "N" (BLOWS/300 mm); W_P% W% W_L% 20 40 60 80	SAMPLE TYPE	SAMPLE NO	RECOVERY (%)	SOIL SYMBOL	SOIL DESCRIPTION	CLASSIFICATION	COMMENTS TESTING Drillers Estimate {G % S % F %}	ELEVATION (m)
0							Brown TOPSOIL with some woodwaste.			54
							0.61m			
1		14.9		1			Compact, grey-brown SAND with a trace to some gravel and traces of cobbles, oxidation, silt and organics.	SP		
							1.83m			
2		31.6		2			Soft, grey-brown, sandy SILT with some zones of clayey SILT and a trace of organics.	CL/ML		53
3		33.1		3			3.05m			52
							End of test pit at required depth. Test pit open to 2.6 m depth. Seepage observed at 1.5 m depth.			
4										51
5										50
6										49
7										48
8										47
9										46
10										

Legend

Sample Type: A-Auger; C-Core; G-Grab; V-Vane; L#-Lab Sample; S-Split Spoon; O-Odex (air rotary); W-Wash (mud return); T-Shelby Tube

Final Depth of Hole: 3.0 m

Depth to Top of Rock:

TEST PIT LOG

Test Pit #: **TP19-11**

Ministry of Transportation and Infrastructure

Project: **Highway 1 - 216 Street to 264 Street Widening**

Location: Langley, B.C.

Date(s) Drilled: November 22, 2019

Excavating Company: Backhoes Unlimited

Prepared by: 26141
Thurber Engineering Ltd.

Datum: 10U

Alignment:

Operator: Andrew Flitten

Northing/Easting: 5440936 , 533544

Station/Offset:

Excavator: JD75G

Logged by: IFA Reviewed by: CJC

Elevation: 60.02 m

DEPTH (m)	DRILLING DETAILS	Pocket Penetrometer / Shear Strength (kPa) 100 200 300 400; DYNAMIC CONE (BLOWS/300 mm); Natural Vane (KPa) / Remold Vane (KPa); SPT "N" (BLOWS/300 mm); W_P% W% W_L% 20 40 60 80	SAMPLE TYPE	SAMPLE NO	RECOVERY (%)	SOIL SYMBOL	SOIL DESCRIPTION	CLASSIFICATION	COMMENTS TESTING Drillers Estimate *{G % S % F %}*	ELEVATION (m)
0							Brown TOPSOIL.			60
		10.8		1			0.3m Brown SAND with some gravel and oxidation.	SP-SM		
1							0.91m Soft, dark brown, friable SILT with some sand and traces of organic silt and organics.	ML/OL		59
		37.7		2			1.52m Firm to stiff, grey-brown, mottled, silty CLAY to SILT and CLAY with a trace of organics.	CH		
2										58
		50.2		3						
3							3.05m End of test pit at required depth. Test pit open to 3.1 m depth. Seepage observed at 2.6 m depth.			57
4										56
5										55
6										54
7										53
8										52
9										51
10										

Legend
Sample Type:
A-Auger; C-Core; G-Grab; V-Vane
L#-Lab Sample; S-Split Spoon; O-Odex (air rotary); W-Wash (mud return); T-Shelby Tube

Final Depth of Hole: 3.0 m
Depth to Top of Rock:

MOT-SOIL-REV2-TEL MOD 26141 MOTI.GPJ MOT-DRAFT-REV2.GDT 7/1/20

TEST PIT LOG

Test Pit #: **TP19-12**

Ministry of Transportation and Infrastructure

Project: **Highway 1 - 216 Street to 264 Street Widening**

Location: Langley, B.C.

Date(s) Drilled: November 22, 2019

Excavating Company: Backhoes Unlimited

Prepared by: 26141 Thurber Engineering Ltd.

Datum: 10U

Alignment:

Operator: Andrew Flitten

Northing/Easting: 5440461 , 534317

Station/Offset:

Excavator: JD75G

Logged by: IFA Reviewed by: CJC

Elevation: 83.0 m

DEPTH (m)	DRILLING DETAILS	Pocket Penetrometer / Shear Strength (kPa) 100 200 300 400; DYNAMIC CONE (BLOWS/300 mm); Natural Vane (KPa) / Remold Vane (KPa); SPT "N" (BLOWS/300 mm); W_P% W% W_L% 20 40 60 80	SAMPLE TYPE	SAMPLE NO	RECOVERY (%)	SOIL SYMBOL	SOIL DESCRIPTION	CLASSIFICATION	COMMENTS TESTING Drillers Estimate {G % S % F %}	ELEVATION (m)
0							Brown, moist TOPSOIL. 0.15m			83
							Brown, gravelly SAND with some silt and a trace of organics.	GP/SP		
1		18		1						82
		6.2		2			1.22m Brown, gravelly SAND to SAND and GRAVEL with a trace of silt (FILL).	SP		
2										81
3		5.1		3			3.05m End of test pit at required depth. Test pit open to 3.1 m depth. No seepage observed.			80
4										79
5										78
6										77
7										76
8										75
9										74
10										

Legend

Sample Type: A-Auger; C-Core; G-Grab; V-Vane; L#-Lab Sample; S-Split Spoon; O-Odex (air rotary); W-Wash (mud return); T-Shelby Tube

Final Depth of Hole: 3.0 m

Depth to Top of Rock:

MOT-SOIL-REV2-TEL MOD 26141 MOTI.GPJ MOT-DRAFT-REV2.GDT 7/1/20

TEST PIT LOG

Test Pit #: **TP19-13**

Ministry of Transportation and Infrastructure

Project: **Highway 1 - 216 Street to 264 Street Widening**

Location: Langley, B.C.

Date(s) Drilled: November 22, 2019

Excavating Company: Backhoes Unlimited

Prepared by: 26141 Thurber Engineering Ltd.

Datum: 10U

Alignment:

Operator: Andrew Flitten

Northing/Easting: 5440105 , 534948

Station/Offset:

Excavator: JD75G

Logged by: IFA Reviewed by: CJC

Elevation: 85.01 m

DEPTH (m)	DRILLING DETAILS	Pocket Penetrometer / Shear Strength (kPa) 100 200 300 400; DYNAMIC CONE (BLOWS/300 mm); Natural Vane (KPa) ⊕ Remold Vane (KPa); SPT "N" (BLOWS/300 mm); W_P% W% W_L% 20 40 60 80	SAMPLE TYPE	SAMPLE NO	RECOVERY (%)	SOIL SYMBOL	SOIL DESCRIPTION	CLASSIFICATION	COMMENTS TESTING Drillers Estimate *{G % S % F %}*	ELEVATION (m)
0							Brown TOPSOIL.			85
							0.15m			
							Soft to firm, friable SILT with some organics, organic silt, clay and sand and a trace of cobbles.			
		41.5		1						
1										84
		28.3		2						
							- firm to stiff with a trace of woodwaste below 1.5 m depth	ML/OL		
2										83
							- 610 mm diameter boulder at 2.3 m depth			
		39.9		3						
3							3.05m			82
							End of test pit at required depth. Test pit open to 3.1 m depth. Seepage observed at 2.9 m.			
4										81
5										80
6										79
7										78
8										77
9										76
10										

Legend

Sample Type: A-Auger; C-Core; G-Grab; V-Vane; L#-Lab Sample; S-Split Spoon; O-Odex (air rotary); W-Wash (mud return); T-Shelby Tube

Final Depth of Hole: 3.0 m

Depth to Top of Rock:

TEST PIT LOG

Test Pit #: **TP19-14**

Ministry of Transportation and Infrastructure — British Columbia

Project: **Highway 1 - 216 Street to 264 Street Widening**
Location: Langley, B.C.

Date(s) Drilled: November 22, 2019
Excavating Company: Backhoes Unlimited
Operator: Andrew Flitten
Excavator: JD75G

Prepared by: 26141 Thurber Engineering Ltd.
Logged by: IFA Reviewed by: CJC

Datum: 10U
Northing/Easting: 5439383 , 536149
Elevation: 89.0 m
Alignment:
Station/Offset:

DEPTH (m)	SAMPLE TYPE	SAMPLE NO	RECOVERY (%)	SOIL SYMBOL	SOIL DESCRIPTION	CLASSIFICATION	COMMENTS TESTING Drillers Estimate *{G % S % F %}*	ELEVATION (m)
0					Brown TOPSOIL.			
					0.46m			
		1			Soft to very soft, dark brown SILT with traces of organic silt, sand and clay.	OH/OL		
					0.91m			
1		2			Very stiff, grey-brown SILT with a trace to some clay. - 450 mm diameter boulder at 1.2 m depth			88
2					- mottled between 1.8 and 2.3 m depth	ML		87
		3						
3					3.05m			86
					End of test pit at required depth. Test pit open to 3.1 m depth. Seepage observed at 0.9 and 2.1 m depth.			
4								85
5								84
6								83
7								82
8								81
9								80
10								

45
27.8
24.1

Legend
Sample Type:
A-Auger
C-Core
G-Grab
V-Vane
L#-Lab Sample
S-Split Spoon
O-Odex (air rotary)
W-Wash (mud return)
T-Shelby Tube

Final Depth of Hole: 3.0 m
Depth to Top of Rock:

TEST PIT LOG

Test Pit #: **TP19-15**

Ministry of Transportation and Infrastructure

Project: **Highway 1 - 216 Street to 264 Street Widening**

Location: Langley, B.C.

Date(s) Drilled: November 22, 2019

Excavating Company: Backhoes Unlimited

Prepared by: 26141
Thurber Engineering Ltd.

Datum: 10U

Alignment:

Operator: Andrew Flitten

Northing/Easting: 5439076 , 536678

Station/Offset:

Excavator: JD75G

Logged by: IFA Reviewed by: CJC

Elevation: 94.0 m

DEPTH (m)	DRILLING DETAILS	Pocket Penetrometer / Shear Strength (kPa) 100 200 300 400; DYNAMIC CONE (BLOWS/300 mm); Natural Vane (KPa) / Remold Vane (KPa); SPT "N" (BLOWS/300 mm); W_P% W% W_L% 20 40 60 80	SAMPLE TYPE	SAMPLE NO	RECOVERY (%)	SOIL SYMBOL	SOIL DESCRIPTION	CLASSIFICATION	COMMENTS TESTING Drillers Estimate *{G % S % F %}*	ELEVATION (m)
0		29.8		1			Brown TOPSOIL.			94
							0.3m Firm, brown, moist, friable SILT with some oxidation, a trace to some cobbles and traces of sand and organics.	ML		
1		24.8		2			0.76m Very stiff, brown-grey SILT with some clay to clayey and a trace of organics.			93
2								CL/ML		92
		24		3						
3							3.05m End of test pit at required depth. Test pit open to 3.1 m depth. No seepage observed.			91
4										90
5										89
6										88
7										87
8										86
9										85
10										

Legend
Sample Type:
A-Auger; C-Core; G-Grab; V-Vane; L#-Lab Sample; S-Split Spoon; O-Odex (air rotary); W-Wash (mud return); T-Shelby Tube

Final Depth of Hole: 3.0 m
Depth to Top of Rock:

MOT-SOIL-REV2-TEL MOD 26141 MOTI.GPJ MOT-DRAFT-REV2.GDT 7/1/20

TEST PIT LOG

Test Pit #: **TP19-16**

Ministry of Transportation and Infrastructure

Project: **Highway 1 - 216 Street to 264 Street Widening**

Location: Langley, B.C.

Date(s) Drilled: November 22, 2019

Excavating Company: Backhoes Unlimited

Prepared by: 26141
Thurber Engineering Ltd.

Datum: 10U

Alignment:

Operator: Andrew Flitten

Northing/Easting: 5438884 , 536993

Station/Offset:

Excavator: JD75G

Logged by: IFA Reviewed by: CJC

Elevation: 96.01 m

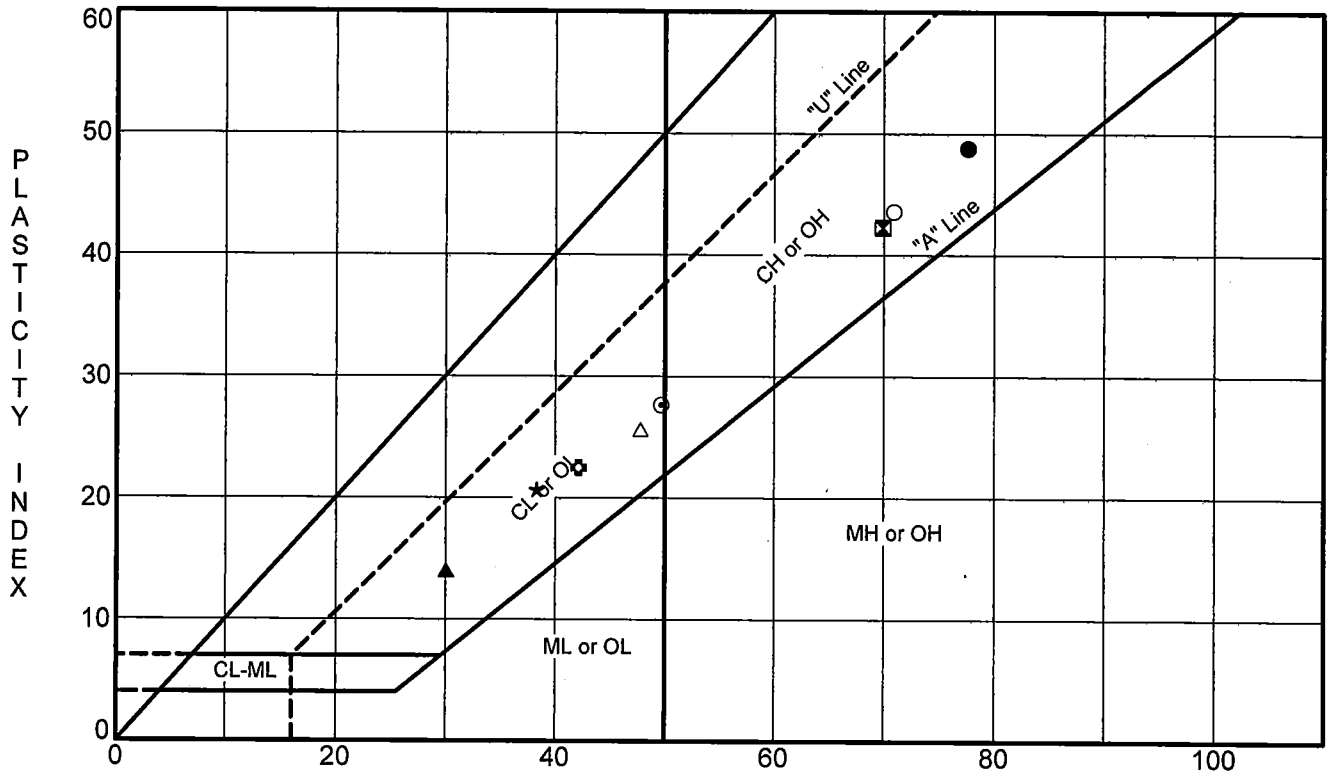
DEPTH (m)	DRILLING DETAILS	Pocket Penetrometer / Shear Strength (kPa) 100 200 300 400; DYNAMIC CONE (BLOWS/300 mm); Natural Vane (KPa) / Remold Vane (KPa); SPT "N" (BLOWS/300 mm); W_P% W% W_L% 20 40 60 80	SAMPLE TYPE	SAMPLE NO	RECOVERY (%)	SOIL SYMBOL	SOIL DESCRIPTION	CLASSIFICATION	COMMENTS TESTING Drillers Estimate *{G % S % F %}*	ELEVATION (m)
0		21.2		1			Brown TOPSOIL.			96
							0.15m Stiff to very stiff, grey-brown, mottled, clayey SILT with a trace of organics.	CL		
							0.61m Very stiff, grey CLAY and SILT with a trace of sand.	CH/CL		
1		23.3		2						95
2										94
		31.7		3						
3							3.05m End of test pit at required depth. Test pit open to 3.1 m depth. Seepage observed at 2.4 m depth.			93
4										92
5										91
6										90
7										89
8										88
9										87
10										

Legend
Sample Type:
A-Auger; C-Core; G-Grab; V-Vane; L#-Lab Sample; S-Split Spoon; O-Odex (air rotary); W-Wash (mud return); T-Shelby Tube

Final Depth of Hole: 3.0 m
Depth to Top of Rock:

THURBER

2019 Thurber Laboratory Test Results



LIQUID LIMIT

	Specimen Identification		LL	PL	PI	MC%	USCS Classification
●	TH19-01, Sa. 3	8.0 m	78	29	49	63.4	
⊠	TH19-02, Sa. 4	13.0 m	70	28	42	47.1	
▲	TH19-03, Sa. 5	18.5 m	30	16	14	28.5	
★	TH19-04, Sa. 4	13.0 m	38	18	20	38.7	
⊙	TH19-05, Sa. 5	18.0 m	50	22	28	44.6	
✿	TH19-06, Sa. 4	13.5 m	42	20	22	39.3	
○	TH19-07, Sa. 4	14.0 m	71	27	44	63.8	
△	TH19-08, Sa. 3	7.0 m	48	22	26	37.3	

THURBER ENGINEERING LTD.

PLASTICITY CHART

CLIENT: Associated Engineering Ltd.

PROJECT: Highway 1 - 216 Street to 264 Street Widening

FILE NO.: 26141

ATTERBERG_LIMITS MT POLLEY 26141.GPJ CAN_LAB.GDT 7/1/20- THURBER BC.GLB

THURBER

2013 Thurber Test Pit Logs

Sheet 1 of 1

LOG OF TEST PIT

TEST PIT NO. **TP13-01**

LOCATION See Dwg. 17-531-145-1
N 5442243, E 530543 (Est.)

TOP OF HOLE ELEV:

METHOD: Zaxis 225 Track Excavator

EXCAVATOR: G&E Contracting

INSPECTOR: CHS

THURBER

CLIENT: McElhanney Consulting Services Ltd.

PROJECT: 232nd Street & 72nd Avenue Intersection

DATE: February 5, 2013

FILE NO.: 17-531-145

PENETRATION (blows/300 mm) | WATER CONTENT (%): ○ Disturbed ● Undisturbed | WATER LEVEL: Plastic Limit — Liquid Limit | SAMPLES: ◧ Disturbed ■ Undisturbed ☒ No Recovery | UNDRAINED SHEAR STRENGTH (kPa): ◆ Peak ◇ Residual ◆ Remolded | GRAIN SIZE (%): ▲ Passing #200 sieve △ Passing #4 sieve | SOIL HEADSPACE READING (ppm): ✱ GASTECH reading ⊠ PID reading

DEPTH (m) | 10 20 30 40 50 60 70 80 90 100 | COMMENTS | SOILS DESCRIPTION

DEPTH (m)		SOILS DESCRIPTION
0		400 mm TOPSOIL.
	SP	Loose to compact, grey-brown, moist to wet, gravelly SAND with trace of silt (Fill).
1		Firm to stiff, light grey, moist, CLAY & SILT with a trace of gravel and organics.
	CI/CH	
2		
	CI/CH	
3		End of hole at required depth. No sloughing observed. Limited seepage into hole from nearby drainage ditch through shallow sands.
4		
5		

LOG OF TEST PIT (COORDINATES EST.) 17-531-145.GPJ THURBER BC.GDT 3/21/13- THURBER BC.GLB

Sheet 1 of 1

LOG OF TEST PIT

TEST PIT NO. **TP13-02**

LOCATION See Dwg. 17-531-145-1
N 5442405, E 530735 (Est.)

TOP OF HOLE ELEV:

METHOD: Zaxis 225 Track Excavator

EXCAVATOR: G&E Contracting

INSPECTOR: CHS

THURBER

CLIENT: McElhanney Consulting Services Ltd.

PROJECT: 232nd Street & 72nd Avenue Intersection

DATE: February 5, 2013

FILE NO.: 17-531-145

PENETRATION (blows/300 mm) | WATER CONTENT (%): ○ Disturbed ● Undisturbed | WATER LEVEL: Plastic Limit — Liquid Limit | SAMPLES: ◧ Disturbed ■ Undisturbed ☒ No Recovery | UNDRAINED SHEAR STRENGTH (kPa): ◆ Peak ◇ Residual ◆ Remolded | GRAIN SIZE (%): ▲ Passing #200 sieve △ Passing #4 sieve | SOIL HEADSPACE READING (ppm): ✱ GASTECH reading ⊠ PID reading

DEPTH (m) | 10 20 30 40 50 60 70 80 90 100 | COMMENTS | SOILS DESCRIPTION

0

100 mm TOPSOIL.

50 mm Loose to compact, grey-brown, wet, gravelly SAND with a trace of silt and organics (Fill).

Firm to stiff, light grey, moist, CLAY & SILT with a trace of organics.

1

CI/CH

2

CI/CH

3

End of hole at required depth.
Sloughing observed in shallow sands.
Limited seepage into hole from shallow sands.

4

5

DEPTH (m)

LOG OF TEST PIT (COORDINATES EST.) 17-531-145.GPJ THURBER BC.GDT 3/21/13- THURBER BC.GLB

Sheet 1 of 1

LOG OF TEST PIT

TEST PIT NO. **TP13-03**

LOCATION See Dwg. 17-531-145-1
N 5442467, E 530763 (Est.)

TOP OF HOLE ELEV:

METHOD: Zaxis 225 Track Excavator

EXCAVATOR: G&E Contracting

INSPECTOR: CHS

THURBER

CLIENT: McElhanney Consulting Services Ltd.

PROJECT: 232nd Street & 72nd Avenue Intersection

DATE: February 5, 2013

FILE NO.: 17-531-145

PENETRATION (blows/300 mm) | WATER CONTENT (%) ○ Disturbed ● Undisturbed | WATER LEVEL Plastic Limit — Liquid Limit | SAMPLES ◧ Disturbed ■ Undisturbed ☒ No Recovery | UNDRAINED SHEAR STRENGTH (kPa) ◆ Peak ◇ Residual ◆ Remolded | GRAIN SIZE (%) ▲ Passing #200 sieve △ Passing #4 sieve | SOIL HEADSPACE READING (ppm) ✱ GASTECH reading ⊠ PID reading

DEPTH (m) | 10 20 30 40 50 60 70 80 90 100 | **COMMENTS** | **SOILS DESCRIPTION**

DEPTH (m)	SOILS DESCRIPTION
0	300 mm Loose to compact, dark brown, wet, sandy TOPSOIL.
	Firm to stiff, light grey, moist, CLAY & SILT with a trace of organics.
1	
2	CH
3	CI/CH
	End of hole at required depth. No sloughing observed. Seepage into hole from shallow sands.
4	
5	

LOG OF TEST PIT (COORDINATES EST.) 17-531-145.GPJ THURBER BC.GDT 3/21/13- THURBER BC.GLB

Sheet 1 of 1

LOG OF TEST PIT

TEST PIT NO. TP13-04

LOCATION See Dwg. 17-531-145-1
N 5442396, E 530557 (Est.)

TOP OF HOLE ELEV:

METHOD: Zaxis 225 Track Excavator

EXCAVATOR: G&E Contracting

INSPECTOR: CHS

THURBER

CLIENT: McElhanney Consulting Services Ltd.

PROJECT: 232nd Street & 72nd Avenue Intersection

DATE: February 5, 2013

FILE NO.: 17-531-145

PENETRATION (blows/300 mm) | WATER CONTENT (%): ○ Disturbed ● Undisturbed | WATER LEVEL: Plastic Limit — Liquid Limit | SAMPLES: ◧ Disturbed ■ Undisturbed ☒ No Recovery | UNDRAINED SHEAR STRENGTH (kPa): ◆ Peak ◇ Residual ◆ Remolded | GRAIN SIZE (%): ▲ Passing #200 sieve △ Passing #4 sieve | SOIL HEADSPACE READING (ppm): ✱ GASTECH reading ⊠ PID reading

DEPTH (m)	10 20 30 40 50 60 70 80 90 100	COMMENTS		SOILS DESCRIPTION	DEPTH (m)
0				100 mm SAND & TOPSOIL.	0
			SP	Compact, brown, moist, gravelly SAND with a trace of silt & fibrous organics (Fill).	
				Firm, light grey-brown, moist, CLAY & SILT with a trace of gravel & fibrous organics (Fill).	
1		asphalt debris observed at 1 m		Compact, brown, moist, gravelly SAND with a trace of silt (Fill).	1
			SP		
2					2
		50 mm of dark brown topsoil and woodwaste at interface		Firm to stiff, light grey, moist, CLAY & SILT with some fibrous organics.	
			CI/CH		
3				End of hole at required depth. Sloughing observed from sand betweeen 2.1 m and 2.5 m. Seepage into hole from sand below 2.1 m.	3
4					4
5					5

LOG OF TEST PIT (COORDINATES EST.) 17-531-145.GPJ THURBER BC.GDT 3/21/13- THURBER BC.GLB

Sheet 1 of 1

LOG OF TEST PIT

TEST PIT NO. **TP13-05**

LOCATION See Dwg. 17-531-145-1
N 5442507, E 530525 (Est.)

TOP OF HOLE ELEV:

METHOD: Zaxis 225 Track Excavator

EXCAVATOR: G&E Contracting

INSPECTOR: CHS

THURBER

CLIENT: McElhanney Consulting Services Ltd.

PROJECT: 232nd Street & 72nd Avenue Intersection

DATE: February 5, 2013

FILE NO.: 17-531-145

PENETRATION (blows/300 mm) | WATER CONTENT (%) ○ Disturbed ● Undisturbed | WATER LEVEL Plastic Limit – Liquid Limit | SAMPLES ◧ Disturbed ■ Undisturbed ☒ No Recovery | UNDRAINED SHEAR STRENGTH (kPa) ◆ Peak ◇ Residual ◆ Remolded | GRAIN SIZE (%) ▲ Passing #200 sieve △ Passing #4 sieve | SOIL HEADSPACE READING (ppm) ■ GASTECH reading ⊠ PID reading

DEPTH (m)	10 20 30 40 50 60 70 80 90 100	COMMENTS		SOILS DESCRIPTION	DEPTH (m)
0				Compact, grey brown, moist to wet, SAND and ORGANICS with a trace of clay and silt (Fill).	0
1		25 mm of topsoil at interface		Soft to firm, light grey, wet, CLAY & SILT with a trace to some fibrous organics.	1
				Below 1.2 m, Firm to stiff, and moist	
			CI/CH	At 1.5 m, abandoned Clay Pipe trending approximately East to West.	
2					2
			CH		
3				End of hole due to significant sloughing of shallow sands. Seepage from shallow sand layer and from draining clay pipe.	3
4					4
5					5

LOG OF TEST PIT (COORDINATES EST.) 17-531-145.GPJ THURBER BC.GDT 3/21/13- THURBER BC.GLB

Sheet 1 of 1

LOG OF TEST PIT

TEST PIT NO. TP13-06

LOCATION See Dwg. 17-531-145-1
N 5442410, E 530523 (Est.)

TOP OF HOLE ELEV:

METHOD: Zaxis 225 Track Excavator

EXCAVATOR: G&E Contracting

INSPECTOR: CHS

THURBER

CLIENT: McElhanney Consulting Services Ltd.

PROJECT: 232nd Street & 72nd Avenue Intersection

DATE: February 5, 2013

FILE NO.: 17-531-145

PENETRATION (blows/300 mm) | WATER CONTENT (%): ○ Disturbed ● Undisturbed | WATER LEVEL: Plastic Limit — Liquid Limit | SAMPLES: ◧ Disturbed ■ Undisturbed ☒ No Recovery | UNDRAINED SHEAR STRENGTH (kPa): ◆ Peak ◇ Residual ◆ Remolded | GRAIN SIZE (%): ▲ Passing #200 sieve △ Passing #4 sieve | SOIL HEADSPACE READING (ppm): ✱ GASTECH reading ⊠ PID reading

10 20 30 40 50 60 70 80 90 100

DEPTH (m)	COMMENTS		SOILS DESCRIPTION
0	Frequent pieces of broken aspahlt up to 1 m square.		Compact, brown, moist, gravelly SAND with a trace of silt and fibrous organics (Fill).
1		GP/SP	
2	Frequent oxidized zones surrounding organics.		Firm to stiff, light grey, moist to wet, CLAY & SILT with some fibrous organics.
3		CI/CH	End of hole at required depth. Some seepage and sloughing observed from sand layer.
4			
5			

LOG OF TEST PIT (COORDINATES EST.) 17-531-145.GPJ THURBER BC.GDT 3/21/13- THURBER BC.GLB

Sheet 1 of 1

LOG OF TEST PIT

TEST PIT NO. TP13-07

LOCATION See Dwg. 17-531-145-1
N 5442248, E 530524 (Est.)

TOP OF HOLE ELEV:

METHOD: Zaxis 225 Track Excavator

EXCAVATOR: G&E Contracting

INSPECTOR: CHS

THURBER

CLIENT: McElhanney Consulting Services Ltd.

PROJECT: 232nd Street & 72nd Avenue Intersection

DATE: February 5, 2013

FILE NO.: 17-531-145

PENETRATION (blows/300 mm) | WATER CONTENT (%): ○ Disturbed ● Undisturbed | WATER LEVEL: Plastic Limit — Liquid Limit | SAMPLES: ◧ Disturbed ■ Undisturbed ☒ No Recovery | UNDRAINED SHEAR STRENGTH (kPa): ◆ Peak ◇ Residual ◆ Remolded | GRAIN SIZE (%): ▲ Passing #200 sieve △ Passing #4 sieve | SOIL HEADSPACE READING (ppm): ✱ GASTECH reading ⊠ PID reading

DEPTH (m)

10 20 30 40 50 60 70 80 90 100

COMMENTS

SOILS DESCRIPTION

DEPTH (m)		SOILS DESCRIPTION
0		300 mm sandy TOPSOIL.
	SP	Compact, brown, moist, gravelly SAND with a trace of silt and fibrous organics (Fill).
1		Firm to stiff, light grey, moist, CLAY & SILT with a trace of organics.
2	CI/CH	
3	CI/CH	End of hole at required depth. Limited sloughing observed from shallow sand layer. Seepage into hole from nearyb drainage ditch observed from shallow sand.
4		
5		

LOG OF TEST PIT (COORDINATES EST.) 17-531-145.GPJ THURBER BC.GDT 3/21/13- THURBER BC.GLB

THURBER

2012 Thurber Test Hole Logs

Ministry of Transportation

SUMMARY LOG

South Coast Region

TEST HOLE No. 12-1

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **South Abutment of the 248th St./Otter Rd. OverpassN 5440728, E 533789** Elevation **79.5 m**

Driller **Sea to Sky Drilling Services** Method **Solid Stem Auger to 3.0 m/Mud Rotary** Dates **May 10, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
													125 mm of ASPHALT. 0.13m	79
	1	G									5.1	SP	Dense, brown SAND with some gravel and a trace of silt. Some wood at 0.6 m depth	78
	2	G									5.3	SP-SM	No gravel below 1.8 m depth	77
	3		32										3.66m	76
	4	S	18	0.03							14.4	SP-SM	Compact, grey SAND with traces of gravel and silt.	75
	5													74
	6	S	22	0.03							22.0	SP		73
	7	S	22	0.03							20.0	SP		72
	8													71
	9	S	25	0.04							19.0	SM	Some silt below 8.5 m depth 9.14m	70
	10	S	36	0.03							17.3	SP	Dense, grey SAND with traces of gravel and silt.	69
	11													68
	12	S	38	0.04							19.2	SP-SM	Some silt between 11.6 and 13.4 m depth	67
	13	S	35	0.01							26.6	SM		66
	14													65
	15	S	35	0.01							19.4	SP		64
	16	S	41	0.04							20.8	SP		63
	17													62
	18	S	34	0.04							24.7	SP		61
	19	S	28	0.04							24.3	SP-SM	19.66m	60
	20												End of testhole at required depth.	59

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: CJC

SHEET 1 of 1

MOT SUMMARY LOG (ELEV.) 17-531-140.GPJ THURBER BC.GDT 8/28/12- THURBER BC.GLB

Ministry of Transportation

SUMMARY LOG

South Coast Region

TEST HOLE No. 12-2

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **North Abutment of the 248th St./Otter Rd. OverpassN 5440836, E 533780** Elevation **75.0 m**

Driller **Sea to Sky Drilling Services** Method **Solid Stem Auger to 3.0 m/Mud Rotary** Dates **May 10, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
													125 mm of ASPHALT. 0.13m	
	1	G	38								4.1	SP	Dense, brown SAND with some gravel and a trace of silt (Fill).	74
	2													73
		G									7.4	SP		
	3		53											72
													3.51m	
	4	S	4	0.03							29.0	SM	Loose, reddish brown SAND with some silt and a trace of gravel.	71
	5												5.03m	70
		S	46	0.04							16.6	SP	Dense, grey SAND with a trace to some gravel and a trace of silt.	
	6													69
	7	S	27	0.03							16.8	SP		68
	8													67
		S	39	0.04							19.9	SP-SM	Trace gravel below 8.5 m depth	
	9													66
	10												10.06m	65
		S	18	0.04							23.1	SM	Compact, brown SAND with some silt.	
	11													64
	12	S	21	0.04							22.8	SM		63
													12.19m	
	13												Dense, brownish grey SAND with a trace to some silt.	62
		S	34	0.04							21.7	SP-SM		
	14													61
	15	S	30	0.04							24.1	SP-SM	Grey below 14.6 m depth	60
	16													59
		S	29	0.04							24.3	SP-SM		
	17													58
	18	S	33	0.04							24.4	SP		57
	19												19.05m	56
		S	45	0.04							15.6	GM/SM	Dense, grey, GRAVEL and SAND with some silt. 19.66m	
	20												End of testhole at required depth.	55

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: CJC

SHEET 1 of 1

MOT SUMMARY LOG (ELEV.) 17-531-140.GPJ THURBER BC.GDT 8/28/12- THURBER BC.GLB

Ministry of Transportation

SUMMARY LOG

South Coast Region

TEST HOLE No. **TH 12-3**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5442108, E 531515** Elevation **35.9 m**

Driller **On-Track Drilling Inc.** Method **Solid Stem Auger** Dates **July 11, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
	1										226.7	PT	Soft, dark brown amorphous PEAT with some fibrous organics and silt and a trace of sand	35
													1.80m	
	2										23.9	SP-SM	Compact, grey SAND with a trace to some silt and a trace of gravel	34
	3												50 mm thick layer of organics at 2.75 m depth Some organic silt below 3 m depth	33
													3.50m	
	4										44.3	OH/CH	Soft to firm, grey, silty CLAY with traces of fine sand and organics Soft to very soft below 4 m depth	32
	5												125 mm thick sand lens at 5 m depth	31
	6										44.0	OH/CH		30
	7										59.4	CH		29
													7.60m	
	8												Compact, grey SAND with a trace to some silt and a trace of thin lenses of clayey silt	28
	9										37.0	CH/CL	150 mm thick layer of firm, grey, silty CLAY at 8.7 m depth	27
														26

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: EPS

SHEET 1 of 2

MOT SUMMARY LOG (ELEV.) 17-531-140A.GPJ THURBER BC.GDT 7/25/12- THURBER BC.GLB

Ministry of Transportation

SUMMARY LOG

South Coast Region

TEST HOLE No. **TH 12-3**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5442108, E 531515** Elevation **35.9 m**

Driller **On-Track Drilling Inc.** Method **Solid Stem Auger** Dates **July 11, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
	11										24.2	SM	Compact, grey SAND with a trace to some silt and a trace of thin lenses of clayey silt *(continued)*	25
	12										39.0	CH/CL	600 mm thick layer of firm, grey, silty CLAY at 11.3 m depth	24
	13										21.3	SM		23
	14										30.3	CL	100 mm thick silty CLAY layer at 14.6 m	22
	15													21
	16										23.0	SM		20
	17													19
CPT Refusal at 18.05 m	18										22.7	SM	18.30m	18
	19												End of hole at required depth Hole open to 2.1 m depth after drilling Water at 2 m depth after drilling	17
														16

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: EPS

SHEET 2 of 2

MOT SUMMARY LOG (ELEV.) 17-531-140A.GPJ THURBER BC.GDT 7/25/12- THURBER BC.GLB

Ministry of Transportation

SUMMARY LOG

South Coast Region

TEST HOLE No. **TH 12-4**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5442076, E 531580** Elevation **37.2 m**

Driller **On-Track Drilling Inc.** Method **Solid Stem Auger** Dates **July 11, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
											8.0	SP-SM	Compact, brown to grey SAND with some gravel (possible fill)	37
	1												1.20m	
											189.7	PT	Firm, dark brown, amorphic PEAT with some fibrous organics (wood)	36
	2										91.9	PT/OH	Pockets of grey SAND with a trace of silt between 1.7 m depth and 2.1 m depth	
											211.0	PT		35
	3													34
													3.80m	
	4										27.8	SM/ML	Compact, grey SAND with a trace to some silt and a trace of organics	4.10m 33
													Soft to very soft, grey silty CLAY with traces of fine sand and organics	
	5												5.30m	32
											21.2	SM	Compact, grey SAND with traces of silt and thin (>50 m) lenses of silty clay	
	6										42.2	CL/CH	600 mm firm to stiff, brown silty CLAY at 5.8 m depth	31
													Trace to some silt between 6.4 m and 8.2 m depth	
	7										26.0	SP-SM		30
	8													29
											33.0	SM	900 mm thick layer of brown, partially decomposed ORGANICS and SAND with some silt and a trace of clay at 8.2 m depth	
	9													28

SAMPLE TYPE
A - Auger
C - Core
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G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
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Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: EPS

MOT SUMMARY LOG (ELEV.) 17-531-140A.GPJ THURBER BC.GDT 7/25/12- THURBER BC.GLB

Ministry of Transportation

SUMMARY LOG

South Coast Region

TEST HOLE No. **TH 12-4**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5442076, E 531580** Elevation **37.2 m**

Driller **On-Track Drilling Inc.** Method **Solid Stem Auger** Dates **July 11, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
											23.3	SM	Compact, grey SAND with traces of silt and thin (>50 m) lenses of silty clay *(continued)*	27
	11													26
											24.1	SM		
	12													25
	13										29.1	CL		24
													600 mm layer of soft to firm, grey silty CLAY at 13.4 m	
	14													23
											20.0	SM		
	15													22
CPT refusal at 15.85 m	16													21
											23.2	SM		
													16.80m	
	17												End of hole at required depth Hole open to 5.2 m depth after drilling Water at 3 m depth after drilling	20
	18													19
	19													18

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: EPS

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MOT SUMMARY LOG (ELEV.) 17-531-140A.GPJ THURBER BC.GDT 7/25/12- THURBER BC.GLB

Ministry of Transportation

SUMMARY LOG

South Coast Region

TEST HOLE No. **TH 12-5**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5441190, E 533080** Elevation **50.5 m**

Driller **On-Track Drilling Inc.** Method **Solid Stem Auger** Dates **July 10, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
	0										8.1	SM	Compact, brown, dry medium to fine SAND with a trace to some gravel and silt (probable culvert backfill)	50
	1													49
	2										5.9	SP-SM		48
	3												Sand coarsens below 3.4 m depth	47
	4										16.0	SW-SM		46
	5										16.9	SM	Some red staining between 5.3 m and 5.6 m depth	45
	6													44
	7										13.1	SW-SM		43
	8										16.9	SM		42
	9													41

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: EPS

MOT SUMMARY LOG (ELEV.) 17-531-140A.GPJ THURBER BC.GDT 7/25/12- THURBER BC.GLB

Ministry of Transportation

SUMMARY LOG

South Coast Region

TEST HOLE No. **TH 12-5**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5441190, E 533080** Elevation **50.5 m**

Driller **On-Track Drilling Inc.** Method **Solid Stem Auger** Dates **July 10, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
													10.10m Firm, grey, silty CLAY with a trace of fine sand	40
	11								55	23	38.6	CH	Soft to very soft below 11 m depth	39
	12										35.0	CL/CH		38
	13								39	20	34.4	CL/CH		37
	14										36.7	CL/CH		36
	15												15.20m	
CPT 12-5 stopped at 40 m	16												End of hole at required depth Hole open to 4.6 m depth after drilling Water at 4.4 m depth after drilling	35
	17													34
	18													33
	19													32
														31

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: EPS

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MOT SUMMARY LOG (ELEV.) 17-531-140A.GPJ THURBER BC.GDT 7/25/12- THURBER BC.GLB

Ministry of Transportation

SUMMARY LOG

South Coast Region

TEST HOLE No. **TH 12-6**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5440937, E 533500** Elevation **54.0 m**

Driller **On-Track Drilling Inc.** Method **Solid Stem Auger** Dates **July 10, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
													0.00m Firm, brown silty CLAY with some fine sand Traces of red staining and organics to 0.15 m depth	
	1										46.7	CH		53
													Soft to firm, grey below 1.4 m	
	2													52
									56	25	41.4	CH		
	3													51
													Very soft, blueish grey, wet silty CLAY below 3 m depth	
	4								45	21	43.0	CL		50
	5													49
													5.50m	
									0	0	25.7	ML/SM	Soft to very soft, grey, sandy SILT with some clay	
	6												5.90m Compact, grey SAND with a trace of shells and lenses with some silt	48
	7										24.2	SM		47
	8										24.5	SM		46
	9													45
													9.80m	

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: EPS

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MOT SUMMARY LOG (ELEV.) 17-531-140A.GPJ THURBER BC.GDT 7/25/12- THURBER BC.GLB

Ministry of Transportation

SUMMARY LOG

South Coast Region

TEST HOLE No. **TH 12-6**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5440937, E 533500** Elevation **54.0 m**

Driller **On-Track Drilling Inc.** Method **Solid Stem Auger** Dates **July 10, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
	11								46	21	36.3	CL/CH	Soft to firm, grey CLAY with some silt to silty clay *(continued)*	43
	12										30.8	CL/CH		42
	13								41	20	31.1	CL		41
	14													40
	15										35.7	CL	15.20m	39
CPT 12-6 stopped at 40 m	16												End of hole at required depth Hole open to 5.3 m depth after drilling Water at 3.5 m depth after drilling	38
	17													37
	18													36
	19													35

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: EPS

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MOT SUMMARY LOG (ELEV.) 17-531-140A.GPJ THURBER BC.GDT 7/25/12- THURBER BC.GLB

Ministry of Transportation

SUMMARY LOG

South Coast Region

TEST HOLE No. **TH 12-7**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5440154, E 534855** Elevation **85.3 m**

Driller **On-Track Drilling Inc.** Method **Solid Stem Auger** Dates **July 12, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
													Loose to compact, brown, dry, silty SAND with a trace to some gravel	0.00m / 0.30m / 85
	1										60.2	SM/OL	Soft, brown, moist to wet, ORGANIC SILT, with some fibrous organics and a trace to some sand	1.10m
											27.8	CL		84
	2												Stiff to very stiff, grey, moist CLAY with some silt and sand and a trace of gravel Some gravel between 2.1 m to 4 m depth	83
											22.2	CL		
	3													82
	4										23.1	CL		81
	5												Trace of thin (>50 mm thick) sand lenses below 5.2 m depth	80
											21.5	CL		
	6													79
	7												Soft to firm between 6.5 m and 7.2 m depth	
									30	17	19.9	CL		78
	8													77
									34	18	20.5	CL		
	9													76

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: EPS

MOT SUMMARY LOG (ELEV.) 17-531-140A.GPJ THURBER BC.GDT 7/25/12- THURBER BC.GLB

Ministry of Transportation

SUMMARY LOG

South Coast Region

TEST HOLE No. **TH 12-7**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5440154, E 534855** Elevation **85.3 m**

Driller **On-Track Drilling Inc.** Method **Solid Stem Auger** Dates **July 12, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
CPT 12-7 refusal at 9.9 m											23.8	ML/CL	10.10m Dense, brown, gravelly SAND with a trace of silt	75
	11										20.7	GP-GM		74
	12													73
	13										14.8	SW-SM		72
	14													71
	15										14.3	SW	15.20m	70
													End of hole at required depth Hole open to 10 m depth Water at 6.4 m depth	
	16													69
	17													68
	18													67
	19													66

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

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MOT SUMMARY LOG (ELEV.) 17-531-140A.GPJ THURBER BC.GDT 7/25/12- THURBER BC.GLB

Ministry of Transportation

SUMMARY LOG

South Coast Region

TEST HOLE No. **TH 12-8**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5439448, E 536024** Elevation **88.0 m**

Driller **On-Track Drilling Inc.** Method **Solid Stem Auger** Dates **July 12, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
CPT 12-8 refusal at 4.45 m	0												0.00m Stiff, grey, silty CLAY with traces of sand and fibrous organics	88
	1										23.9	CL		87
													Some dark brown staining with an organic odour between 1.4 m and 1.8 m depth	
	2													86
													2.40m	
											38.0	OL/ML	Firm, brown, organicy SILT with some sand and a trace of clay	
											99.2	OH		
	3												3.00m	85
													Compact, grey SAND with some gravel and a trace of silt	
	4										16.4	SM		84
	5													83
											24.1	SP-SM	Compact to dense, with no gravel below 5.2 m depth	
	6													82
													6.70m	
	7										27.9	CL	Stiff, grey, silty CLAY and some sandy layers	81
	8													80
											22.5	CL		
	9													79
													Firm below 9.1 m depth	

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: EPS

SHEET 1 of 2

MOT SUMMARY LOG (ELEV.) 17-531-140A.GPJ THURBER BC.GDT 7/25/12- THURBER BC.GLB

Ministry of Transportation

SUMMARY LOG

South Coast Region

TEST HOLE No. **TH 12-8**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5439448, E 536024** Elevation **88.0 m**

Driller **On-Track Drilling Inc.** Method **Solid Stem Auger** Dates **July 12, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
	11										24.6	CL	Stiff, grey, silty CLAY and some sandy layers *(continued)* Trace of sand below 11 m depth	77
	12										23.3	CL		76
	13										24.9	CL		75
	14													74
	15										24.0	CL	15.20m	73
	16												End of hole at required depth Hole open to 3 m depth after drilling Water at 2.9 m depth after drilling	72
	17													71
	18													70
	19													69

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: EPS

MOT SUMMARY LOG (ELEV.) 17-531-140A.GPJ THURBER BC.GDT 7/25/12- THURBER BC.GLB

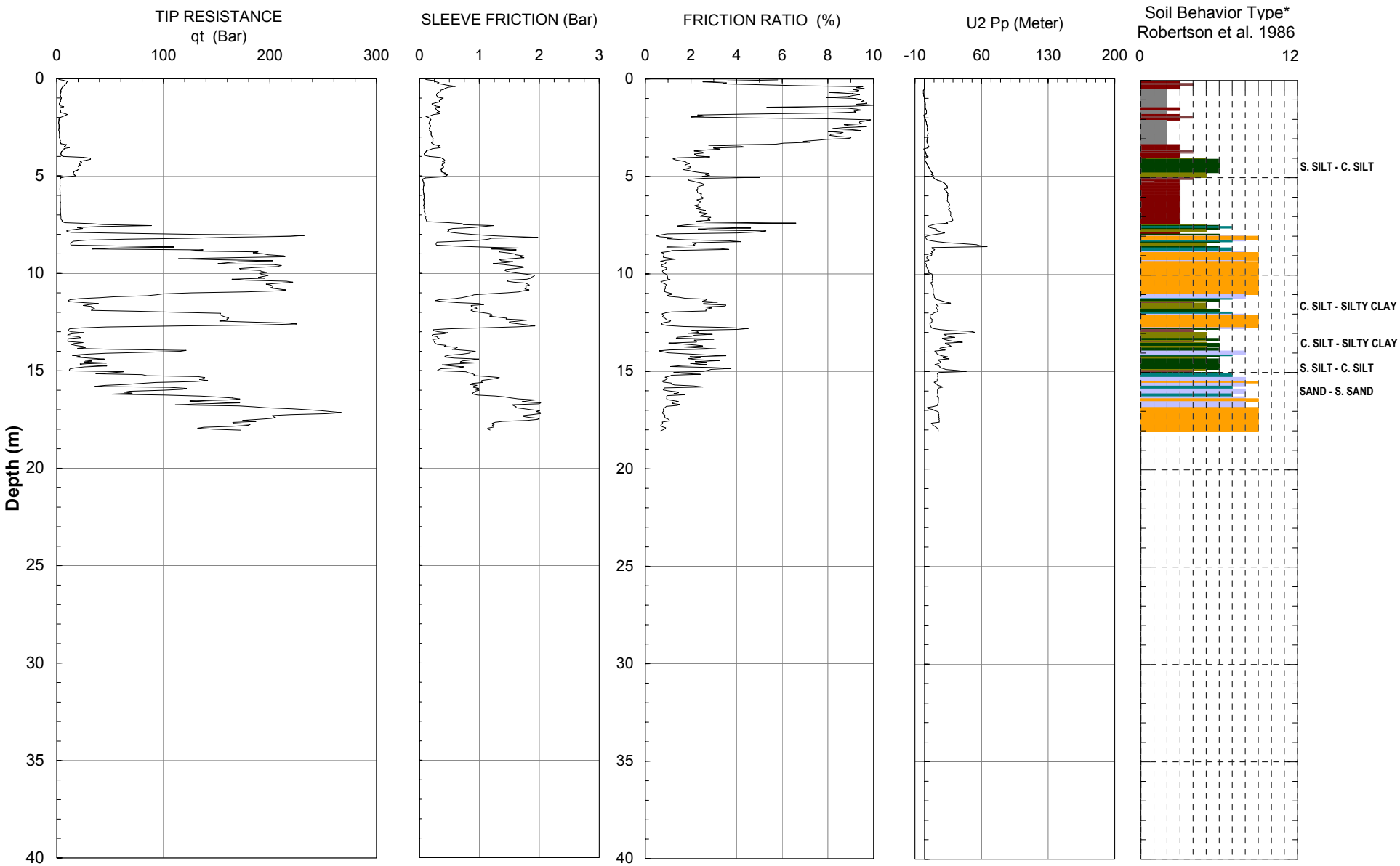
2012 Thurber CPT Logs

THURBER ENGINEERING

Operator: Schwartz Soil Technical
Sounding: CPT12 - 3
Cone Id: DPG1110 10 Ton

Date: July 10 - 12, 2012
Site: Hwy 1 Eastbound climbing lane at 232nd
Thurber Project Number: 17 - 531 - 140A

Schwartz SOIL TECH



Maximum Depth = 18.05 meters

Depth Increment = 0.05 meters

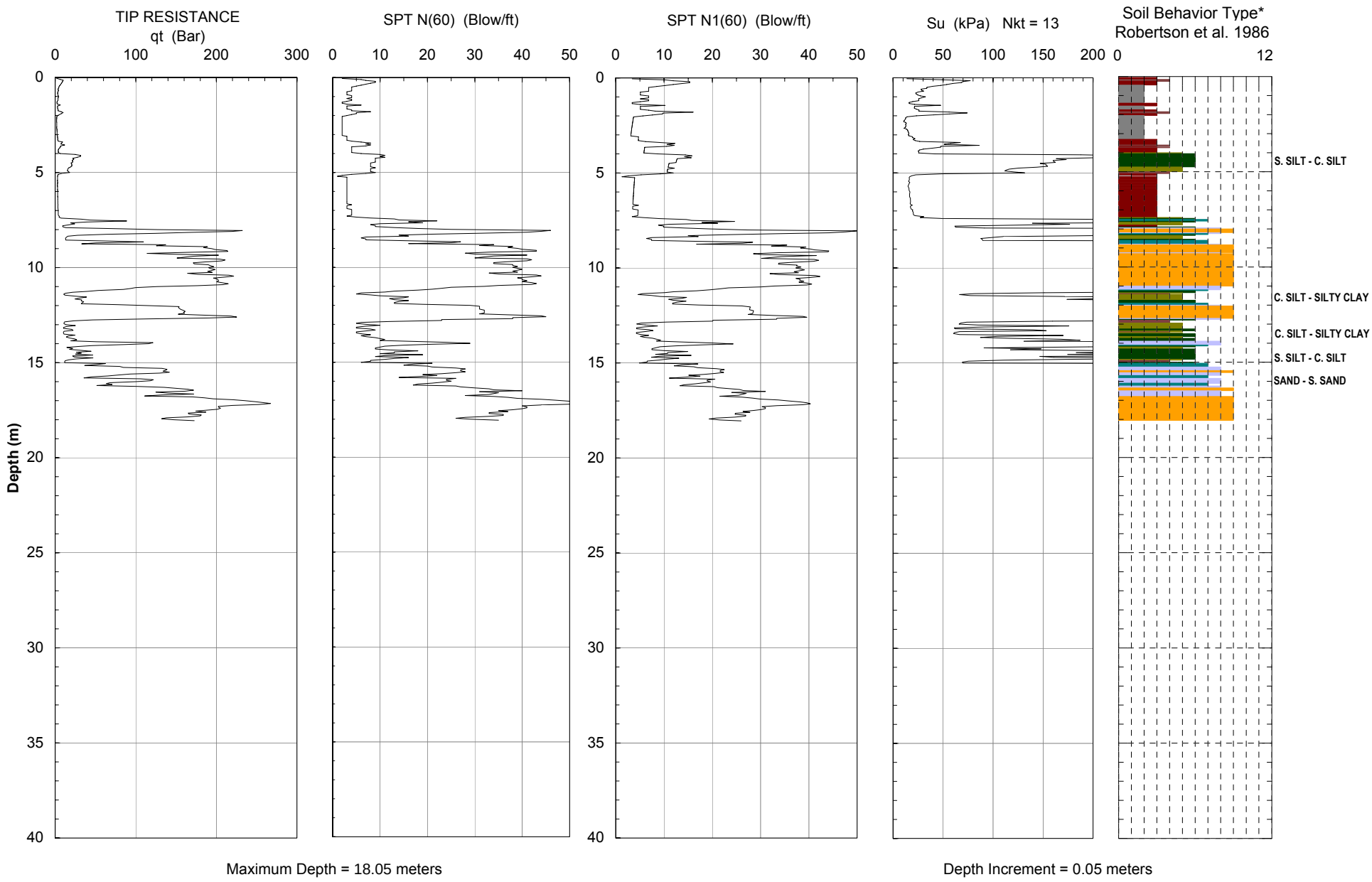
1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

THURBER ENGINEERING

Operator: Schwartz Soil Technical
Sounding: CPT12 - 3
Cone Id: DPG1110 10 Ton

Date: July 10 - 12, 2012
Site: Hwy 1 Eastbound climbing lane at 232nd
Thurber Project Number: 17 - 531 - 140A

Schwartz SOIL TECH



Maximum Depth = 18.05 meters

Depth Increment = 0.05 meters

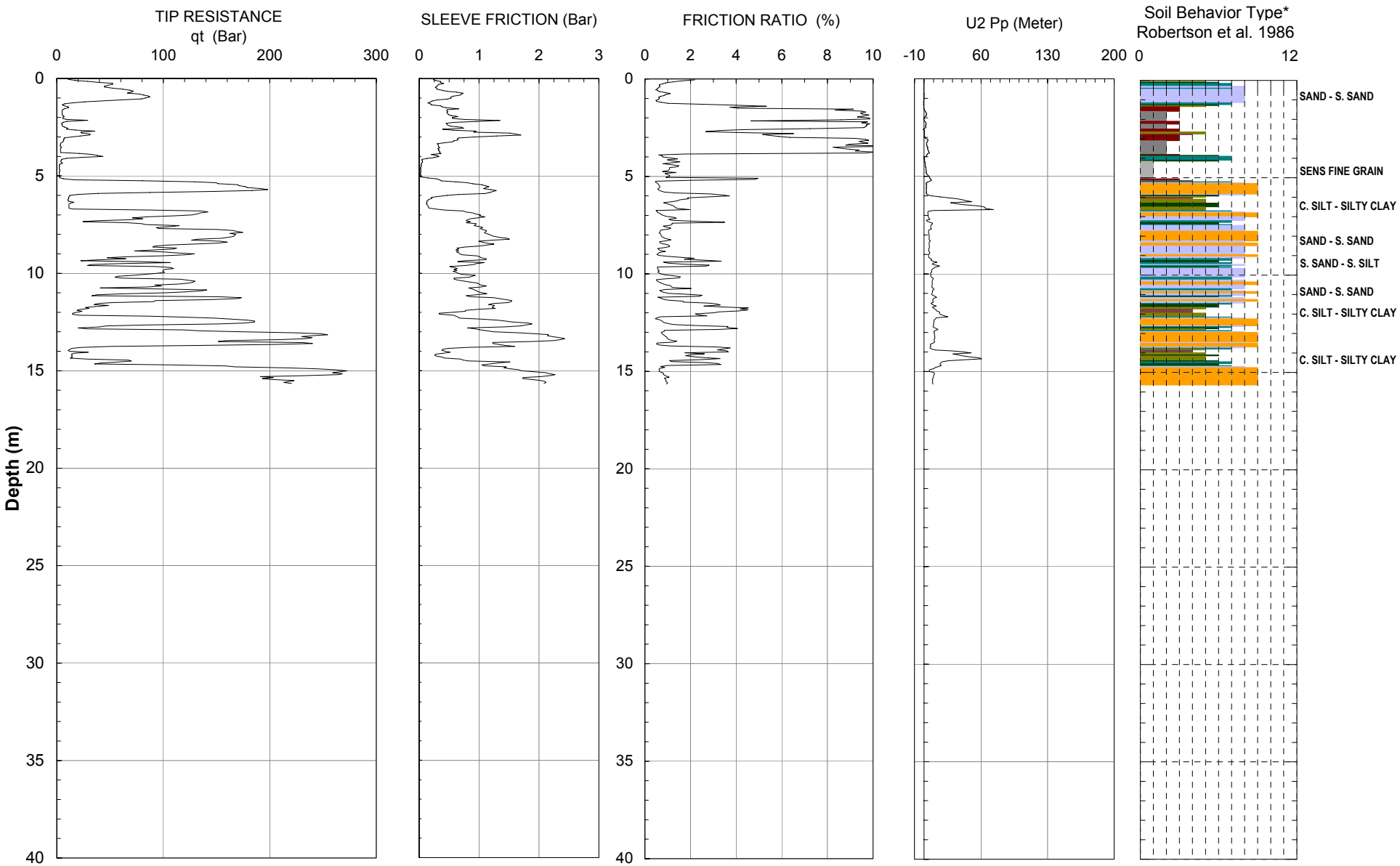
1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

THURBER ENGINEERING

Operator: Schwartz Soil Technical
Sounding: CPT12 - 4
Cone Id: DPG1110 10 Ton

Date: July 10 - 12, 2012
Site: Hwy 1 Eastbound climbing lane at 232nd
Thurber Project Number: 17 - 531 - 140A

Schwartz SOIL TECH



Maximum Depth = 15.65 meters

Depth Increment = 0.05 meters

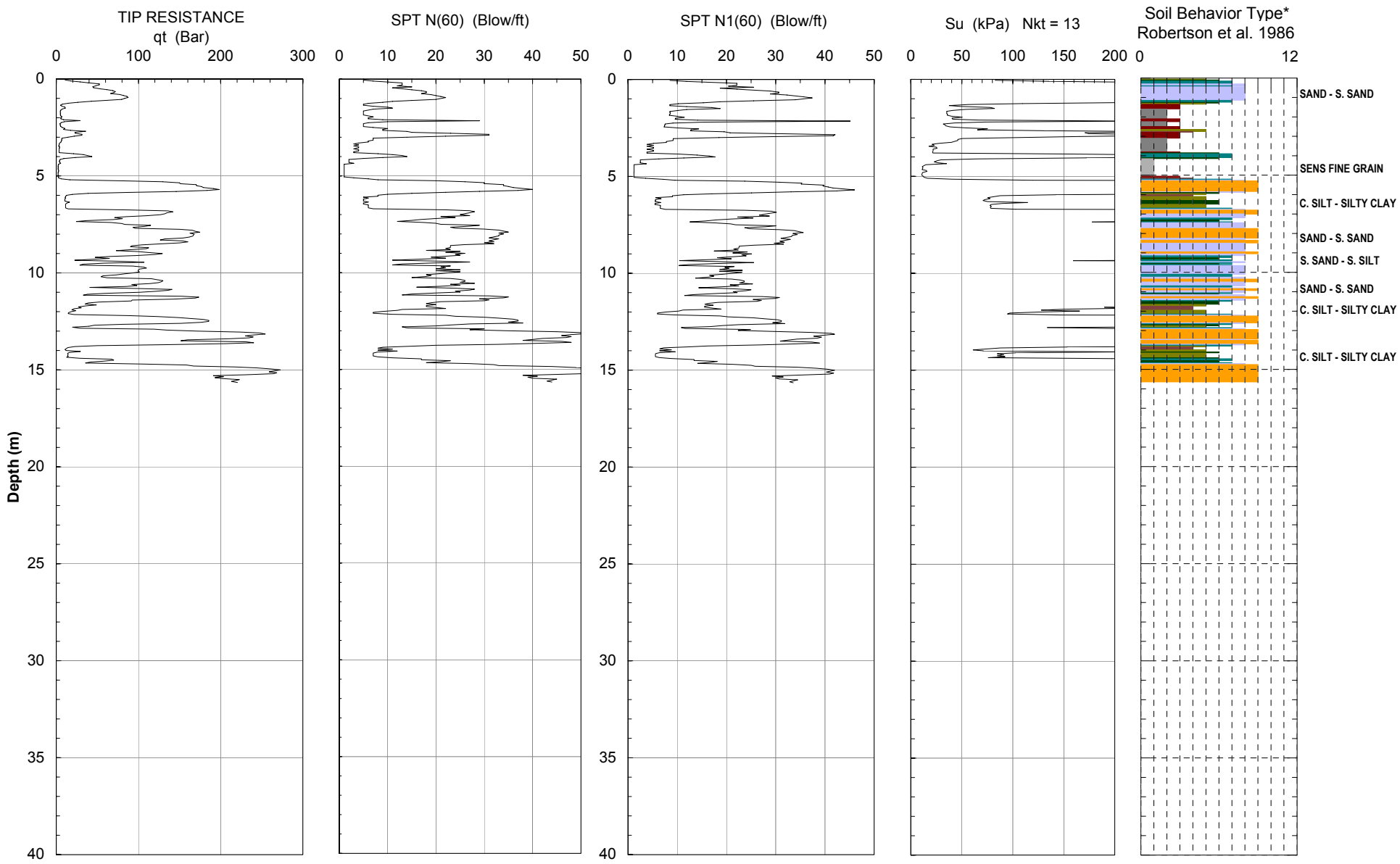
1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

THURBER ENGINEERING

Operator: Schwartz Soil Technical
Sounding: CPT12 - 4
Cone Id: DPG1110 10 Ton

Date: July 10 - 12, 2012
Site: Hwy 1 Eastbound climbing lane at 232nd
Thurber Project Number: 17 - 531 - 140A

Schwartz SOIL TECH



Maximum Depth = 15.65 meters

Depth Increment = 0.05 meters

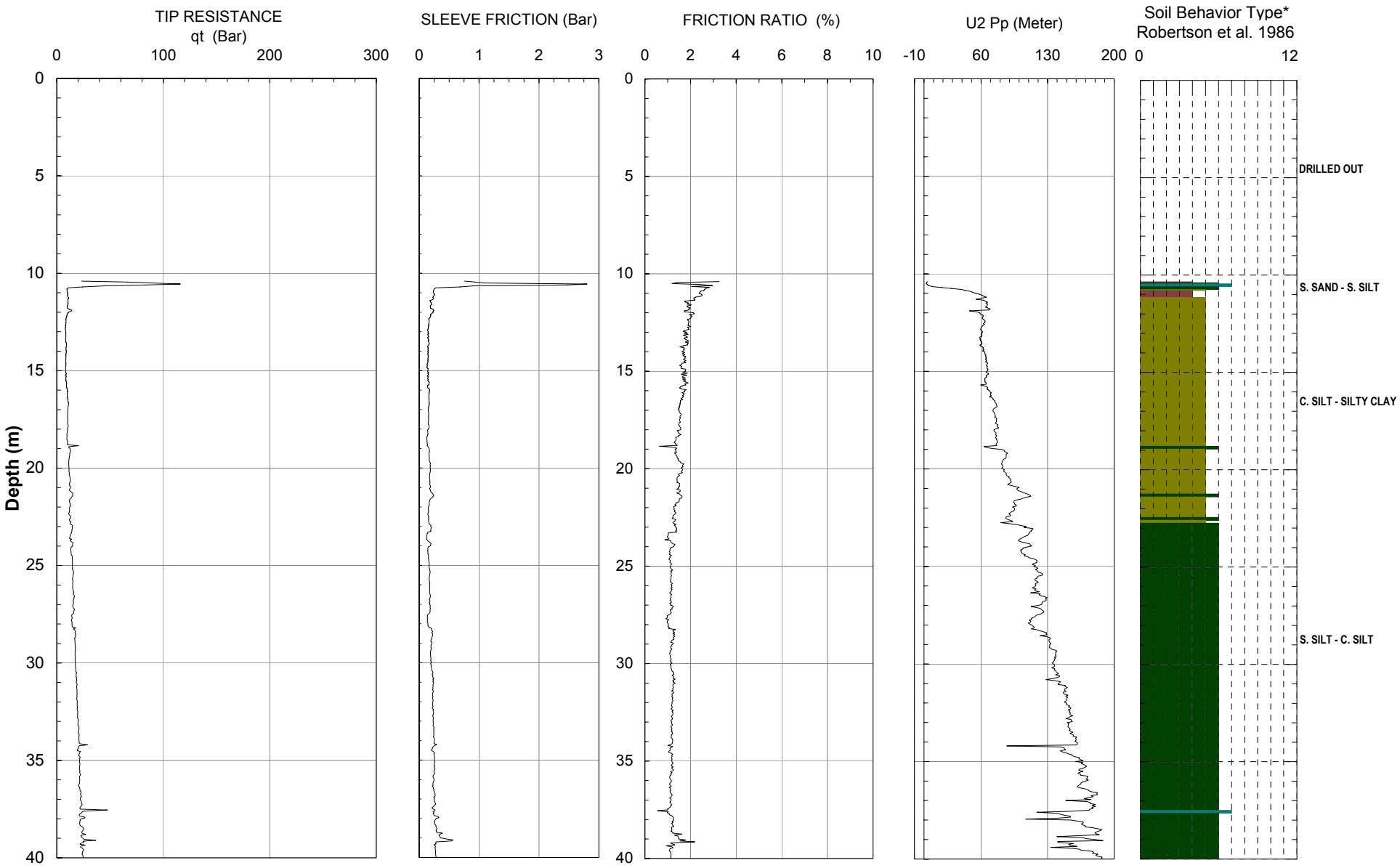
1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

THURBER ENGINEERING

Operator: Schwartz Soil Technical
Sounding: CPT12 - 5
Cone Id: DPG1110 10 Ton

Date: July 10 - 12, 2012
Site: Hwy 1 Eastbound climbing lane at 232nd
Thurber Project Number: 17 - 531 - 140A

Schwartz SOIL TECH



Maximum Depth = 40.00 meters

Depth Increment = 0.05 meters

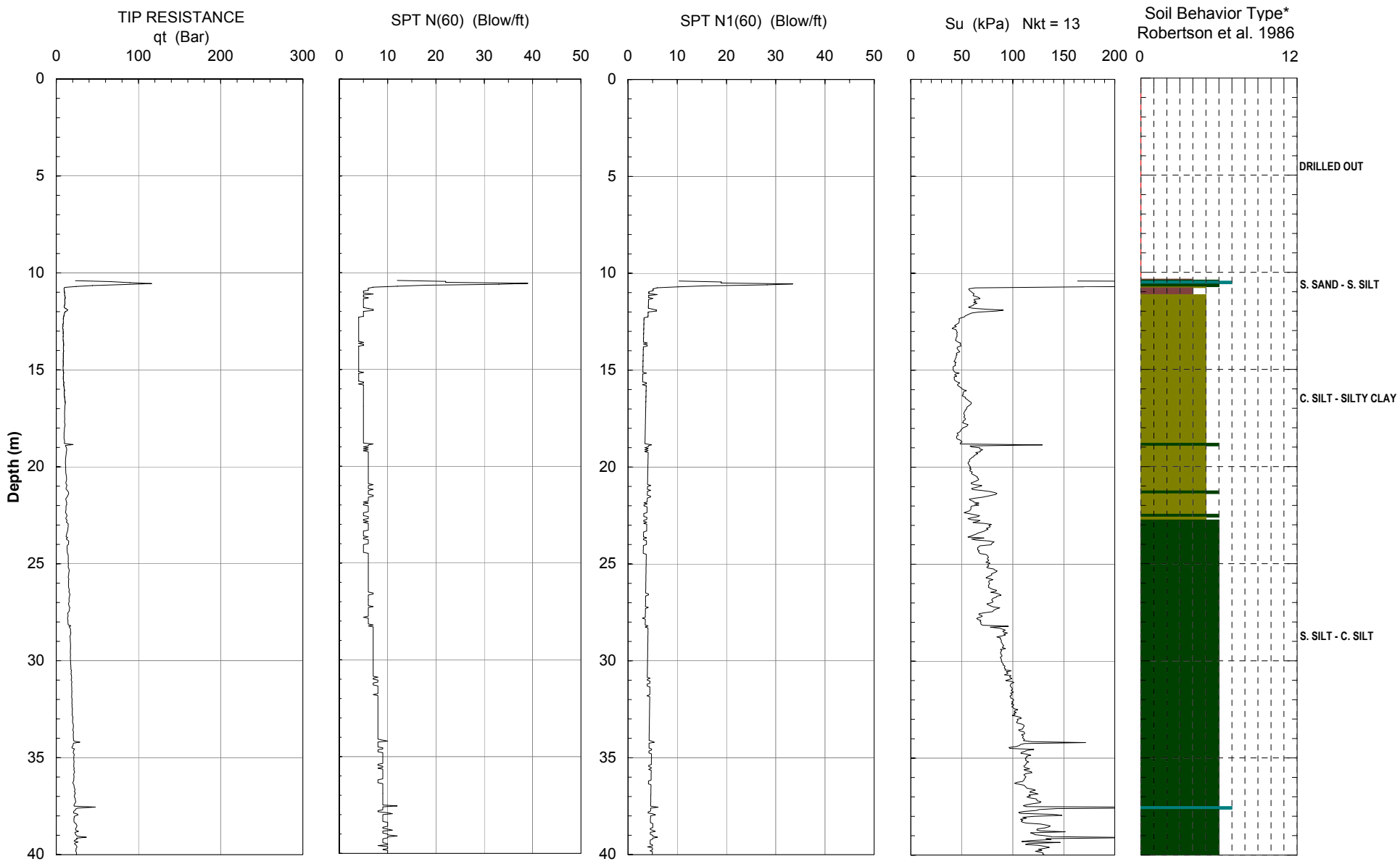
1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

THURBER ENGINEERING

Operator: Schwartz Soil Technical
Sounding: CPT12 - 5
Cone Id: DPG1110 10 Ton

Date: July 10 - 12, 2012
Site: Hwy 1 Eastbound climbing lane at 232nd
Thurber Project Number: 17 - 531 - 140A

Schwartz SOIL TECH



Maximum Depth = 40.00 meters

Depth Increment = 0.05 meters

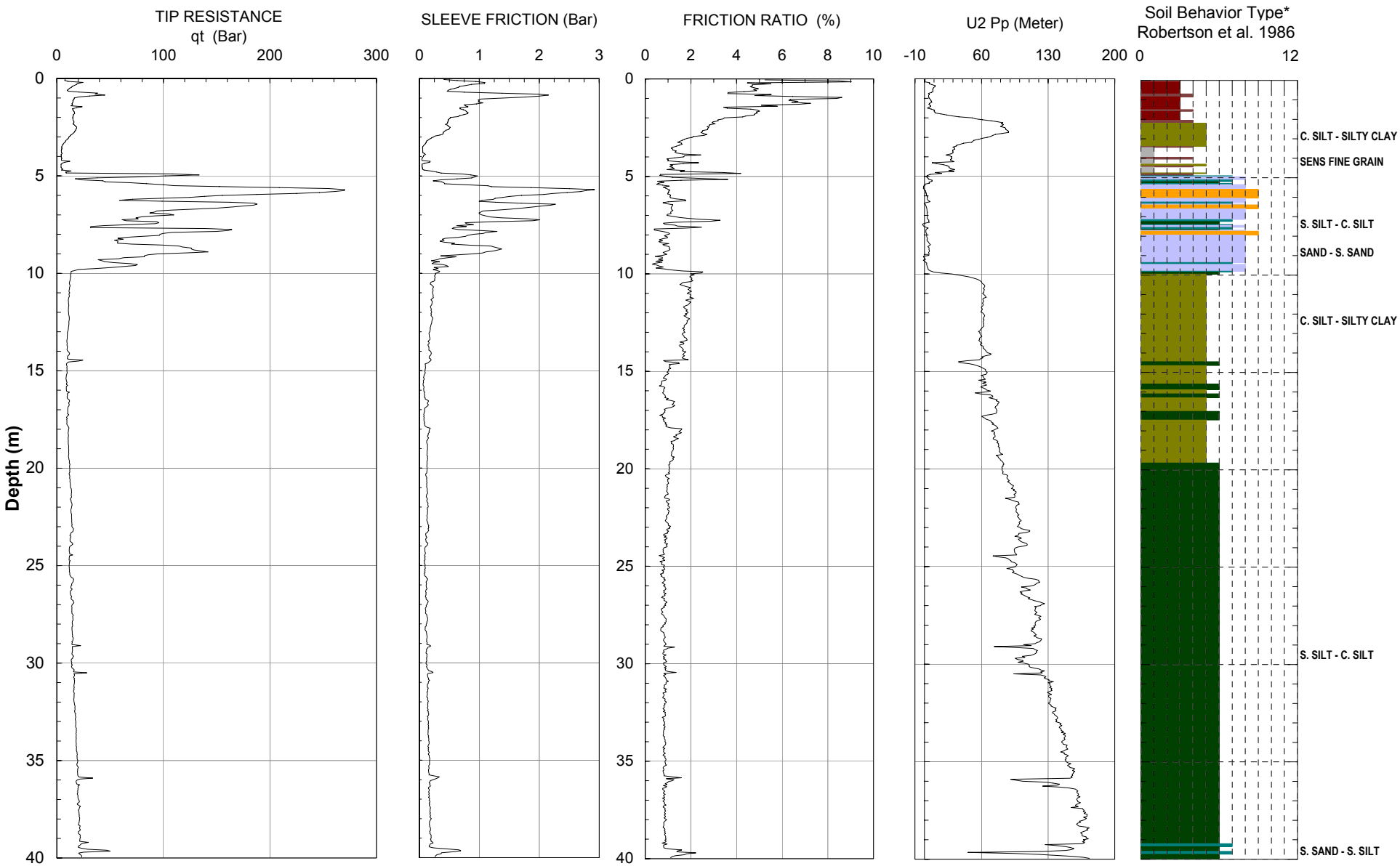
1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

THURBER ENGINEERING

Operator: Schwartz Soil Technical
Sounding: CPT12 - 6
Cone Id: DPG1110 10 Ton

Date: July 10 - 12, 2012
Site: Hwy 1 Eastbound climbing lane at 232nd
Thurber Project Number: 17 - 531 - 140A

Schwartz SOIL TECH



Maximum Depth = 40.00 meters

Depth Increment = 0.05 meters

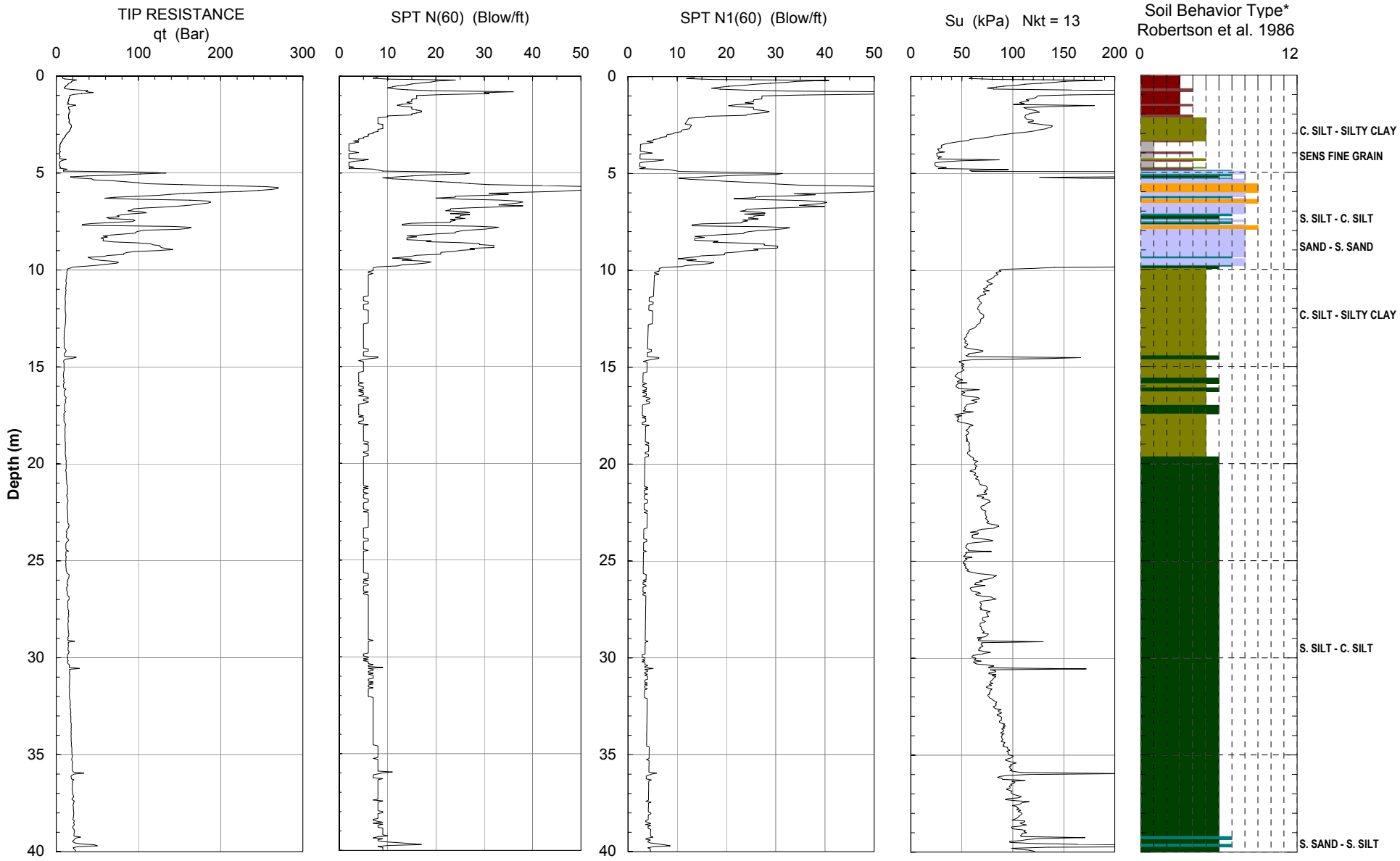
1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

THURBER ENGINEERING

Operator: Schwartz Soil Technical
Sounding: CPT12 - 6
Cone Id: DPG1110 10 Ton

Date: July 10 - 12, 2012
Site: Hwy 1 Eastbound climbing lane at 232nd
Thurber Project Number: 17 - 531 - 140A

Schwartz SOIL TECH



Maximum Depth = 40.00 meters

Depth Increment = 0.05 meters

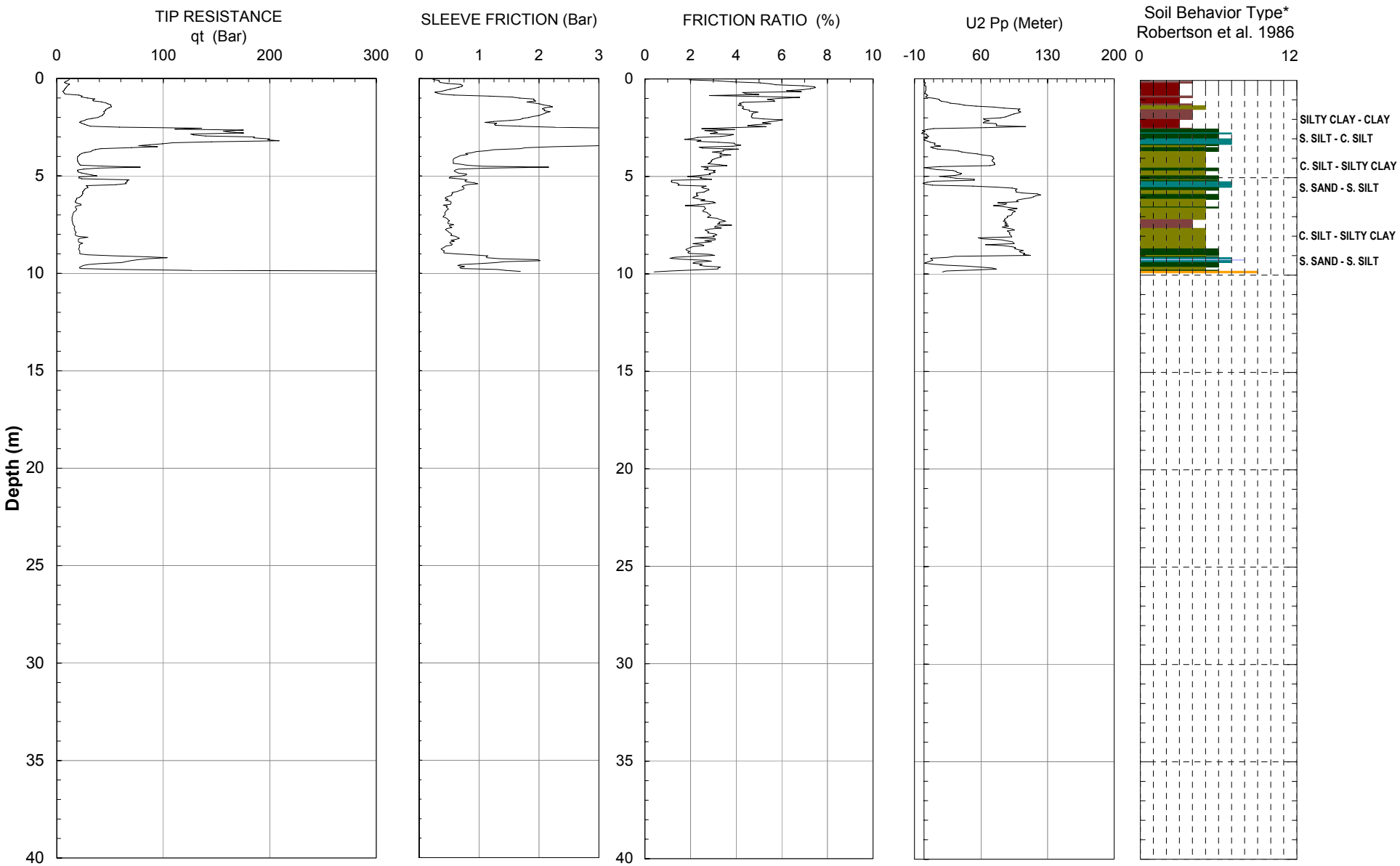
1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

THURBER ENGINEERING

Operator: Schwartz Soil Technical
Sounding: CPT12 - 7
Cone Id: DPG1110 10 Ton

Date: July 10 - 12, 2012
Site: Hwy 1 Eastbound climbing lane at 232nd
Thurber Project Number: 17 - 531 - 140A

Schwartz SOIL TECH



Maximum Depth = 9.90 meters

Depth Increment = 0.05 meters

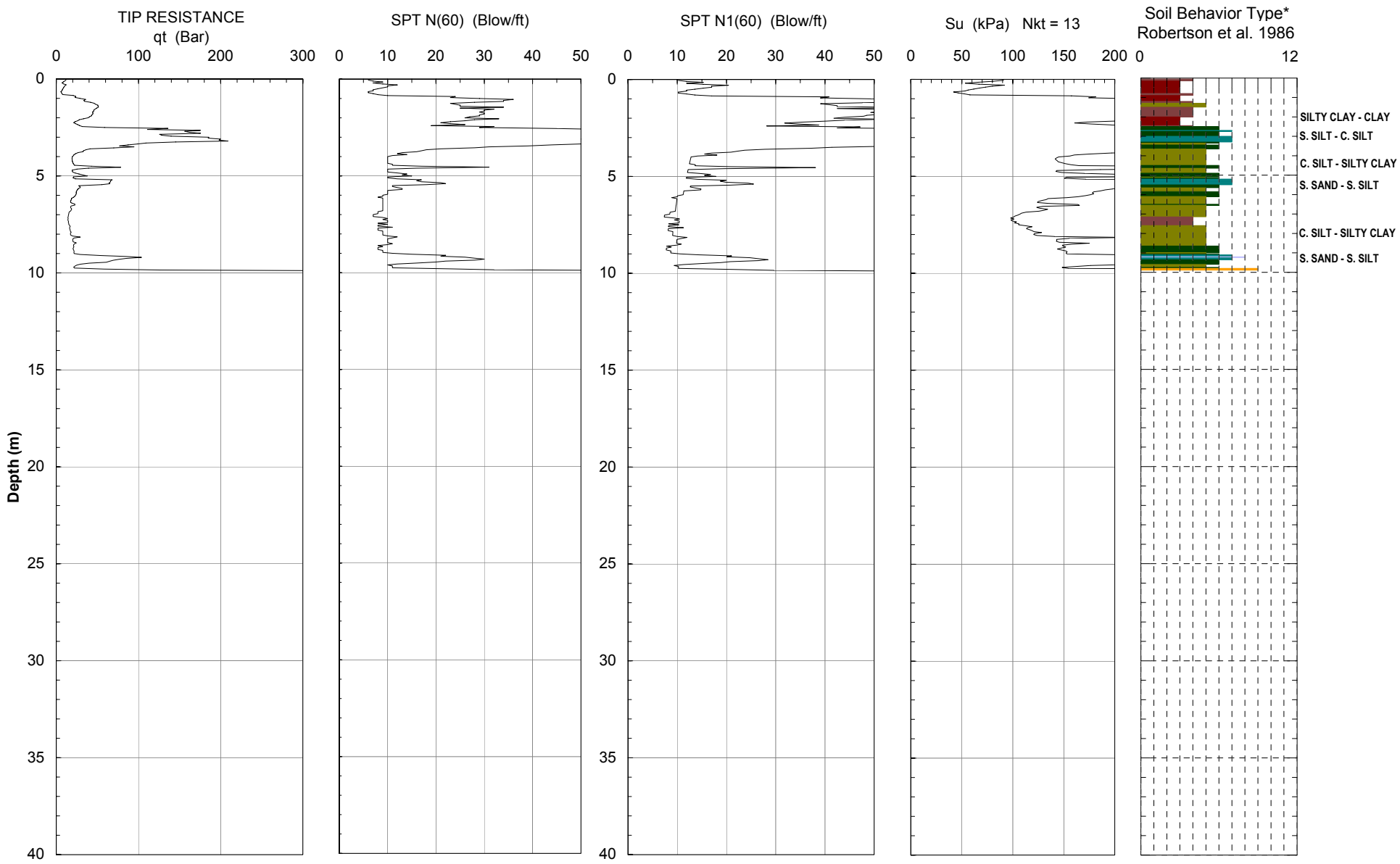
1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

THURBER ENGINEERING

Operator: Schwartz Soil Technical
Sounding: CPT12 - 7
Cone Id: DPG1110 10 Ton

Date: July 10 - 12, 2012
Site: Hwy 1 Eastbound climbing lane at 232nd
Thurber Project Number: 17 - 531 - 140A

Schwartz SOIL TECH



Maximum Depth = 9.90 meters

Depth Increment = 0.05 meters

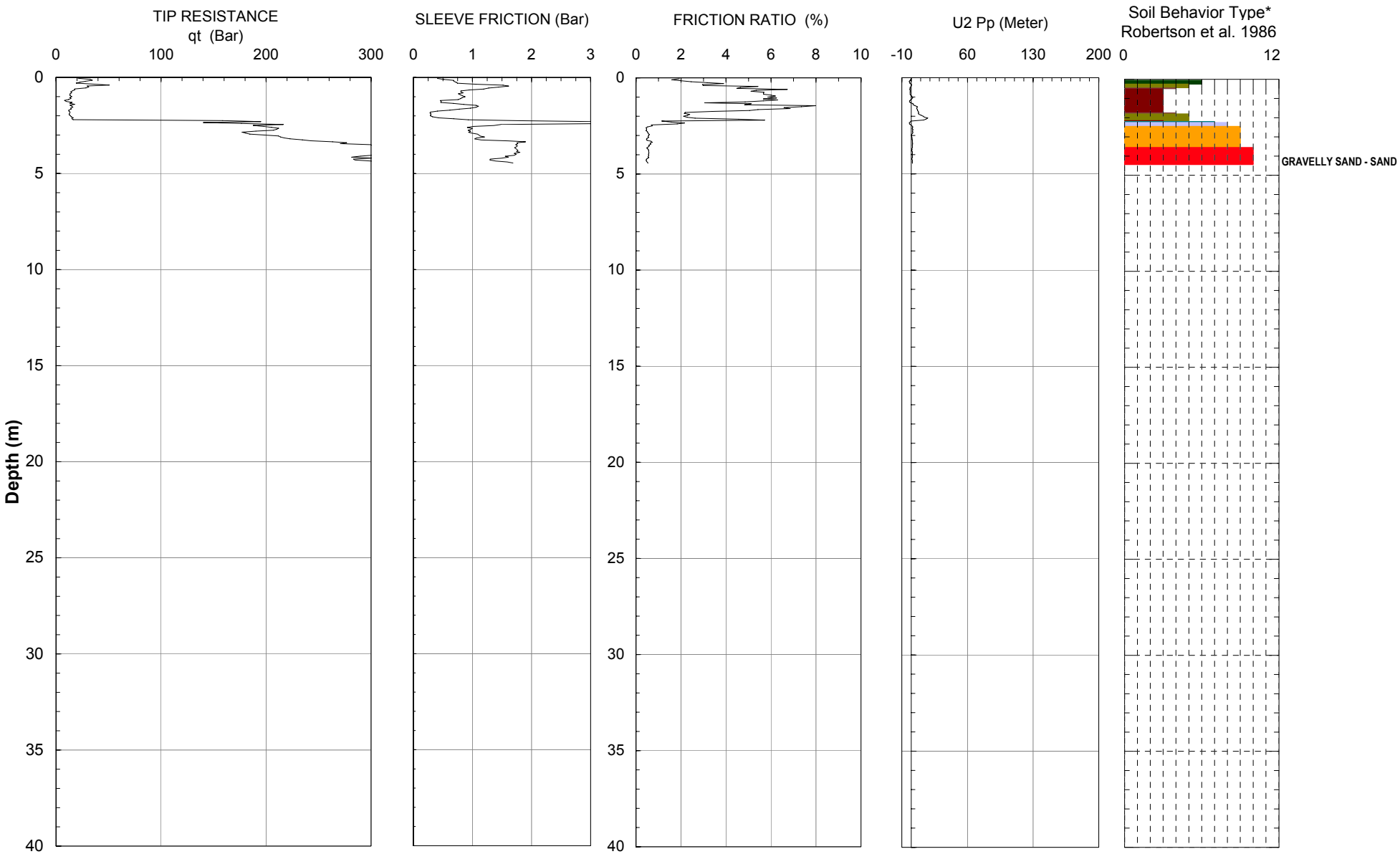
1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

THURBER ENGINEERING

Operator: Schwartz Soil Technical
Sounding: CPT12 - 8
Cone Id: DPG1110 10 Ton

Date: July 10 - 12, 2012
Site: Hwy 1 Eastbound climbing lane at 232nd
Thurber Project Number: 17 - 531 - 140A

Schwartz SOIL TECH



Maximum Depth = 4.45 meters

Depth Increment = 0.05 meters

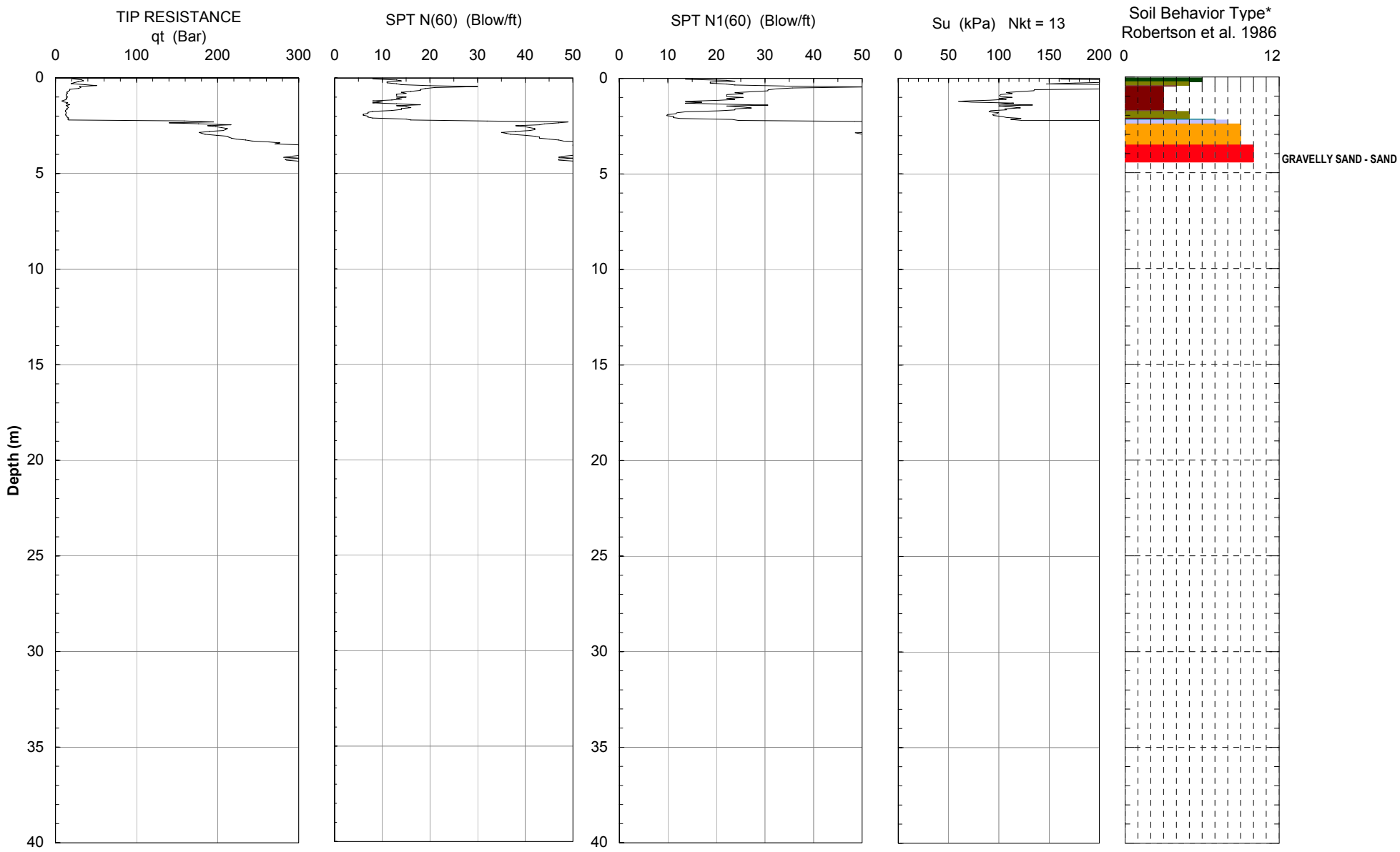
1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

THURBER ENGINEERING

Operator: Schwartz Soil Technical
Sounding: CPT12 - 8
Cone Id: DPG1110 10 Ton

Date: July 10 - 12, 2012
Site: Hwy 1 Eastbound climbing lane at 232nd
Thurber Project Number: 17 - 531 - 140A

Schwartz SOIL TECH



Maximum Depth = 4.45 meters

Depth Increment = 0.05 meters

1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

THURBER

2012 Thurber Test Pit Logs

Ministry of Transportation

SUMMARY LOG

South Coast Region

TEST HOLE No. **TP12-01**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5442256, E 531283** Elevation **29.6 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 23, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
	0												Brown, moist, sandy SILT with some organics. 0.20m	
	1	G											Loose to compact, brown, moist SAND with some gravel and a trace of silt. Grey below 0.6 m depth 1.07m	29
													Firm, dark grey, moist SILT with some organics, a trace to some clay and a trace of sand. 1.22m	
													Stiff, grey and brown, moist, sandy SILT with some clay. 1.52m	28
	2												Stiff, grey, moist CLAY and SILT with a trace to some sand and a trace of organics.	
		G												27
	3													
														26
	4												3.96m End of test pit at 4.0 m depth. No water seepage observed upon completion of test pit.	
	5													25
														24

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: CJC

SHEET 1 of 1

MOT SUMMARY LOG (ELEV.) 17-531-140.GPJ THURBER BC.GDT 7/20/12- THURBER BC.GLB

Ministry of Transportation

SUMMARY LOG

South Coast Region

TEST HOLE No. **TP12-02**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5442235, E 531310** Elevation **30.8 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 23, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
	0												Brown, moist SILT with some organics and sand. 0.15m	30
	1	G											Loose, brown, moist SAND with some wood and a trace to some gravel. 0.61m	
													Firm, brown and orange, moist SILT with some clay and a trace of sand. Some wood at 0.8 m depth. 0.76m	
													Loose to compact, grey, moist to wet SAND with a trace of silt. Brown at 1.2 m depth	29
	2												1.98m	
		G									46.9	CL	Very soft, grey, wet, silty CLAY with a trace of organics.	28
	3												3.66m	
	4												End of test pit at 3.7 m depth. Water seepage at 1.5 m depth upon completion of test pit.	27
														26
	5													25

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: CJC

SHEET 1 of 1

MOT SUMMARY LOG (ELEV.) 17-531-140.GPJ THURBER BC.GDT 7/20/12- THURBER BC.GLB

Ministry of Transportation

SUMMARY LOG

South Coast Region

TEST HOLE No. **TP12-03**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5442215, E 531330** Elevation **31.3 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 23, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
	0	G											Loose, brown, moist SAND with some silt, a trace to some gravel and a trace of organics.	31
													0.30m	
		G											Soft to firm, grey, moist, clayey SILT with some sand.	
													0.91m	
	1	G											Firm, dark brown, moist ORGANIC SILT with some sand.	30
													1.37m	
													Soft, grey, moist to wet, sandy SILT with some clay to clayey.	
													1.98m	
	2	G											Loose to compact, wet, grey SAND.	
													2.13m	
													Very soft, grey, wet, silty CLAY with a trace of organics.	29
		G									55.1	CH		
	3													28
	4													
													4.27m	27
													End of test pit at 4.3 m depth. Water seepage at 0.9 m depth upon completion of test pit.	
	5													26

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

FILE No. **17-531-140**

PREPARED By: **Thurber Engineering Ltd.**

INSPECTOR: **CJC**

SHEET 1 of 1

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

MOT SUMMARY LOG (ELEV.) 17-531-140.GPJ THURBER BC.GDT 7/20/12- THURBER BC.GLB

Ministry of Transportation

SUMMARY LOG

South Coast Region

TEST HOLE No. **TP12-04**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5442205, E 531355** Elevation **31.6 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 23, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
	0												Soft, brown, moist SILT with some organics and a trace of sand. 0.15m	
		G											Loose to compact, brown to grey, moist, SILT and SAND with some organics and clay. 0.76m	31
	1	G											Very soft, dark brown, wet ORGANICS and SILT with some sand. 1.07m	
													Firm, grey, moist SILT and CLAY with some organics. 1.52m	30
		G									67.2	OH/CH	Very soft, grey, moist, silty CLAY with a trace to some organics and a trace of sand. 2.13m	
	2												Compact, grey, wet SAND with a trace to some silt.	29
		G												
	3												3.66m	28
													End of test pit at 3.7 m depth. Water seepage at 0.9 m depth upon completion of test pit.	
	4													27
	5													26

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: CJC

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MOT SUMMARY LOG (ELEV.) 17-531-140.GPJ THURBER BC.GDT 7/20/12- THURBER BC.GLB

Ministry of Transportation

SUMMARY LOG

South Coast Region

TEST HOLE No. **TP12-05**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5442199, E 531369** Elevation **31.8 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 23, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
	0												Soft, brown, moist SILT with some organics and a trace to some sand. 0.15m	
		G											Firm to stiff, grey and brown, moist SILT with some clay and a trace of organics. 0.46m	31
		G									91.0	OH/PT		
	1												Very soft, dark brown, wet, silty ORGANICS with some wood. 1.07m	
		G											Stiff, grey, moist, silty CLAY with some organics. 1.52m	
		G											Loose to compact, grey, moist, fine to medium SAND with some silt and some zones of clayey SILT. Wet below 2.0 m depth	30
	2												2.59m	
													Very soft, grey, wet, silty CLAY with traces of organics and fine sand.	29
	3	G									48.0	CH		
														28
	4												4.27m	
													End of test pit at 4.3 m depth. Water seepage at 2.0 m depth upon completion of test pit.	27
	5													
														26

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: CJC

SHEET 1 of 1

MOT SUMMARY LOG (ELEV.) 17-531-140.GPJ THURBER BC.GDT 7/20/12- THURBER BC.GLB

Ministry of Transportation

SUMMARY LOG

South Coast Region

TEST HOLE No. **TP12-06**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5442189, E 531387** Elevation **32.2 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 23, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
	0												Soft, brown, moist SILT with some organics and a trace to some sand. 0.15m	32
													0.30m	
		G											Firm, grey and brown, moist SILT with some clay and a trace to some sand. 0.46m	
													0.76m	
	1	G									52.7	OH/CH	Loose, grey, wet SAND with some organics and a trace of silt. 1.22m	31
													Soft, grey to brown, moist to wet SAND and SILT with some clay. A vertical section of organics runs parallel to the highway.	
		G									40.5	CH	1.83m	
	2												Brown, moist ORGANICS and grey, moist, clayey SILT with some wood and a trace of sand.	
													Soft, grey, wet, silty CLAY with some organics and zones of SAND. 2.29m	30
													Compact, grey, moist to wet SAND with some silt and a trace to some clay.	
	3												3.05m	
													Very soft, grey, wet, silty CLAY.	29
													End of test pit at 3.0 m depth. Water seepage at 0.8 and 2.3 m depth upon completion of test pit.	
	4													28
	5													27

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: CJC

SHEET 1 of 1

MOT SUMMARY LOG (ELEV.) 17-531-140.GPJ THURBER BC.GDT 7/20/12- THURBER BC.GLB

Ministry of Transportation

SUMMARY LOG

South Coast Region

TEST HOLE No. **TP12-07**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5442181, E 531399** Elevation **32.6 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 23, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
	0												Soft, brown, moist SILT with some sand and organics. 0.15m	32
	1	G									372.1	OH/PT	Very soft, brown, wet ORGANICS and WOOD with some zones of grey, clayey SILT. 1.07m	
		G											Soft, grey, wet, silty CLAY with some organics to organicy. 1.52m	31
		G											Loose, grey, wet SAND with some silt and a trace to some organics. 1.98m	
	2	G									48.6	CH	Very soft, grey, wet, silty CLAY with traces of organics and sand. 2.59m	30
		G											Loose to compact, grey, wet SAND with a trace of silt. 3.05m	
	3	G											Very soft, grey, wet, silty CLAY. 3.66m	29
	4												End of test pit at 3.7 m depth. Water seepage at 0.8, 1.5 and 2.6 m depth upon completion of test pit.	28
	5													27

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: CJC

SHEET 1 of 1

MOT SUMMARY LOG (ELEV.) 17-531-140.GPJ THURBER BC.GDT 7/20/12- THURBER BC.GLB

Ministry of Transportation

SUMMARY LOG

South Coast Region

TEST HOLE No. **TP12-08**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5442167, E 531420** Elevation **33.0 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 23, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
	0												Soft, brown, moist to wet SILT with some organics and a trace of sand.	33
													0.23m	
													Firm, brown to grey, moist SILT with some clay, a trace to some sand and a trace of organics.	
													0.46m	
	1	G									376.0	OH/PT	Very soft, brown, wet, silty ORGANICS and WOOD.	32
													1.07m	
													Soft, grey, wet SILT and CLAY with some organics.	
		G									48.7	OH/CH		
	2													31
	3													30
													3.05m	
													Compact, grey, wet SAND with a trace of silt.	
													3.35m	
													End of test pit at 3.4 m depth. Water seepage at 0.5 m depth upon completion of test pit.	
	4													29
	5													28

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: CJC

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MOT SUMMARY LOG (ELEV.) 17-531-140.GPJ THURBER BC.GDT 7/20/12- THURBER BC.GLB

Ministry of Transportation

SUMMARY LOG

South Coast Region

TEST HOLE No. **TP12-09**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5442161, E 531431** Elevation **33.4 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 23, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
	0												Soft, brown, moist SILT with some organics and a trace of sand. 0.15m – 0.23m	33
		G											Loose, brown, moist SAND with some silt. 0.61m	
	1												Firm, brownish grey, moist SILT with some sand and a trace of clay.	
													Very soft, brown, wet ORGANICS with some silt.	32
		G									190.9	OH/PT		
	2												2.29m	
													Loose to compact, grey, wet SAND with some silt and a trace to some organics. 2.74m	31
		G												
		G									45.6	CL	Very soft, grey, wet, silty CLAY with a trace to some sand and organics.	
	3												3.66m	30
													Compact, grey, wet SAND with a trace of silt.	
	4												4.27m	
													End of test pit at 4.3 m depth. Water seepage at 1.5 m depth upon completion of test pit.	29
	5													28

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: CJC

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South Coast Region

TEST HOLE No. **TP12-10**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5442145, E 531454** Elevation **34.2 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 23, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
	0												Soft, brown, moist SILT with some organics and a trace of sand. 0.15m	34
		G											Firm to stiff, grey and brown, moist SILT with some sand and clay, a trace of organics and occasional sandy zones. 0.76m	
	1	G									153.4	OH/PT	Very soft, brown, wet ORGANICS and WOOD with some silt. 1.37m	33
													Loose, grey, wet SAND with some silt and clay. 1.83m	
	2												Very soft, brown, wet PEAT and WOOD with some silt. 2.44m	32
		G											Firm, grey, wet SILT and CLAY with some organics.	
	3												Soft below 2.9 m depth	31
	4												4.27m	30
													End of test pit at 4.3 m depth. Water seepage at 1.5 m depth upon completion of test pit.	
	5													29

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: CJC

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South Coast Region

TEST HOLE No. **TP12-11**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5442129, E 531470** Elevation **35.0 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 23, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
	0												Soft, dark brown, moist SILT with some organics to organicy and a trace of sand. 0.30m	35
													Stiff, brown and grey, moist SILT with some clay and sand. 0.38m	
		G									246.7	OH/PT	Very soft, dark brown, moist SILT and ORGANICS. Extends to 1.5 m depth on the north side of the pit. 1.07m	
	1													34
		G											Loose to compact, brown, moist SAND with some silt. Wet below 1.5 m depth	
	2												Brown below 2.0 m depth	33
													2.44m	
	3												End of test pit at 2.4 m depth due to sloughing. Water seepage at 1.5 m depth upon completion of test pit.	32
	4													31
	5													30

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: CJC

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South Coast Region

TEST HOLE No. **TP12-12a**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5442120, E 531494** Elevation **35.5 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 23, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
	0												Soft, brown, moist SILT with some organics and a trace of sand.	35
													0.30m	
													Firm, grey, moist SILT with some clay and sand.	
													0.38m	
		G									193.7	OH/PT	Very soft, dark brown, moist ORGANIC SILT and ORGANICS with some wood. Extends to 2.4 m depth on the north side.	
	1												1.22m	
													Loose to compact, brownish grey, wet SAND.	34
		G												
	2													
													2.44m	33
													End of test pit at 2.4 m depth due to sloughing. Water seepage at 1.2 m depth upon completion of test pit.	
	3													32
	4													31
	5													30

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: CJC

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South Coast Region

TEST HOLE No. **TP12-12b**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5442121, E 531496** Elevation **35.8 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 23, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
													Soft, brown, moist SILT with some organics and a trace of sand.	35
	1												Firm, grey, moist SILT with some sand and clay.	
													Very soft, dark brown, moist ORGANICS mixed with soft, grey, moist SILT and CLAY.	34
	2												Very soft, brown, moist ORGANICS and WOOD.	
													Very soft, grey, moist to wet, silty CLAY with a trace of organics.	33
	3												End of test pit at 3.4 m depth. No water seepage observed upon completion of test pit.	
														32
	4													
														31
	5													
														30

0.15m
0.30m
0.91m
2.74m
3.35m

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

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PREPARED By: Thurber Engineering Ltd.
INSPECTOR: CJC
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South Coast Region

TEST HOLE No. **TP12-13**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5442108, E 531515** Elevation **36.8 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 23, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
													Soft, brown, moist SILT with some organics to organicy. 0.30m	
													Soft, brown, moist ORGANICS with some zones of sand and stiff, grey silt with some clay. 0.76m	36
	1												Loose to compact, grey, moist, fine to medium SAND with a trace of silt (South Side). Very soft, brown ORGANICS (North Side). 1.22m	
													Very soft, brown, moist, ORGANICS and WOOD with some zones of grey sand.	35
	2	G									466.9	PT	Moist, grey SAND is encountered on the south side at 1.5 m depth. Wet below 1.8 m depth	
													3.35m	34
	3												Very soft, grey, wet, silty CLAY with some zones of sand and some organics.	
		G									55.9	CH		33
	4												4.57m	
													End of test pit at 4.6 m depth. Water seepage at 1.8 m depth upon completion of test pit.	32
	5													
														31

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: CJC

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South Coast Region

TEST HOLE No. **TP12-14**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5442091, E 531544** Elevation **37.6 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 23, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
	0												Soft, dark brown, moist SILT with some organics and a trace of sand.	
													0.46m	
													Loose, grey, moist SAND with some silt. (Varies from 0-0.3 m thick)	37
													0.61m	
		G									435.7	PT	Very soft, dark brown, moist ORGANICS and WOOD with some silt.	
	1													
													Compact, grey, moist SAND below 1.5 m depth on the south side beneath the embankment.	36
	2													
		G									563.4	PT		35
	3													
													3.35m	
													Very soft, grey, moist to wet SILT and CLAY with some sand.	34
		G									42.8	CL/CH		
	4													
													4.27m	
													End of test pit at 4.3 m depth. No water seepage observed upon completion of test pit.	33
	5													
														32

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: CJC

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SUMMARY LOG

South Coast Region

TEST HOLE No. **TP12-15**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5442078, E 531562** Elevation **37.8 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 23, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
													Soft, brown, moist SAND and SILT with a trace of organics. 0.08m	
		G											Loose, brown, moist SAND with some silt zones and a trace of clay. 0.46m	
	1												Loose to compact, grey, moist SAND with a trace of silt. 1.22m	37
		G									373.4	PT	Dark brown, moist mixture of ORGANICS, SILT and WOOD.	36
	2												Compact, grey, moist SAND below 1.8 m depth on the south side beneath the embankment.	
	3												3.66m	35
		G									27.7	OL/CL	Soft to very soft, grey, moist to wet clayey SILT with some organics and some zones of sand. 4.57m	34
	4												End of test pit at 4.6 m depth. No water seepage observed upon completion of test pit.	33
	5													32

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: CJC

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South Coast Region

TEST HOLE No. **TP12-16**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5442057, E 531597** Elevation **39.8 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 23, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
	0												Loose, brown, moist SAND with some silt and organics and a trace of gravel. 0.15m	39.8
													Compact, brown, moist SAND with some silt and a trace of gravel. 0.61m	39
	1	G											Compact, grey, moist SAND with traces of silt and gravel.	38
	2													37
	3												3.05m End of test pit at 3.0 m depth due to sloughing. No water seepage observed upon completion of test pit.	36
	4													35
	5													34

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: CJC

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South Coast Region

TEST HOLE No. **TP12-17**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5442064, E 531584** Elevation **39.8 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 23, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
	0												Loose, brown, moist SILT and SAND with some organics. 0.08m	39.8
													Compact, brown, moist, silty SAND. 0.46m	
	1	G											Compact, grey, moist SAND with some gravel and a trace of silt.	39
	2													38
	3												3.05m End of test pit at 3.0 m depth. No water seepage observed upon completion of test pit.	37
	4													36
	5													35
														34

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: CJC

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South Coast Region

TEST HOLE No. **TP12-18**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5442068, E 531577** Elevation **38.9 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 23, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
	0												Loose, brown, moist, silty SAND with some organics. 0.30m	38
	1												Compact, grey, moist SAND with some gravel and a trace of silt.	37
	2													36
	3												3.05m End of test pit at 3.0 m depth. No water seepage observed upon completion of test pit.	35
	4													34
	5													33

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

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South Coast Region

TEST HOLE No. **TP12-19**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5442075, E 531569** Elevation **37.6 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 23, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
	0												Loose, brown, moist, silty SAND with some organics. 0.30m	37
	1												Compact, grey, moist SAND with a trace to some gravel and a trace of silt.	36
	2												2.13m Brown, moist PEAT/ORGANICS and WOOD. Faint hydrocarbon odour.	35
	3													34
	4												4.27m Soft to very soft, grey, wet SILT and CLAY with some sand. 4.42m	33
	5												End of test pit at 4.4 m depth. No water seepage observed upon completion of test pit.	32

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: CJC

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South Coast Region

TEST HOLE No. **TP12-20**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5442037, E 531627** Elevation **41.2 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 23, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
	0												Firm, brown, moist SILT with some sand and organics. Trace of organics below 0.2 m depth	41
													0.46m	
													Compact, grey, moist SAND with a trace to some gravel and a trace of silt.	
	1	G												40
	2													39
		G												
	3													38
													3.96m	
	4												End of test pit at 4.0 m depth. No water seepage observed upon completion of test pit.	37
	5													36

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: CJC

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MOT SUMMARY LOG (ELEV.) 17-531-140.GPJ THURBER BC.GDT 7/20/12- THURBER BC.GLB

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SUMMARY LOG

South Coast Region

TEST HOLE No. **TP12-21**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5441981, E 531720** Elevation **47.6 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 24, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
	0												Compact, brown, moist SAND with some organics and a trace of silt.	47
	0.30m												Compact, brown, moist SAND with a trace to some gravel and a trace of silt. Grey below 0.8 m depth	
	1	G												46
	2												Some gravel below 1.8 m depth	45
	3	G												44
	4													43
	4.27m												End of test pit at 4.3 m depth. No water seepage observed upon completion of test pit.	
	5													42

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: CJC

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South Coast Region

TEST HOLE No. **TP12-22**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5441942, E 531787** Elevation **50.8 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 24, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
	0												Loose, brown, moist SAND with some silt and organics and a trace to some gravel.	50
		G											0.46m	
													Compact, grey, moist SAND with a trace to some gravel and some zones of silt.	
		G											0.91m	
	1												Compact, grey, moist SAND with a trace to some gravel and a trace of silt.	
													Trace to some silt between 1.5 and 1.8 m depth	49
	2													
		G											Trace to some silt between 2.4 and 2.7 m depth	
														48
	3												Some reddish brown zones at 3.0 and 3.7 m depth	
		G												
	4												4.27m	47
													End of test pit at 4.3 m depth. No water seepage observed upon completion of test pit.	
	5													46
														45

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: CJC

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South Coast Region

TEST HOLE No. **TP12-23**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5441884, E 531881** Elevation **53.4 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 24, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
	0												Loose, brown, moist SAND with some silt and a trace to some gravel and organics. 0.15m	53
	1	G											Compact, grey, moist SAND with some gravel and a trace of silt.	52
	2												Gravelly with a trace of cobbles between 1.8 and 2.4 m depth	51
	3	G												50
	4												4.57m	49
	5												End of test pit at 4.6 m depth. No water seepage observed upon completion of test pit.	48

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: CJC

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South Coast Region

TEST HOLE No. **TP12-24**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5441827, E 531979** Elevation **55.4 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 24, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
	0												Loose, dark brown, moist, silty SAND with some organics. 0.08m	55
		G											Compact, brown, moist SAND with some silt and a trace of organics. 0.46m	
	1												Compact to dense, grey, moist SAND with a trace to some gravel and a trace of silt.	54
		G												
	2													53
	3													52
		G												
	4												4.27m	
													End of test pit at 4.3 m depth. No water seepage observed upon completion of test pit.	51
	5													50

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: CJC

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South Coast Region

TEST HOLE No. **TP12-25**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5441754, E 532102** Elevation **55.5 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 24, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
	0												Loose, dark brown, moist, silty SAND with some organics. 0.08m	55
		G											Firm, brown, moist SILT with some sand and traces of organics and gravel. 0.91m	
	1												Compact, grey, moist SAND with some gravel and silt.	54
													Trace of silt below 1.5 m depth	
	2	G												53
	3													52
													3.66m	
	4												End of test pit at 3.7 m depth. No water seepage observed upon completion of test pit.	51
	5													50

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

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PREPARED By: Thurber Engineering Ltd.

INSPECTOR: CJC

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South Coast Region

TEST HOLE No. **TP12-26**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5441690, E 532211** Elevation **55.5 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 24, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
	0												Stiff, brown, dry to moist, sandy SILT with some organics and a trace to some gravel.	55
		G											Firm below 0.6 m depth Some wood at 0.6 m depth	
	1												1.07m Compact to dense, grey, moist, gravelly SAND with traces of cobbles and silt.	54
													Some gravel between 1.5 and 1.8 m depth.	
	2	G												53
	3												3.05m Dense, brown, moist SAND and GRAVEL.	
													3.35m Compact to dense, grey, moist, gravelly SAND with traces of cobbles and silt.	52
	4	G												
													4.57m	51
	5												End of test pit at 4.6 m depth. No water seepage observed upon completion of test pit.	50

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: CJC

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TEST HOLE No. **TP12-27**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5441612, E 532351** Elevation **52.2 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 24, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
	0												Firm to stiff, dark brown to grey, moist SILT with some organics, a trace to some clay and a trace of sand.	52
		G											0.30m	
													Loose, brown, moist SAND with some silt to silty and a trace of gravel. Grey below 0.5 m depth	
	1												0.76m	
													Compact, grey, moist, gravelly SAND with some cobbles.	51
													1.22m	
													Compact, grey, moist SAND with traces of cobbles and gravel.	
		G												
	2												Some roots at 2.0 m depth	
		G											2.13m	50
													Stiff, grey, moist, clayey SILT with a trace of sand.	
													2.44m	
	3												Compact, grey, moist SAND with a trace to some gravel and a trace of silt.	49
													4.27m	48
	4												End of test pit at 4.3 m depth. No water seepage observed upon completion of test pit.	
	5													47

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: CJC

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TEST HOLE No. **TP12-28**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5441580, E 532433** Elevation **50.4 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 24, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
	0												Loose, brown, moist, silty SAND with some organics. 0.23m	50
	1	G											Compact, grey, moist SAND with some gravel, a trace to some silt and a trace of cobbles.	49
	2													48
	3	G												47
	4												4.27m	46
	5												End of test pit at 4.3 m depth. No water seepage observed upon completion of test pit.	45

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: CJC

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South Coast Region

TEST HOLE No. **TP12-29**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5441520, E 532526** Elevation **48.3 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 24, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
	0												Compact, brown, moist SAND with traces of silt and organics.	48
	1												Some gravel below 1.1 m depth	47
		G												
	2													46
	3	G											3.35m	45
	4												End of test pit at 3.4 m depth due to sloughing. No water seepage observed upon completion of test pit.	44
	5													43

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: CJC

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South Coast Region

TEST HOLE No. **TP12-30**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5441437, E 532665** Elevation **48.2 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 24, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
	0												Loose, brown, moist SAND with some silt and a trace of organics. 0.15m	48
	1												Compact, grey, moist SAND with a trace to some gravel and a trace of silt.	47
	2	G											Some gravel below 1.5 m depth	46
	3	G											Trace of gravel below 3.2 m depth	45
	4												3.96m End of test pit at 4.0 m depth. No water seepage observed upon completion of test pit.	44
	5													43

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: CJC

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SUMMARY LOG

South Coast Region

TEST HOLE No. **TP12-31**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5441361, E 532788** Elevation **48.2 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 24, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
	0												Loose, brown, moist SAND with a trace to some silt and a trace of organics. 0.15m	48
	1												Compact, grey, moist SAND with traces of gravel, cobbles and silt.	47
		G											Some silt at 1.2 m depth	
	2												Some gravel below 1.5 m depth	46
	3	G												45
	4												4.27m	44
	5												End of test pit at 4.3 m depth. No water seepage observed upon completion of test pit.	43

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: CJC

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South Coast Region

TEST HOLE No. **TP12-32**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5441310, E 532882** Elevation **47.9 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 24, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
	0												0.08m Loose, brown, moist, silty SAND with some organics.	47
	1												Compact, grey, moist SAND with some gravel and a trace of silt. Trace of gravel below 0.6 m depth	46
	2	G											Some reddish brown zones between 1.2 and 1.5 m depth	45
	3	G												44
	4	G											4.88m	43
	5												End of test pit at 4.9 m depth. No water seepage observed upon completion of test pit.	42

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: CJC

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TEST HOLE No. **TP12-33**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5441258, E 532970** Elevation **49.2 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 24, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
	0												Firm, dark brown, moist SILT with some organics and a trace to some sand. 0.08m	49
													Compact, grey, moist SAND with some silt.	
	1	G												48
													Wet below 1.5 m depth	
		G											1.83m Stiff, grey, dry to moist SILT with some clay and some sand. 2.13m	
	2												Compact, grey to brown, wet, SAND with some silt.	47
		G											Trace of silt below 2.7 m depth	
	3												3.51m	46
		G											Stiff, grey, moist SILT with some clay and sand. 3.96m	
	4												End of test pit at 4.0 m depth. Water seepage at 1.5 m depth upon completion of test pit.	45
	5													44

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: CJC

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MOT SUMMARY LOG (ELEV.) 17-531-140.GPJ THURBER BC.GDT 7/20/12- THURBER BC.GLB

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SUMMARY LOG

South Coast Region

TEST HOLE No. **TP12-34**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5441224, E 533032** Elevation **51.1 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 24, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
													Soft, brown, moist SILT with some sand and organics. 0.08m	51
		G									52.0	CH	Stiff over firm, grey, moist SILT and CLAY with a trace of sand layers. 0.76m	
	1	G									35.3	CL/ML	Stiff to very stiff, grey to brown, moist, clayey SILT with a trace to some sand. 1.83m	50
	2												Soft, grey, moist to wet SILT with some fine sand and a trace to some clay. Sandy below 2.3 m depth	49
	3	G									24.6	ML		48
	4	G											4.27m	47
	5												End of test pit at 4.4 m depth. No water seepage observed upon completion of test pit.	46

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: CJC

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SUMMARY LOG

South Coast Region

TEST HOLE No. **TP12-35**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5441170, E 533099** Elevation **50.5 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 24, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
	0												Soft, dark grey, moist SILT with some organics and a trace of sand. 0.15m	50
	1	G											Compact, grey, moist SAND with a trace to some gravel.	49
	2													48
	3	G											Piece of dimensional lumber at 2.9 m depth 3.05m Firm, grey, moist, sandy SILT with some gravel. 3.35m Compact, grey, moist SAND with some gravel. Some wood to 3.7 m depth	47
	4												4.57m	46
	5													45

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: CJC

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SUMMARY LOG

South Coast Region

TEST HOLE No. **TP12-36**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5441196, E 533064** Elevation **50.5 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 24, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
	0												Soft, brown, moist SAND and SILT with some organics. 0.15m	50
													Loose to compact, grey, moist, gravelly SAND with a trace of silt. 0.46m	
													Compact, brown, moist, gravelly SAND with some silt to silty. 0.76m	
	1												Compact, grey, moist, gravelly SAND with traces of silt and cobbles.	49
	2													48
	3												3.35m	
													End of test pit at 3.4 m depth. No water seepage observed upon completion of test pit.	47
	4													46
	5													45

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: CJC

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SUMMARY LOG

South Coast Region

TEST HOLE No. **TP12-37**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5441123, E 533198** Elevation **50.8 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 24, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
	0												Soft, brown, moist SILT with some organics and a trace of sand. 0.15m	50
													0.30m Loose, grey, moist, gravelly SAND with some silt.	
	1	G											Loose, brown, moist to wet, silty SAND with a trace of gravel (east side of pit). 1.07m Loose, brown, moist to wet, gravelly SAND with some silt (west side of pit). Swampy ground to the east of this test pit. Wet below 0.9 m depth	49
	2	G									32.0	CL/ML	Stiff, grey to brown, moist to wet SILT with some clay and sand layers. 2.13m	
	3	G									31.9	ML/CL	Soft to firm, grey, moist to wet, clayey SILT with some sand.	48
	4												4.27m End of test pit at 4.3 m depth. Water seepage at 0.9 m depth upon completion of test pit.	47
	5													46
														45

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: CJC

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SUMMARY LOG

South Coast Region

TEST HOLE No. **TP12-38**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5441075, E 533263** Elevation **53.8 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 24, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
													Soft, brown, moist SILT with some sand and organics. 0.08m	
	1	G									38.8	CH	Stiff, dry, grey to brown, clayey SILT with some thin layers of sand.	53
	2												2.29m Loose, grey, wet SILT and SAND with some clay. Silty below 2.6 m depth	52
		G											2.90m	51
	3												Loose to compact, grey, moist to wet, SAND with some silt. 3.66m	
		G												50
	4												End of test pit at 3.8 m depth. No water seepage observed upon completion of test pit.	
	5													49
														48

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. **17-531-140**

PREPARED By: **Thurber Engineering Ltd.**

INSPECTOR: **CJC**

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SUMMARY LOG

South Coast Region

TEST HOLE No. **TP12-39**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5440928, E 533514** Elevation **54.8 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 24, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
													Soft, brown, moist, sandy SILT with some organics. 0.08m	
													Loose to compact, grey, moist SAND with traces of gravel and silt. 0.46m	54
	1	G									53.5	CH	Firm to stiff, grey to brown, moist, clayey SILT with some sand and a trace of organics. Trace of sand below 1.2 m depth	
													1.83m	53
	2	G									47.7	CH	Soft, grey, moist to wet SILT and CLAY.	
													2.90m	52
	3	G									52.6	CH	Very soft, grey, wet, silty CLAY with traces of sand and organics.	
													3.96m	51
	4												End of test pit at 4.0 m depth. No water seepage observed upon completion of test pit.	
	5													50
														49

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: CJC

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SUMMARY LOG

South Coast Region

TEST HOLE No. **TP12-40**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5441003, E 533379** Elevation **55.6 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 24, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
													Soft, dark brown, moist SILT with some sand to sandy.	
													0.61m	55
		G											Stiff, grey to brown, wet SAND and SILT.	
	1	G											1.22m	
		G											Loose to compact, grey, moist to wet SAND with some silt to silty and a trace of gravel.	54
													1.83m	
	2												Very soft, grey, wet SILT and CLAY with a trace of organics.	
		G									41.5	CL/CH		53
	3												3.05m	
													End of test pit at 3.0 m depth due to sloughing. Water seepage at 1.2 m depth upon completion of test pit.	
	4													52
														51
	5													
														50

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: CJC

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SUMMARY LOG

South Coast Region

TEST HOLE No. **TP12-41**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5440519, E 534193** Elevation **84.0 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 25, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
	0												Compact, brown, moist SAND with some organics and a trace to some gravel and silt. Trace of organics below 0.3 m depth	
		G												
													0.91m	
	1												Compact, grey, moist, gravelly SAND with a trace of silt.	83
		G				35.8	63.3	0.8			5.9			
	2													82
	3												A trace to some clayey SILT clumps below 3.0 m depth	81
													3.96m	
	4												End of test pit at 4.0 m depth. No water seepage observed upon completion of test pit.	80
	5													79

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: CJC

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SUMMARY LOG

South Coast Region

TEST HOLE No. **TP12-42**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5440410, E 534393** Elevation **84.9 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 25, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
													Loose, dark brown, moist SILT and SAND with some organics. 0.30m	
		G											Loose, brown, moist, silty SAND with some gravel and a trace of organics. 0.61m	
	1												Compact, grey, moist, gravelly SAND with a trace of silt.	84
		G				41.4	57.4	1.2			5.1	GP/SP		83
	2													
	3													82
		G				37.0	61.4	1.6				GP/SP		
													3.96m	81
	4												End of test pit at 4.0 m depth. No water seepage observed upon completion of test pit.	
	5													80
														79

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: CJC

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South Coast Region

TEST HOLE No. **TP12-43**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5440333, E 534522** Elevation **84.7 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 25, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
	0												Soft, dark brown, moist, sandy SILT with some organics. 0.15m	84
		G											Loose to compact, brown, moist SAND with some silt to silty and traces of organics and gravel. 0.53m	
	1												Compact, grey, moist SAND with traces of silt and gravel. 1.22m	83
		G				24.5	66.6	8.9			9.0	SP-SM	Compact, grey, moist, gravelly SAND with a trace to some silt.	
	2													82
	3													81
	4												3.96m End of test pit at 4.0 m depth. No water seepage observed upon completion of test pit.	80
	5													79

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: CJC

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SUMMARY LOG

South Coast Region

TEST HOLE No. **TP12-44**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5440251, E 534654** Elevation **85.2 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 25, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
													Soft, dark brown, moist SILT with some organics and a trace to some sand.	85
													0.08m Very stiff, grey, moist SILT with some clay to clayey and traces of sand and organics.	
	1	G									19.1	CL/ML		
													1.22m Soft, grey, moist, clayey SILT with a trace to some sand and a trace of organics.	84
	2	G									26.5	CL		83
	3													82
													3.35m Soft, grey, moist SILT with some clay to clayey and a trace to some sand and brown, wet, sandy SILT with a trace of wood/organics.	
	4	G									19.9	CL/ML		81
													4.57m End of test pit at 4.6 m depth. No water seepage observed upon completion of test pit.	
	5													80

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: CJC

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SUMMARY LOG

South Coast Region

TEST HOLE No. **TP12-45**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5440184, E 534773** Elevation **85.2 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 25, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
													Compact, brown, moist SAND and GRAVEL. 0.30m	85
		G											Very stiff, grey, moist, sandy SILT with a trace to some clay. 0.61m	
	1												Compact, brown, moist, gravelly SAND with some silt. 1.22m	84
		G				56.2	41.6	2.2			4.3	GP	Compact, grey, moist GRAVEL and SAND with a trace of silt.	
	2													83
													Some gravel below 2.3 m depth	
	3												3.66m	82
		G											Stiff, grey, moist to wet, silty CLAY. 3.96m	
	4												Compact, grey, moist to wet SAND with some silt. 4.88m	81
		G												
	5												End of test pit at 4.9 m depth. No water seepage observed upon completion of test pit.	80

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
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R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: CJC

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SUMMARY LOG

South Coast Region

TEST HOLE No. **TP12-46**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5440129, E 534867** Elevation **82.9 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 25, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
	0												Soft, brown, moist SILT with some organics and sand. 0.08m	
		G											Very stiff, grey, moist SILT with some clay and traces of gravel, sand and organics.	82
	1												1.22m	
		G											Soft, brown, wet SILT with some clay and traces of organics and sand. 1.52m	
		G									56.3	OH	Soft, brown, wet SILT with some wood, organics and organic silt and a trace to some sand.	81
	2												2.74m	
	3												Soft to firm, grey, wet SILT with some clay to clayey. 3.05m	80
		G											Very stiff, brown, moist SILT with a trace to some sand and clay. 3.66m	
	4												End of test pit at 3.8 m depth. Water seepage at 1.2 m depth upon completion of test pit.	79
	5													78
														77

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: CJC

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MOT SUMMARY LOG (ELEV.) 17-531-140.GPJ THURBER BC.GDT 7/20/12- THURBER BC.GLB

Ministry of Transportation

SUMMARY LOG

South Coast Region

TEST HOLE No. **TP12-47**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5440030, E 535023** Elevation **86.4 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 25, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
													Soft, brown, moist SILT with some organics and a trace to some sand.	86
	0.30												0.30m	
	1	G							43	23	24.7	CL	Very stiff, grey and brown, moist SILT with some clay to clayey, a trace to some sand and traces of gravel and cobbles.	85
	2	G							38	20	21.5	CL		84
	2.90												2.90m	
	3												End of test pit at 2.9 m depth. No water seepage observed upon completion of test pit.	83
	4													82
	5													81

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: CJC

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SUMMARY LOG

South Coast Region

TEST HOLE No. **TP12-48**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5439958, E 535167** Elevation **90.2 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 25, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
													Soft, brown, moist SILT with some organics and a trace to some sand. 0.08m	90
		G							39	20	18.0	CL	Stiff to very stiff, brown, moist SILT with some clay and traces of sand and organics. 0.91m	
	1												Soft, brown, moist to wet SILT with some organics and a trace to some sand and gravel.	89
		G							46	41	41.3	ML/OL		
	2													88
													2.44m	
													Firm, grey and brown, moist to wet SILT with some sand and clay and a trace of organics.	
	3	G							42	23	31.1	CL	Very stiff below 3.0 m depth 3.35m	87
													End of test pit at 3.4 m depth. Water seepage at 2.4 m depth upon completion of test pit.	
	4													86
	5													85

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: CJC

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SUMMARY LOG

South Coast Region

TEST HOLE No. **TP12-49**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5439893, E 535285** Elevation **92.1 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 25, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
	0												Soft to firm, brown, moist SILT with traces of sand and organics.	92
		G											0.91m	
	1												Stiff, brown, moist SILT with some sand to sandy.	91
													1.52m	
	2												Very stiff, grey, dry to moist SILT with some sand and a trace to some clay.	90
		G							31	19	23.1	CL		
	3												3.05m	89
													End of test pit at 3.0 m depth. No water seepage observed upon completion of test pit.	
	4													88
	5													87

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: CJC

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SUMMARY LOG

South Coast Region

TEST HOLE No. **TP12-50**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5439814, E 535422** Elevation **93.5 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 25, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
	0												Firm, brown, moist SILT with some organics and a trace of sand.	93
	1	G									68.4	OH		
													1.22m Stiff, grey and brown, moist SILT with some clay and traces of sand and organics.	92
	2	G							41	23	32.5	CL	Some zones of firm, wet, dark brown SILT with some organics below 2.1 m depth	
													2.44m	91
	3	G							37	19	22.1	CL	Very stiff, grey, moist CLAY and SILT with a trace to some sand and a trace of gravel.	
													3.35m End of test pit at 3.4 m depth. No water seepage observed upon completion of test pit.	90
	4													89
	5													88

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: CJC

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SUMMARY LOG

South Coast Region

TEST HOLE No. **TP12-51**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5439771, E 535499** Elevation **95.3 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 25, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
	0												Soft, brown, moist SILT with some sand to sandy and some organics.	95
													Trace of organics below 0.5 m depth	
	1	G									54.8	OH		94
													1.52m Firm, grey and brown, moist SILT with some sand and traces of organics and clay.	
	2	G							40	21	25.8	CL		
													2.29m Very stiff, grey, moist (wet in cracks) CLAY and SILT with a trace to some sand.	93
	3	G							43	21	23.9	CL		92
													3.66m End of test pit at 3.7 m depth. No water seepage observed upon completion of test pit.	
	4													91
	5													90

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: CJC

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SUMMARY LOG

South Coast Region

TEST HOLE No. **TP12-52**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5439710, E 535590** Elevation **94.9 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 25, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
	0												Firm, dark brown, moist SILT with some organics and a trace of sand.	94
													0.61m Very stiff, grey and brown, moist SILT with some clay to clayey and traces of sand and organics.	
	1	G							47	24	26.7	CL		
	2												1.98m End of test pit at 2.0 m depth. No water seepage observed upon completion of test pit.	93
	3													92
	4													91
	5													90
														89

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: CJC

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SUMMARY LOG

South Coast Region

TEST HOLE No. **TP12-53**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5439650, E 535703** Elevation **93.8 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 25, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
	0												Firm, brown, moist SILT with some sand to sandy and some organics.	93
		G									45.1	ML/OL		
	1												0.91m Stiff, grey with some brown zones, moist CLAY and SILT with traces of sand and organics. Very stiff below 1.4 m depth	92
		G							40	19	24.4	CL		
	2													
	3												2.74m End of test pit at 2.7 m depth. No water seepage observed upon completion of test pit.	91
	4													90
	5													89
														88

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: CJC

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SUMMARY LOG

South Coast Region

TEST HOLE No. **TP12-54**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5439593, E 535794** Elevation **94.1 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 25, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
	0												Firm, brown, moist SILT with some organics.	94
		G											0.76m	
	1												Stiff, brown, moist SILT with some clay and a trace to some organics. 0.91m	93
		G							44	24	31.1	CL	Very stiff, grey and brown, moist, clayey SILT with traces of sand and gravel.	
	2												Grey below 2.1 m depth	92
		G							31	23	25.4	CL/ML	2.44m Very stiff, grey, moist SILT with a trace to some sand and a trace of clay.	
	3												3.05m End of test pit at 3.0 m depth. No water seepage observed upon completion of test pit.	91
	4													90
	5													89

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

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INSPECTOR: CJC

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South Coast Region

TEST HOLE No. **TP12-55**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5439499, E 535946** Elevation **91.7 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 25, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
													Soft, brown, wet ORGANICS and SILT. 0.15m	
		G											Firm, grey, moist, clayey SILT with a trace of organics. 0.76m	91
	1	G									48.0	OH/WOOD	Soft, brown, moist WOOD and SILT with some organics.	90
	2	G											Wet below 1.8 m depth 1.98m Loose to compact, grey, wet, silty SAND. 2.59m	89
	3	G											Very stiff, brown and grey, moist SILT with a trace to some sand and clay and a trace of gravel. 3.05m	88
	4												End of test pit at 3.0 m depth. Water seepage at 1.8 m depth upon completion of test pit.	87
	5													86

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: CJC

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SUMMARY LOG

South Coast Region

TEST HOLE No. **TP12-56**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5439457, E 536010** Elevation **88.8 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 25, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
	0												Soft, brown, moist SILT with some organics. 0.15m	88
	1	G									23.5	CL	Firm to stiff, grey, moist CLAY and SILT with traces of sand and organics. Wet with a trace to some sand below 0.9 m depth	87
	2	G											1.98m Soft to firm, brown, moist SILT with some wood/organics and traces of sand and clay.	86
	3	G									42.1	OH	3.35m Very stiff, grey, moist SILT with some organics and clay and a trace to some sand.	85
	4	G											4.27m Loose to compact, grey, wet SAND with some zones of silt.	84
	5												4.88m End of test pit at 4.9 m depth. Water seepage at 4.3 m depth upon completion of test pit.	83

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: CJC

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SUMMARY LOG

South Coast Region

TEST HOLE No. **TP12-57**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5440094, E 534925** Elevation **85.3 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 25, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
													Firm, brown, moist SILT with some organics. 0.08m	
	1	G									19.5	CL	Stiff to very stiff, grey, moist CLAY and SILT with traces of sand and organics. Brown and grey below 1.2 m depth	85 / 84
	2	G									58.4	OH	1.83m Soft, brown, wet SILT with some organic silt, sand and wood/organics. 2.59m	83
	3	G											Very stiff, grey, moist SILT with some clay to clayey and a trace of sand. 3.66m	82
	4												End of test pit at 4.3 m depth. Water seepage at 1.8 m depth upon completion of test pit.	81
	5													80

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: CJC

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SUMMARY LOG

South Coast Region

TEST HOLE No. **TP12-58**

Project **Highway 1 - 232 to 264 EB Climbing Lane**

Location **N 5440222, E 534721** Elevation **84.2 m**

Driller **Backhoes Unlimited** Method **Excavator** Dates **May 25, 2012**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	ELEVATION (m)
	0												Loose, brown, moist, gravelly SAND. 0.15m	84
													Firm, grey, moist SILT with some organics and a trace of sand. 0.30m	
		G											Loose to compact, brown, moist, gravelly SAND. 0.76m	
	1												Stiff, grey, moist SILT with some clay and a trace of sand. 0.91m	83
		G											Compact, grey, moist GRAVEL and SAND with some cobbles.	
	2												Some gravel below 2.0 m depth	82
	3													81
		G											3.35m Compact, grey, moist SAND with a trace of silt. 3.96m	
	4												End of test pit at 4.0 m depth. No water seepage observed upon completion of test pit.	80
	5													79

SAMPLE TYPE
A - Auger
C - Core
D - Denison
G - Grab
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

FILE No. 17-531-140

PREPARED By: Thurber Engineering Ltd.

INSPECTOR: CJC

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THURBER

2012 Thurber Laboratory Testing

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THURBER ENGINEERING LTD.

DIRECT SHEAR TEST REPORT DS 12-1
TP 12-42, Sa.2 & 3 combined
Normal Stress = 50 kPa

McElhanney Consulting Services Ltd.
Hwy#1 232 - 264 EB Climbing Lane

Report Date: July 11, 2012
File Number: 17-531-140

Peak Shear Stress = 47 kPa

Sample Preparation

The original sample consisted of clean, well graded gravelly Sand. This material was screened over a 4.75 mm sieve. The test specimen was formed by compacting -4.75 mm material directly into the shearbox. Water was added until the material appeared to be near optimum moisture content. The material was compacted in 3 layers of 10 mm each to produce a dense specimen.

Specimen Data

	As Set Up	As Tested
Wet Density (kg/cu.m.):	1,851	---
Dry Density (kg/cu.m.):	1,710	1,727
Moisture Content:	8.2%	---
Void Ratio:	0.608	0.592
Saturation:	37.3%	---

After Test Data

There was no misalignment of the top and bottom halves of the shearbox.
The load cap was tilted approximately 3^0 from front to back.
The gap between the shearbox halves was 2.5 mm at the front and 3 mm at the back.
There was no extruded material between the shearbox halves.
At the end of the test there was a 5 mm thick shear zone in plane with the split in the shearbox.

Test Procedure

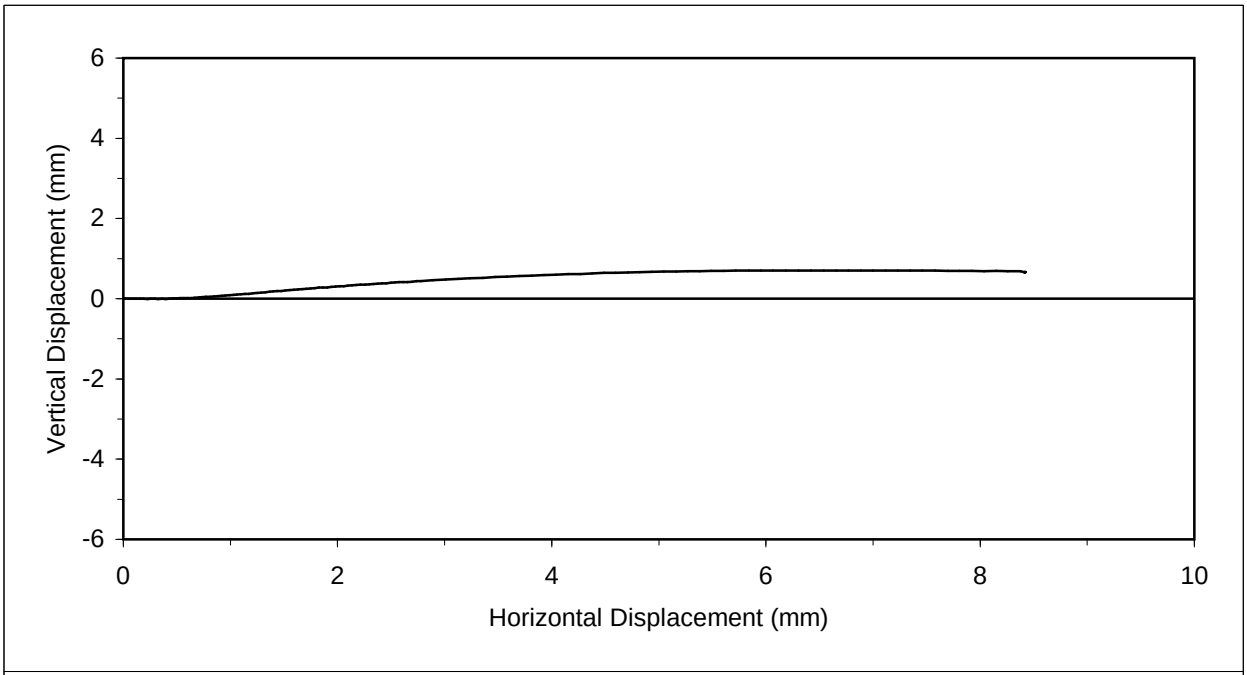
ASTM D 3080 Direct Shear Test of Soils Under Consolidated Drained Conditions

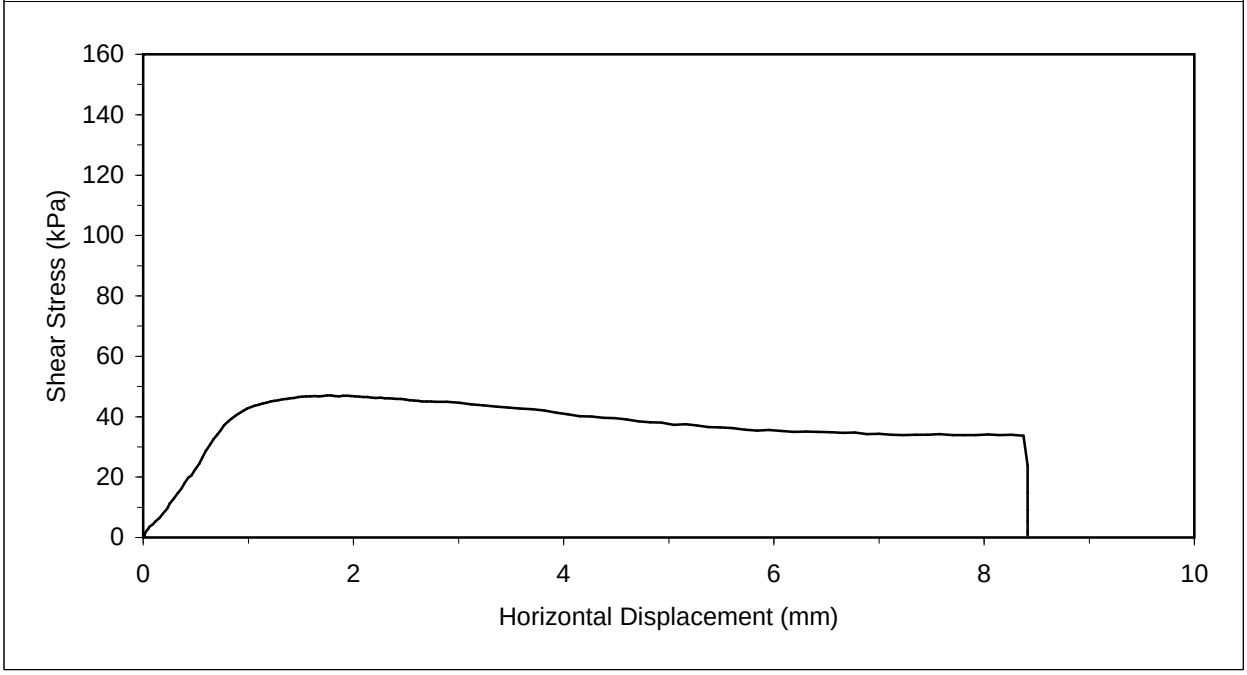
THURBER

DIRECT SHEAR TEST REPORT DS 12-1
TP 12-42, Sa.2 & 3 combined @ Normal Stress = 50 kPa

McElhanney Consulting Services Ltd.
Hwy#1 232 - 264 EB Climbing Lane

File Number: 17-531-140
Test Dates: July 10 - 11, 2012





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THURBER ENV. CONSULTANTS LTD.
ATTN: PAUL EVANS
900 - 1281 West Georgia Street
Vancouver BC V6E 3J7

Date Received: 31-AUG-12
Report Date: 06-SEP-12 15:56 (MT)
Version: FINAL

Client Phone: 604-684-4384

Certificate of Analysis

Lab Work Order #: L1202866

Project P.O. #: NOT SUBMITTED
Job Reference: 17-531-140
C of C Numbers: 10-253856
Legal Site Desc:

Brian Morgan
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1202866-1	L1202866-2			
	Description	SOIL	SOIL			
	Sampled Date	10-MAY-12	10-MAY-12			
	Sampled Time					
	Client ID	TH12-1 SA#4	TH12-2 SA#4			
Grouping	**Analyte**					
SOIL						
Anions and Nutrients	Water Soluble Sulfate (%)	<0.010	<0.010			

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
SO4-WATER-SOL-SK	Soil	Water Soluble Sulfate (6 hour 1:10)	CSA A23.2-3B (CONCRETE)

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
SK	ALS ENVIRONMENTAL - SASKATOON, SASKATCHEWAN, CANADA

Chain of Custody Numbers:

10-253856

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: THURBER ENV. CONSULTANTS LTD.
900 - 1281 West Georgia Street
Vancouver BC V6E 3J7
Contact: PAUL EVANS

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SO4-WATER-SOL-SK	**Soil**							
Batch R2430948								
WG1538563-1 DUP		**L1202866-1**						
Water Soluble Sulfate		<0.010	<0.010	RPD-NA	%	N/A	0.1	05-SEP-12
WG1538563-3 IRM		**NA2SO4_SOIL**						
Water Soluble Sulfate			108.3		%		70-130	05-SEP-12
WG1538563-2 MB								
Water Soluble Sulfate			<0.010		%		0.01	05-SEP-12

Quality Control Report

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

THURBER

2011 BC MoTI Test Hole Logs

Ministry of Transportation

SUMMARY LOG

Geotechnical and Materials Engineering

TEST HOLE No. **AH11-01**

Project **HWY 1 EASTBOUND TRUCK CLIMBING LANE**

Location **N5,442,333/E531,116** Elevation **28.6m**

Driller **Sea To Sky** Method **Solid Stem Auger** Dates **2011-10-16**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	Other Tests
			-	-		(50)	(50)	(0)	-	-	-	(SP-GP)	Asphalt Pavement 0.13m	
		Bag	-	-		(35)	(65)	(0)	-	-	-	(SP-GP)	compact moist brown GRAVELLY SAND (12mm diameter gravel) 0.2m	
	1												compact moist brown SAND and GRAVEL (40mm diameter gravel) 0.76m	
		Bag	-	-		(0)	(0)	(100)	-	-	-	(ML)		
	2												stiff moist brown CLAYEY SILT	
	3	Bag	-	-		(0)	(0)	(100)	-	-	-	(ML)	3.05m	
													End of Borehole	
	4													
	5													
	6													
	7													
	8													
	9													

SAMPLE TYPE
A - Auger
C - Core
D - Denison
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586)

NOTE: Brackets ( ) denote Driller's estimate

FILE No. **12366**

PREPARED By: **JJ/SK**

SHEET 1 of 1

SUMMARY LOG 232 TO 264.GPJ BC_MOT.GDT 12-2-15

Ministry of Transportation

SUMMARY LOG

Geotechnical and Materials Engineering

TEST HOLE No. **AH11-02**

Project **HWY 1 EASTBOUND TRUCK CLIMBING LANE**

Location **N5,442,200/E531,344**

Elevation **32.7m**

Driller **Sea To Sky** Method **Solid Stem Auger** Dates **2011-10-16**

Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	Other Tests
	Bag	-	-		(15)	(85)	(0)	-	-	-	(SP-GP)	compact moist brown SAND, some gravel (25mm diameter graves)	
1													
												1.52m	
	Bag	-	-		(0)	(10)	(90)	-	-	-	(ML)	stiff moist grey-brown CLAYEY SILT, some sand 1.83m	
2													
	Bag	-	-		(0)	(95)	(5)	-	-	-	(SP)	compact moist grey SAND, trace gravel 2.44m	
	Bag	-	-		(0)	(0)	(80 Peat)	-	-	-	(Pt)	soft moist brown PEAT, some silt 2.74m	
3													
4													
	Bag	-	-		(0)	(0)	(100)	-	-	-	(CL)	firm moist grey SILTY CLAY	
5													
6	Bag	-	-		(0)	(0)	(100)	-	-	-	(CL)	6.1m	
												End of Borehole	
7													
8													
9													

SAMPLE TYPE
A - Auger
C - Core
D - Denison
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

FILE No. **12366**

PREPARED By: **JJ/SK**

Blowcount = Standard Penetration Test (ASTM-1586)

NOTE: Brackets ( ) denote Driller's estimate

SHEET 1 of 1

SUMMARY LOG 232 TO 264.GPJ BC_MOT.GDT 12-2-15

Ministry of Transportation

SUMMARY LOG

Geotechnical and Materials Engineering

TEST HOLE No. **AH11-03**

Project **HWY 1 EASTBOUND TRUCK CLIMBING LANE**

Location **N5,442,164/E531,404**

Elevation **34.8m**

Driller **Sea To Sky** Method **Solid Stem Auger** Dates **2011-10-16**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	Other Tests
	1	Bag	-	-		(15)	(85)	(0)	-	-	-	(SP)	compact moist brown SAND, some gravel (20mm diameter gravels)	
	2													
	3												3.2m	
	4	Bag	-	-		(0)	(10)	(90)	-	-	-	(CL)	firm moist grey SILTY CLAY, some sand	
						(0)	(75)	(25)				(SP-SC)	4.27m loose to compact wet grey SILTY SAND	
	5												4.57m	
		Bag	-	-		(0)	(0)	(100)	-	-	-	(CL)	firm moist grey SILTY CLAY	
	6												6.25m	
	7	Bag	-	-		(5)	(95)	(0)	-	-	-	(SP)	compact to dense wet grey SAND, trace gravel (13mm diameter gravels)	
													7.47m	
	8												compact wet grey SAND, some silt	
		Bag	-	-		(0)	(15)	(85)	-	-	-	(SC)	8.53m	
						(0)	(0)	(100)				(CL)	stiff moist grey SILTY CLAY	
	9												9.14m	
													End of Borehole	

SAMPLE TYPE
A - Auger
C - Core
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T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

FILE No. **12366**

PREPARED By: **JJ/SK**

Blowcount = Standard Penetration Test (ASTM-1586)

NOTE: Brackets ( ) denote Driller's estimate

SHEET 1 of 1

SUMMARY LOG 232 TO 264.GPJ BC_MOT.GDT 12-2-15

Ministry of Transportation

SUMMARY LOG

Geotechnical and Materials Engineering

TEST HOLE No. **AH11-04**

Project **HWY 1 EASTBOUND TRUCK CLIMBING LANE**

Location **N5,442,128/E531,464**

Elevation **36.9m**

Driller **Sea To Sky** Method **Solid Stem Auger** Dates **2011-10-16**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	Other Tests
													Asphalt Pavement 0.13m	
	1	Bag	-	-		(15)	(85)	(0)	-	-	-	(SP)	compact moist brown SAND, some gravel (25mm diameter gravels)	
													1.83m	
	2	Bag	-	-		(0)	(45)	(55)	-	-	-	(SC-CL)	stiff moist grey-brown SILT and SAND 2.13m	
		Bag	-	-		(0)	(30)	(70)	-	-	-	(SC-ML)	compact to dense moist grey-brown SILTY SAND	
	3												3.05m	
	4	Bag	-	-		(0)	(95)	(5)	-	-	-	(SP)	compact to dense moist grey-brown SAND, trace silt	
	5					(10 Peat)	(0)	(90)				(CL)	5.18m stiff moist grey-brown SILTY CLAY, trace peat 5.33m	
	6												stiff moist grey SILTY CLAY	
	7	Bag	-	-		(0)	(0)	(100)	-	-	-	(CL)	7.01m End of Borehole	
	8													
	9													

SAMPLE TYPE
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SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
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TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

FILE No. **12366**

PREPARED By: **JJ/SK**

Blowcount = Standard Penetration Test (ASTM-1586)

NOTE: Brackets ( ) denote Driller's estimate

SHEET 1 of 1

SUMMARY LOG 232 TO 264.GPJ BC_MOT.GDT 12-2-15

Ministry of Transportation

SUMMARY LOG

Geotechnical and Materials Engineering

TEST HOLE No. **AH11-05**

Project **HWY 1 EASTBOUND TRUCK CLIMBING LANE**

Location **N5,442,076/E531,551**

Elevation **40.0m**

Driller **Sea To Sky** Method **Solid Stem Auger** Dates **2011-10-16**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	Other Tests
		Bag	-	-		(40)	(60)	(0)	-	-	-	(SP-GP)	Asphalt Pavement 0.08m compact moist brown SAND and GRAVEL (25mm diameter gravel) 0.15m	
	1	Bag	-	-		(10)	(90)	(0)	-	-	-	(SP)	compact moist brown SAND, some gravel (25mm diameter gravel)	
	2												2.59m	
	3	Bag	-	-		(0)	(90)	(10)	-	-	-	(SM-SP)	compact moist brown SAND, some silt 3.05m	
													End of Borehole	
	4													
	5													
	6													
	7													
	8													
	9													

SAMPLE TYPE
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SHEAR STRENGTH kPa
U - Unconfined Compression
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TESTS
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Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
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FILE No. **12366**

PREPARED By: **JJ/SK**

SHEET 1 of 1

Blowcount = Standard Penetration Test (ASTM-1586)

NOTE: Brackets ( ) denote Driller's estimate

SUMMARY LOG 232 TO 264.GPJ BC_MOT.GDT 12-2-15

Ministry of Transportation

SUMMARY LOG

Geotechnical and Materials Engineering

TEST HOLE No. **AH11-06**

Project **HWY 1 EASTBOUND TRUCK CLIMBING LANE**

Location **N5,441,823/E531,980** Elevation **54.4m**

Driller **Sea To Sky** Method **Solid Stem Auger** Dates **2011-10-16**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	Other Tests
		Bag	-	-		(50)	(50)	(0)	-	-	-	(SP-GP)	Asphalt Pavement 0.08m compact moist brown SAND and GRAVEL (25mm diameter gravel) 0.2m	
	1	Bag	-	-		(5)	(95)	(0)	-	-	-	(SP)	compact moist brown SAND, trace gravel (13mm diameter gravel)	
													1.68m	
	2	Bag	-	-		(0)	(25)	(75)	-	-	-	(ML)	stiff moist brown SANDY SILT 2.13m	
		Bag	-	-		(0)	(100)	(0)	-	-	-	(SP)	compact to dense moist grey-brown SAND	
	3												3.05m	
													End Of Borehole	
	4													
	5													
	6													
	7													
	8													
	9													

SAMPLE TYPE
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SHEAR STRENGTH kPa
U - Unconfined Compression
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TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
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FILE No. **12366**

PREPARED By: **JJ/SK**

Blowcount = Standard Penetration Test (ASTM-1586)

NOTE: Brackets ( ) denote Driller's estimate

SHEET 1 of 1

SUMMARY LOG 232 TO 264.GPJ BC_MOT.GDT 12-2-15

Ministry of Transportation

SUMMARY LOG

Geotechnical and Materials Engineering

TEST HOLE No. **AH11-06A**

Project **HWY 1 EASTBOUND TRUCK CLIMBING LANE**

Location **As Staked**

Elevation

Driller **Sea To Sky** Method **Solid Stem Auger** Dates **2011-10-16**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	Other Tests
													Asphalt Pavement 0.2m	
		Bag	-	-		(30)	(70)	(0)	-	-	-	(SP-GP)	compact moist brown GRAVELLY SAND (25mm diameter gravel) 0.28m	
		Bag	-	-		(5)	(95)	(0)	-	-	-	(SP)	compact moist brown SAND, trace gravel (13mm diamter gravel) 0.76m	
	1												compact moist grey SAND	
		Bag	-	-		(0)	(100)	(0)	-	-	-	(SP)	1.52m	
													End Of Borehole	
	2													
	3													
	4													
	5													
	6													
	7													
	8													
	9													

SAMPLE TYPE
A - Auger
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SHEAR STRENGTH kPa
U - Unconfined Compression
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TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

FILE No. **12366**

PREPARED By: **JJ/SK**

SHEET 1 of 1

Blowcount = Standard Penetration Test (ASTM-1586)

NOTE: Brackets ( ) denote Driller's estimate

SUMMARY LOG 232 TO 264.GPJ BC_MOT.GDT 12-2-15

Ministry of Transportation

SUMMARY LOG

Geotechnical and Materials Engineering

TEST HOLE No. **AH11-07**

Project **HWY 1 EASTBOUND TRUCK CLIMBING LANE**

Location **N5,441,092/E533,218** Elevation **54.3m**

Driller **Sea To Sky** Method **Solid Stem Auger** Dates **2011-10-17**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	Other Tests
		Bag	-	-		(40)	(60)	(0)	-	-	-	(SP-GP)	Asphalt Pavement 0.08m compact moist brown SAND and GRAVEL (25mm diameter gravel) 0.23m	
	1	Bag	-	-		(5)	(95)	(0)	-	-	-	(SP)	compact moist brown SAND, trace gravel (13mm diamter gravel) 0.91m	
		Bag	-	-		(0)	(75)	(25)	-	-	-	(SM)		
	2												compact moist to wet brown SILTY SAND	
	3	Bag	-	-		(0)	(65)	(35)	-	-	-	(SM)	3.05m	
													End of Borehole	
	4													
	5													
	6													
	7													
	8													
	9													

SAMPLE TYPE
A - Auger
C - Core
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T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

FILE No. **12366**

PREPARED By: **JJ/SK**

SHEET 1 of 1

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

SUMMARY LOG 232 TO 264.GPJ BC_MOT.GDT 12-2-15

Ministry of Transportation

SUMMARY LOG

Geotechnical and Materials Engineering

TEST HOLE No. **AH11-07A**

Project **HWY 1 EASTBOUND TRUCK CLIMBING LANE**

Location **As Staked**

Elevation

Driller **Sea To Sky** Method **Solid Stem Auger** Dates **2011-10-17**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	Other Tests
													Asphalt Pavement 0.18m	
		Bag	-	-		(40)	(60)	(0)	-	-	-	(SP-GP)	compact moist brown SAND and GRAVEL (50mm diameter gravel) 0.41m	
		Bag	-	-		(5)	(95)	(0)	-	-	-	(SP)	compact moist brown SAND, trace gravel (13mm diamter gravel) 0.76m	
	1												compact moist brown SAND, some sand, trace gravel (25mm diameter gravel)	
		Bag	-	-		(5)	(80)	(15)	-	-	-	(SM)	1.52m	
													End of Borehole	
	2													
	3													
	4													
	5													
	6													
	7													
	8													
	9													

SAMPLE TYPE
A - Auger
C - Core
D - Denison
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

FILE No. **12366**

PREPARED By: **JJ/SK**

SHEET 1 of 1

Blowcount = Standard Penetration Test (ASTM-1586)

NOTE: Brackets ( ) denote Driller's estimate

SUMMARY LOG 232 TO 264.GPJ BC_MOT.GDT 12-2-15

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SUMMARY LOG

Geotechnical and Materials Engineering

TEST HOLE No. **AH11-08**

Project **HWY 1 EASTBOUND TRUCK CLIMBING LANE**

Location **N5,440,840/E533,643** Elevation **65.1m**

Driller **Sea To Sky** Method **Solid Stem Auger** Dates **2011-10-17**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	Other Tests
		Bag	-	-		(50)	(50)	(0)	-	-	-	(SP-GP)	Asphalt Pavement 0.1m compact moist brown SAND and GRAVEL (75mm diameter gravel) 0.46m	
	1	Bag	-	-		(5)	(95)	(0)	-	-	-	(SP)	compact moist brown SAND, trace gravel (13mm diameter gravel) 0.91m	
		Bag	-	-		(5)	(85)	(10)	-	-	-	(SP-SM)	compact moist brown SAND, some sand, trace gravel (113mm diameter gravel) 1.68m	
	2												compact moist brown SAND	
	3	Bag	-	-		(0)	(100)	(0)	-	-	-	(SP)	3.05m	
													End of Borehole	
	4													
	5													
	6													
	7													
	8													
	9													

SAMPLE TYPE
A - Auger
C - Core
D - Denison
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

FILE No. **12366**

PREPARED By: **JJ/SK**

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

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SUMMARY LOG

Geotechnical and Materials Engineering

TEST HOLE No. **AH11-09**

Project **HWY 1 EASTBOUND TRUCK CLIMBING LANE**

Location **N5,440,587/E534,073** Elevation **83.1m**

Driller **Sea To Sky** Method **Solid Stem Auger** Dates **2011-10-17**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	Other Tests
		Bag	-	-		(50)	(50)	(0)	-	-	-	(SP-GP)	Asphalt Pavement 0.13m compact moist brown SAND and GRAVEL (38mm diameter gravel) 0.33m	
		Bag	-	-		(0)	(100)	(0)	-	-	-	(SP)	compact moist brown SAND 0.76m	
	1													
		Bag	-	-		(0)	(100)	(0)	-	-	-	(SP)		
	2												compact to dense moist grey SAND	
		Bag	-	-		(0)	(100)	(0)	-	-	-	(SP)	3.05m	
	3												End of Borehole	
	4													
	5													
	6													
	7													
	8													
	9													

SAMPLE TYPE
A - Auger
C - Core
D - Denison
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

FILE No. **12366**

PREPARED By: **JJ/SK**

SHEET 1 of 1

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

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SUMMARY LOG

Geotechnical and Materials Engineering

TEST HOLE No. **AH11-10**

Project **HWY 1 EASTBOUND TRUCK CLIMBING LANE**

Location **N5,440,759/E533,814**

Elevation **77.9m**

Driller **Sea To Sky** Method **Solid Stem Auger** Dates **2011-10-18**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	Other Tests
												(TS)	Topsoil/Moss 0.03m	
	1	Bag	-	-		(0)	(100)	(0)	-	-	-	(SP)		
	2													
	3	Bag	-	-		(0)	(100)	(0)	-	-	-	(SP)		
	4	Bag	-	-		(0)	(100)	(0)	-	-	-	(SP)	compact to dense moist brown SAND	
	5													
	6	Bag	-	-		(0)	(100)	(0)	-	-	-	(SP)		
	7													
	8	Bag	-	-		(0)	(100)	(0)	-	-	-	(SP)		
	9	Bag	-	-		(0)	(100)	(0)	-	-	-	(SP)	9.14m	
													End of Borehole	

SAMPLE TYPE
A - Auger
C - Core
D - Denison
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

FILE No. **12366**

PREPARED By: **JJ/SK**

SHEET 1 of 1

Blowcount = Standard Penetration Test (ASTM-1586)

NOTE: Brackets ( ) denote Driller's estimate

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SUMMARY LOG

Geotechnical and Materials Engineering

TEST HOLE No. **AH11-11**

Project **HWY 1 EASTBOUND TRUCK CLIMBING LANE**

Location **N5,440,730/E533,865**

Elevation **80.5m**

Driller **Sea To Sky** Method **Solid Stem Auger** Dates **2011-10-18**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	Other Tests
												(TS)	Topsoil/Moss 0.03m	
	1	Bag	-	-		(0)	(100)	(0)	-	-	-	(SP)		
	2													
	3	Bag	-	-		(0)	(100)	(0)	-	-	-	(SP)		
	4	Bag	-	-		(0)	(100)	(0)	-	-	-	(SP)	compact to dense moist brown SAND	
	5													
	6	Bag	-	-		(0)	(100)	(0)	-	-	-	(SP)		
	7													
	8	Bag	-	-		(0)	(100)	(0)	-	-	-	(SP)		
	9	Bag	-	-		(0)	(100)	(0)	-	-	-	(SP)	9.14m	
													End Of Borehole	

SAMPLE TYPE
A - Auger
C - Core
D - Denison
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

FILE No. **12366**

PREPARED By: **JJ/SK**

SHEET 1 of 1

Blowcount = Standard Penetration Test (ASTM-1586)

NOTE: Brackets ( ) denote Driller's estimate

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SUMMARY LOG

Geotechnical and Materials Engineering

TEST HOLE No. **AH11-12**

Project **HWY 1 EASTBOUND TRUCK CLIMBING LANE**

Location **N5,440,684/E533,942**

Elevation **82.2m**

Driller **Sea To Sky** Method **Solid Stem Auger** Dates **2011-10-18**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	Other Tests
												(TS)	Topsoil/Moss 0.04m	
	1	Bag	-	-		(0)	(100)	(0)	-	-	-	(SP)		
	2													
	3	Bag	-	-		(0)	(100)	(0)	-	-	-	(SP)		
	4	Bag	-	-		(0)	(100)	(0)	-	-	-	(SP)	compact to dense moist brown SAND	
	5													
	6	Bag	-	-		(0)	(100)	(0)	-	-	-	(SP)		
	7	Bag	-	-		(0)	(100)	(0)	-	-	-	(SP)		
	8													
	9	Bag	-	-		(0)	(100)	(0)	-	-	-	(SP)	9.14m	
													End Of Borehole	

SAMPLE TYPE
A - Auger
C - Core
D - Denison
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

FILE No. **12366**

PREPARED By: **JJ/SK**

SHEET 1 of 1

Blowcount = Standard Penetration Test (ASTM-1586)

NOTE: Brackets ( ) denote Driller's estimate

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SUMMARY LOG

Geotechnical and Materials Engineering

TEST HOLE No. **AH11-13**

Project **HWY 1 EASTBOUND TRUCK CLIMBING LANE**

Location **N5,440,332/E534,506** Elevation **85.6m**

Driller **Sea To Sky** Method **Solid Stem Auger** Dates **2011-10-17**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	Other Tests
		Bag	-	-		(40)	(60)	(0)	-	-	-	(SP-GP)	Asphalt Pavement 0.1m compact moist brown SAND and GRAVEL (25mm diameter gravel) 0.61m	
	1	Bag	-	-		(60)	(40)	(0)	-	-	-	(GP)	compact to dense moist brown SAND and GRAVEL (75mm diameter cobbles) 1.52m	
	2	Bag	-	-		(65)	(35)	(0)	-	-	-	(GP)	compact moist grey SAND and GRAVEL (100mm diameter cobbles) 3.05m	
	3												End of Borehole	
	4													
	5													
	6													
	7													
	8													
	9													

SAMPLE TYPE
A - Auger
C - Core
D - Denison
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

FILE No. **12366**

PREPARED By: **JJ/SK**

SHEET 1 of 1

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

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SUMMARY LOG

Geotechnical and Materials Engineering

TEST HOLE No. **AH11-14**

Project **HWY 1 EASTBOUND TRUCK CLIMBING LANE**

Location **N5,440,077/E534,938** Elevation **87.6m**

Driller **Sea To Sky** Method **Solid Stem Auger** Dates **2011-10-17**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	Other Tests
		Bag	-	-		(50)	(50)	(0)	-	-	-	(SP-GP)	Asphalt Pavement 0.1m compact moist brown SAND and GRAVEL (50mm diameter gravel) 0.61m	
	1	Bag	-	-		-	-	-	-	-	-	(ML)	stiff moist grey-brown CLAYEY SILT 1.07m	
		Bag	-	-		(0)	(20)	(80)	-	-	-	(ML)	very stiff moist brown SANDY SILT 2.29m	
	2													
	3	Bag	-	-		(0)	(5)	(95)	-	-	-	(ML)	very stiff moist grey-brown SILT, trace sand 3.05m	
													End of Borehole	
	4													
	5													
	6													
	7													
	8													
	9													

SAMPLE TYPE
A - Auger
C - Core
D - Denison
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

FILE No. **12366**

PREPARED By: **JJ/SK**

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

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SUMMARY LOG

Geotechnical and Materials Engineering

TEST HOLE No. **AH11-14A**

Project **HWY 1 EASTBOUND TRUCK CLIMBING LANE**

Location **As Staked**

Driller **Sea To Sky** Method **Solid Stem Auger**

Elevation

Dates **2011-10-17**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	Other Tests
													Asphalt Pavement 0.25m	
		Bag	-	-		(40)	(60)	(0)	-	-	-	(SP-GP)	compact moist brown SAND and GRAVEL (13mm diameter gravel) 0.61m	
	1												stiff moist brown SILT, some sand	
		Bag	-	-		(0)	(10)	(90)	-	-	-	(ML)	1.52m	
													End of Borehole	
	2													
	3													
	4													
	5													
	6													
	7													
	8													
	9													

SAMPLE TYPE
A - Auger
C - Core
D - Denison
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

FILE No. **12366**

PREPARED By: **JJ/SK**

SHEET 1 of 1

Blowcount = Standard Penetration Test (ASTM-1586)

NOTE: Brackets ( ) denote Driller's estimate

SUMMARY LOG 232 TO 264.GPJ BC_MOT.GDT 12-2-15

Ministry of Transportation

SUMMARY LOG

Geotechnical and Materials Engineering

TEST HOLE No. **AH11-15**

Project **HWY 1 EASTBOUND TRUCK CLIMBING LANE**

Location **N5,439,823/E535,368** Elevation **89.2m**

Driller **Sea To Sky** Method **Solid Stem Auger** Dates **2011-10-17**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	Other Tests
		Bag	-	-		(55)	(45)	(0)	-	-	-	(GP)	Asphalt Pavement 0.1m compact moist brown SAND and GRAVEL (25mm diameter gravel) 0.36m	
		Bag	-	-		(0)	(100)	(0)	-	-	-	(SP)	compact moist brown SAND 0.61m	
	1													
		Bag	-	-		(0)	(0)	(100)	-	-	-	(CL)	firm to stiff moist grey SILTY CLAY	
	2													
		Bag	-	-		(0)	(0)	(100)	-	-	-	(CL)	3.05m	
	3												End of Borehole	
	4													
	5													
	6													
	7													
	8													
	9													

SAMPLE TYPE
A - Auger
C - Core
D - Denison
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

FILE No. **12366**

PREPARED By: **JJ/SK**

SHEET 1 of 1

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

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SUMMARY LOG

Geotechnical and Materials Engineering

TEST HOLE No. **AH11-16**

Project **HWY 1 EASTBOUND TRUCK CLIMBING LANE**

Location **N5,439,571/E535,795**

Elevation **90.8m**

Driller **Sea To Sky** Method **Solid Stem Auger** Dates **2011-10-17**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	Other Tests
		Bag	-	-		(55)	(45)	(0)	-	-	-	(GP)	Asphalt Pavement 0.1m compact moist brown SAND and GRAVEL (50mm diameter gravel) 0.51m	
	1	Bag	-	-		(0)	(10)	(90)	-	-	-	(ML)	stiff moist brown CLAYEY SILT, some sand 1.68m	
	2												stiff moist grey SILTY CLAY	
	3	Bag	-	-		(0)	(0)	(100)	-	-	-	(CL)	3.05m End Of Borehole	
	4													
	5													
	6													
	7													
	8													
	9													

SAMPLE TYPE
A - Auger
C - Core
D - Denison
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

FILE No. **12366**

PREPARED By: **JJ/SK**

SHEET 1 of 1

Blowcount = Standard Penetration Test (ASTM-1586)

NOTE: Brackets ( ) denote Driller's estimate

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TEST HOLE No. **AH11-17**

Project **HWY 1 EASTBOUND TRUCK CLIMBING LANE**

Location **N5,439,316/E536,227** Elevation **92.1m**

Driller **Sea To Sky** Method **Solid Stem Auger** Dates **2011-10-17**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	Other Tests
		Bag	-	-		(60)	(40)	(0)	-	-	-	(GP)	Asphalt Pavement 0.1m compact moist brown SAND and GRAVEL, with cobbles (63mm diameter gravel to 150mm diameter cobbles) 0.61m	
	1	Bag	-	-		(0)	(10)	(90)	-	-	-	(ML)	stiff moist brown CLAYEY SILT, trace to some sand	
	2													
	3	Bag	-	-		(0)	(0)	(100)	-	-	-	(ML)	3.05m	
													End of Borehole	
	4													
	5													
	6													
	7													
	8													
	9													

SAMPLE TYPE
A - Auger
C - Core
D - Denison
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
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TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

FILE No. **12366**

PREPARED By: **JJ/SK**

SHEET 1 of 1

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

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Geotechnical and Materials Engineering

TEST HOLE No. **AH11-17A**

Project **HWY 1 EASTBOUND TRUCK CLIMBING LANE**

Location **As Staked**

Elevation

Driller **Sea To Sky** Method **Solid Stem Auger** Dates **2011-10-17**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	Other Tests
		Bag	-	-		(70)	(30)	(0)	-	-	-	(GP)	Asphalt Pavement 0.18m compact moist brown SANDY GRAVEL, with cobbles (63mm diameter gravel to 150mm diameter of cobbles) 0.46m Refusal	

1 2 3 4 5 6 7 8 9

SAMPLE TYPE
A - Auger
C - Core
D - Denison
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

FILE No. **12366**

PREPARED By: **JJ/SK**

SHEET 1 of 1

Blowcount = Standard Penetration Test (ASTM-1586) NOTE: Brackets ( ) denote Driller's estimate

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SUMMARY LOG

Geotechnical and Materials Engineering

TEST HOLE No. **TH11-01**

Project **HWY 1 EASTBOUND TRUCK CLIMBING LANE**

Location **N5,441,515/E532,500**

Elevation **55.1m**

Driller **Sea To Sky** Method **Wash Rotary** Dates **2011-10-16**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	Other Tests
													Asphalt Pavement 0.1m	
Driving a rock (plug sampler)	1	S	55	0.076		(60)	(40)	(0)	-	-	-	(GP)		
	2												very dense moist grey SAND and GRAVEL, with cobbles (25mm diameter gravel, cobbles diameter unknown)	
	3	S	42	0		-	-	-	-	-	-	(GP)		
	4	S	47	0.102		(70)	(30)	(0)	-	-	-	(GP)		
	5												5.49m	
	6	S	29	0.305		(20)	(80)	(0)	-	-	-	(SP)	compact moist grey GRAVELLY SAND	
	7												7.01m	
	8	S	30	0.305		(0)	(100)	(0)	-	-	-	(SP)	compact to dense moist brown SAND	
	9	S	65	0.406		(0)	(100)	(0)	-	-	-	(SP)		
													9.75m	

SAMPLE TYPE
A - Auger
C - Core
D - Denison
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

FILE No. **12366**

PREPARED By: **JJ/SK**

Blowcount = Standard Penetration Test (ASTM-1586)

NOTE: Brackets ( ) denote Driller's estimate

SHEET 1 of 2

SUMMARY LOG 232 TO 264.GPJ BC_MOT.GDT 12-2-15

Ministry of Transportation

SUMMARY LOG

Geotechnical and Materials Engineering

TEST HOLE No. **TH11-01**

Project **HWY 1 EASTBOUND TRUCK CLIMBING LANE**

Location **N5,441,515/E532,500**

Elevation **55.1m**

Driller **Sea To Sky** Method **Wash Rotary** Dates **2011-10-16**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	Other Tests
		S	>62	0		-	-	-	-	-	-	(GP)	very dense moist grey SAND, with cobbles (cobbles diameter unknown) 10.67m *(continued)* End of Borehole	
	11													
	12													
	13													
	14													
	15													
	16													
	17													
	18													
	19													

SAMPLE TYPE
A - Auger
C - Core
D - Denison
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

Blowcount = Standard Penetration Test (ASTM-1586)

NOTE: Brackets ( ) denote Driller's estimate

FILE No. **12366**

PREPARED By: **JJ/SK**

SHEET 2 of 2

SUMMARY LOG 232 TO 264.GPJ BC_MOT.GDT 12-2-15

Ministry of Transportation

SUMMARY LOG

Geotechnical and Materials Engineering

TEST HOLE No. **TH11-02**

Project **HWY 1 EASTBOUND TRUCK CLIMBING LANE**

Location **N5,441,349/E532,781**

Elevation **54.5m**

Driller **Sea To Sky** Method **Wash Rotary** Dates **2011-10-17**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	Other Tests
													Asphalt Pavement 0.15m	
	1	S	49	0.305		(20)	(80)	(0)	-	-	-	(SP-GP)	dense moist grey-brown GRAVELLY SAND (40mm diameter gravel)	
	2												2.13m	
	3	S	21	0.305		(0)	(100)	(0)	-	-	-	(SP)		
	4	S	17	0.305		(0)	(100)	(0)	-	-	-	(SP)	compact moist grey SAND	
	5													
	6	S	44	0.254		(0)	(100)	(0)	-	-	-	(SP)		
Sampler Refusal - 1 Cobble found	7												7.16m	
		S	95	0.229		(20)	(80)	(0)	-	-	-	(SP-GP)		
	8												very dense moist grey GRAVELLY SAND (50mm diameter gravel)	
	9	S	67	0.254		(30)	(70)	(0)	-	-	-	(SP-GP)		

SAMPLE TYPE
A - Auger
C - Core
D - Denison
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

FILE No. **12366**

PREPARED By: **JJ/SK**

Blowcount = Standard Penetration Test (ASTM-1586)

NOTE: Brackets ( ) denote Driller's estimate

SHEET 1 of 2

SUMMARY LOG 232 TO 264.GPJ BC_MOT.GDT 12-2-15

Ministry of Transportation

SUMMARY LOG

Geotechnical and Materials Engineering

TEST HOLE No. **TH11-02**

Project **HWY 1 EASTBOUND TRUCK CLIMBING LANE**

Location **N5,441,349/E532,781**

Elevation **54.5m**

Driller **Sea To Sky** Method **Wash Rotary** Dates **2011-10-17**

Drilling Details	Depth (m)	Sample Type	Blowcount	Recovery (m)	Shear Strength (kPa)	Gradation % Gravel	Gradation % Sand	Gradation % Fines	Index Properties w_L	Index Properties w_P	Index Properties w	Classification	Description	Other Tests
													10.06m	
		S	46	0.356		(0)	(100)	(0)	-	-	-	(SP)	dense moist grey SAND	
													10.97m	
	11												End of Borehole	
	12													
	13													
	14													
	15													
	16													
	17													
	18													
	19													

SAMPLE TYPE
A - Auger
C - Core
D - Denison
S - Split Spoon
T - Shelby Tube
W - Wash

SHEAR STRENGTH kPa
U - Unconfined Compression
F_V - Field Vane
L_V - Lab Vane
R - Remoulded

TESTS
M - Mechanical Analysis
Q, R, S - Triaxial Compression
C - Consolidation
DS - Direct Shear
w_L, w_P - Liquid, Plastic Limits
w - Moisture Content

FILE No. **12366**

PREPARED By: **JJ/SK**

SHEET 2 of 2

Blowcount = Standard Penetration Test (ASTM-1586)

NOTE: Brackets ( ) denote Driller's estimate

SUMMARY LOG 232 TO 264.GPJ BC_MOT.GDT 12-2-15

THURBER

2010 EXP Test Hole and CPT Logs

Appendix A

Geotechnical Testhole Records

2010: AH10-1 though 10-4

2010: CPT10-1, 10-2, & 10-4BH10-01, AH10-02 through 10-05

Augerhole no. : AH10-1

Location : See Location Plan

Ground Surface Elevation : +25.5m (±) [Geodetic, approx.]

Ground Water Elevation : Water not observed at time of drilling
(at time of investigation)

Equipment : Truck mounted drill rig, piston sampler

Method of sampling: ○ GRAB

▨ PISTON TUBE (3.5")

Depth (ft)	Depth (m)	SPT 'N'	symbol	Description	sample no.	moisture content %	Remarks
0	0		○	brown SAND & GRAVEL trace silt (FILL)	S1	7	Asphalt Thickness = 6" (±)
			○	stiff grey CLAEY SILT occasional organics	S2	34	
	1		○	v.stiff to stiff, mottled grey-rust CLAYEY SILT / SILTY CLAY	S3	33	Hole caved in at 2.7m depth
5	2		○	-reduced mottling with depth, becomes grey -softens with depth	S4	41	
10	3		○	firm to soft, blue-grey SILTY CLAY	S5	58	
	4		○		S6	76	
15	5		○		S7	54	
20	6						
	7		○		S8	50	
25	8						
			○		S9	46	
30	9			End of Hole @ 9.1m (30')			
35	10						
	11						
40	12						
	13						
45	14						
	15						
50							

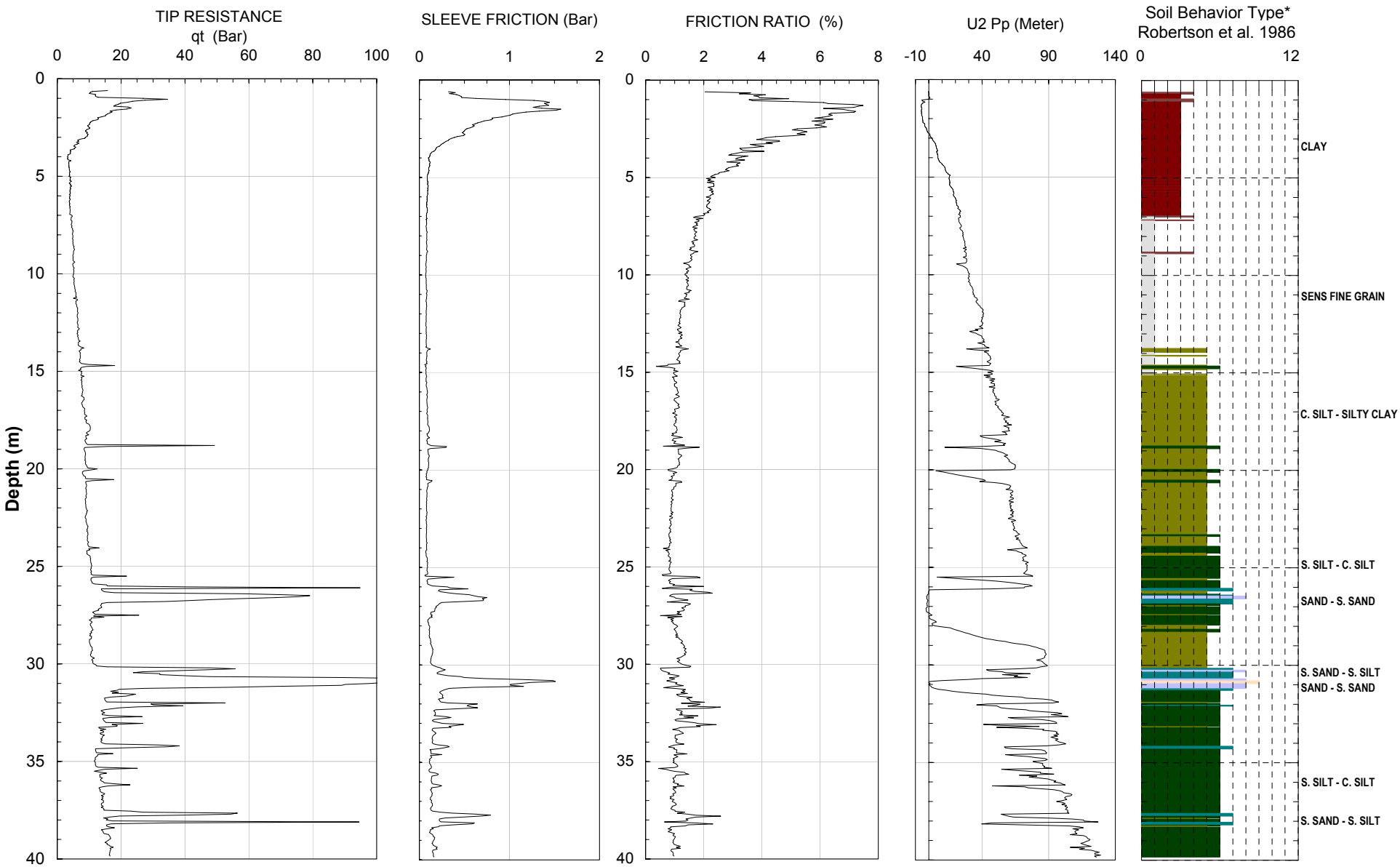
AECOM		TROW ASSOCIATES INC.	
PROPOSED CANADIAN PACIFIC RAILWAY OVERPASS; 232 STREET, LANGLEY, B.C.	Augerhole No. AH10-1	Logged by: MB	Date of Drilling: 2010-FEB-04
		Sheet: 1 of 1	Dwg No. 091-02125-AH1

Trow

Operator: Dynamic Drilling Inc.
Sounding: CPT10 - 1
Cone ID: HT1094 10 Ton

Date: February 3, 2010
Site: 232nd Street Grade Separation
Trow Project No: 091 - 02125

DYNAMIC DRILLING INC.
IN-SITU TESTING SERVICES



Maximum Depth = 39.85 meters

Depth Increment = 0.05 meters

1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

Augerhole no. : AH10-2

Location : See Location Plan

Ground Surface Elevation : +24.5m (±) [Geodetic, approx.]

Ground Water Elevation : Water not observed at time of drilling
(at time of investigation)

Equipment : Truck mounted drill rig, piston sampler

Method of sampling: ○ GRAB

▨ PISTON TUBE (3.5")

Depth (ft)	Depth (m)	SPT 'N'	symbol	Description	sample no.	moisture content %	Remarks
0	0			brown SAND & GRAVEL trace silt (FILL)			Asphalt Thickness = 3" (±)
				stiff grey CLAEY SILT occasional organics			
	1		○	v.stiff to stiff, mottled grey-rust CLAYEY SILT / SILTY CLAY	S10	33	
5							
	2		▨	-reduced mottling with depth, becomes grey -softens with depth			Consolidation Test Limits: L(w) = 54% P(w) = 22%
10	3		○	firm to soft, blue-grey SILTY CLAY	S11	50	
	4		○		S12	47	
15							
	5		▨				Consolidation Test Limits: L(w) = 35% P(w) = 16%
20	6						
	7		○		S13	42	
25							
	8						
30	9		○	-small sand pocket @8.8m depth	S14	51	
	10		▨	-occasional small sand pockets below 10m depth			Consolidation Test Limits: L(w) = 39% P(w) = 17%
35	11						
	12		○		S15	44	
40				-occasional black horizons visible within silty clay material			
	13						
45							
	14						Consolidation Test Limits: L(w) = 38% P(w) = 13%
			▨	End of Hole @ 14.3m (47')			
50	15						

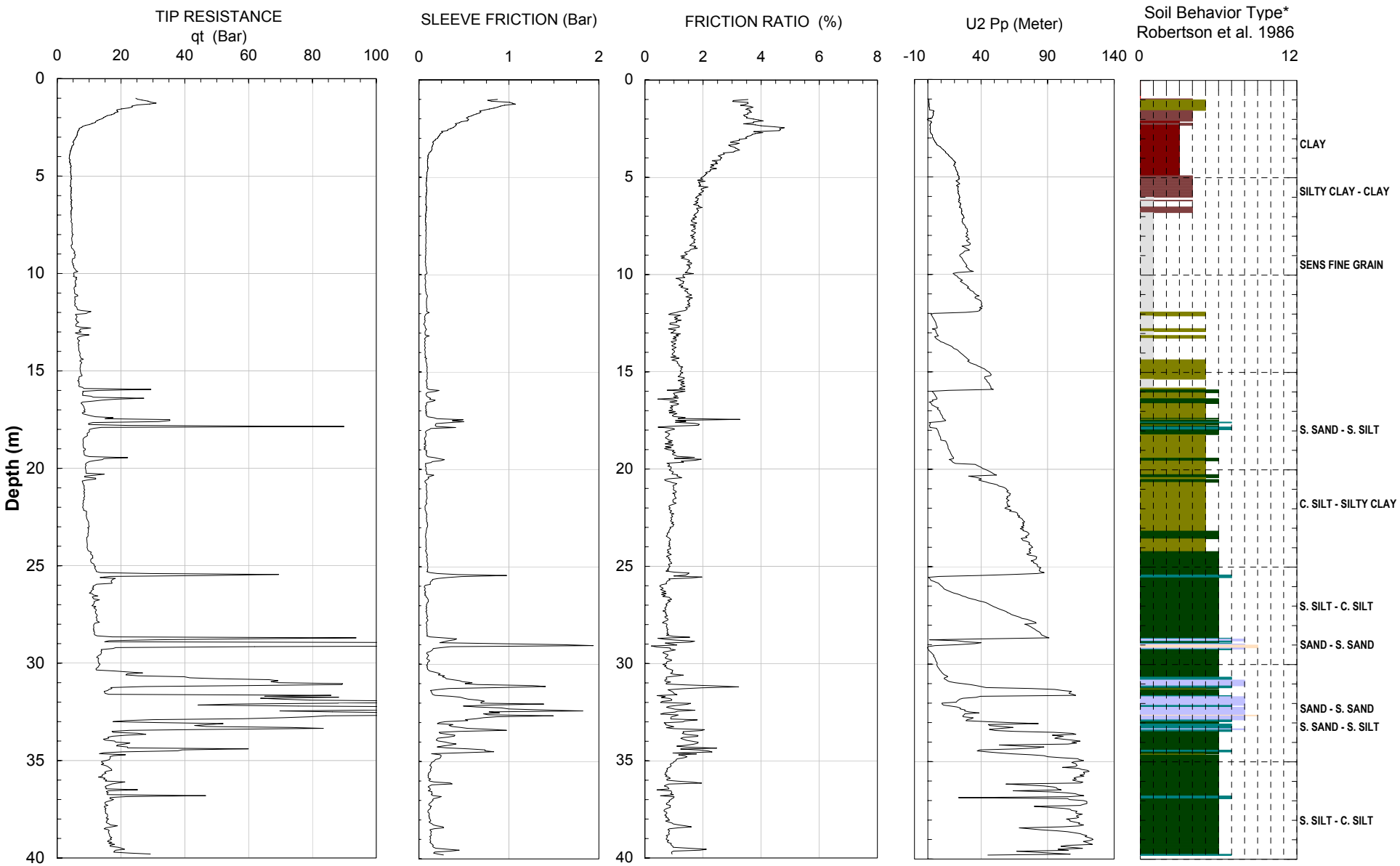
AECOM	TROW ASSOCIATES INC.		
PROPOSED CANADIAN PACIFIC RAILWAY OVERPASS; 232 STREET, LANGLEY, B.C.	Augerhole No. AH10-2	Logged by: MB	Date of Drilling: 2010-FEB-04
		Sheet: 1 of 1	Dwg No. 091-02125-AH2

Trow

Operator: Dynamic Drilling Inc.
Sounding: CPT10 - 2
Cone ID: HT1094 10 Ton

Date: February 3, 2010
Site: 232nd Street Grade Separation
Trow Project No: 091 - 02125

DYNAMIC DRILLING INC.
IN-SITU TESTING SERVICES



Maximum Depth = 39.80 meters

Depth Increment = 0.05 meters

1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

Augerhole no. : AH10-3

Location : See Location Plan

Ground Surface Elevation : +23.7m (±) [Geodetic, approx.]

Ground Water Elevation : Water not observed at time of drilling
(at time of investigation)

Equipment : Truck mounted drill rig, piston sampler

Method of sampling: ○ GRAB

▨ PISTON TUBE (3.5")

Depth (ft)	Depth (m)	SPT 'N'	symbol	Description	sample no.	moisture content %	Remarks
0	0			brown SAND & GRAVEL trace silt (FILL)			Asphalt Thickness = 3" (±)
				stiff grey CLAEY SILT occasional organics			
	1		○	v.stiff to stiff, mottled grey-rust CLAYEY SILT / SILTY CLAY	S16	36	
5							
	2		○	-reduced mottling with depth, becomes grey -softens with depth	S17	38	
10	3						
	4		○	firm to soft, blue-grey SILTY CLAY	S18	38	
15							
	5		○		S19	37	
20	6						
	7		○		S20	43	
			○	-occasional sand pockets below 7m	S21	25	
25	8						
			○		S22	40	
30	9						
				End of Hole @ 9.1m (30')			
35	10						
	11						
40	12						
	13						
45	14						
	15						
50							

AECOM	TROW ASSOCIATES INC.		
PROPOSED CANADIAN PACIFIC RAILWAY OVERPASS; 232 STREET, LANGLEY, B.C.	Augerhole No. AH10-3	Logged by: MB	Date of Drilling: 2010-FEB-04
		Sheet: 1 of 1	Dwg No. 091-02125-AH3

Augerhole no. : AH10-4

Location : See Location Plan

Ground Surface Elevation : +23.0m (±) [Geodetic, approx.]

Ground Water Elevation : Water not observed at time of drilling
(at time of investigation)

Equipment : Truck mounted drill rig, piston sampler

Method of sampling: ○ GRAB

▨ PISTON TUBE (3.5")

Depth (ft)	Depth (m)	SPT 'N'	symbol	Description	sample no.	moisture content %	Remarks
0	0			0.15m of SAND & GRAVEL trace silt (FILL)			Hole caved at 5.0m
				underlain by			
	1		○	stiff grey CLAEY SILT occasional organics	S23	33	
5				v.stiff to stiff, mottled grey-rust CLAYEY SILT / SILTY CLAY			
	2		○	-reduced mottling with depth, becomes grey	S24	45	
10	3			-softens with depth			
				firm to soft, blue-grey SILTY CLAY			
	4		○		S25	48	
15	5		○		S26	44	
20	6						
	7		○		S27	35	
25	8		○	-occasional sand pockets below 8m	S28	30	
30	9			-irregular zones of SILTY material below 9m			
	10		○		S29	39	
35	11						
	12		○		S30	38	
40	13		○		S31	42	
45	14		○		S32	40	
50	15						

AECOM		TROW ASSOCIATES INC.	
PROPOSED CANADIAN PACIFIC RAILWAY OVERPASS; 232 STREET, LANGLEY, B.C.	Augerhole No. AH10-4	Logged by: MB	Date of Drilling: 2010-FEB-04
		Sheet: 1 of 2	Dwg No. 091-02125-AH4

Augerhole no. : AH10-4

Location : See Location Plan

Ground Surface Elevation : +23.0m (±) [Geodetic, approx.]

Ground Water Elevation : Water not observed at time of drilling
(at time of investigation)

Equipment : Truck mounted drill rig, piston sampler

Method of sampling: ○ GRAB

▨ PISTON TUBE (3.5")

Depth (ft)	Depth (m)	SPT 'N'	symbol	Description	sample no.	moisture content %	Remarks
50				firm to soft, blue-grey SILTY CLAY			
	16		○	-occasional sand pockets -irregular zones of SILTY material	S33	39	
55	17						
	18		○		S34	38	
60				End of Hole @ 18.3m (60')			
	19						
65	20						
	21						
70							
	22						
75	23						
	24						
80							
	25						
85	26						
	27						
90							
	28						
95	29						
100							

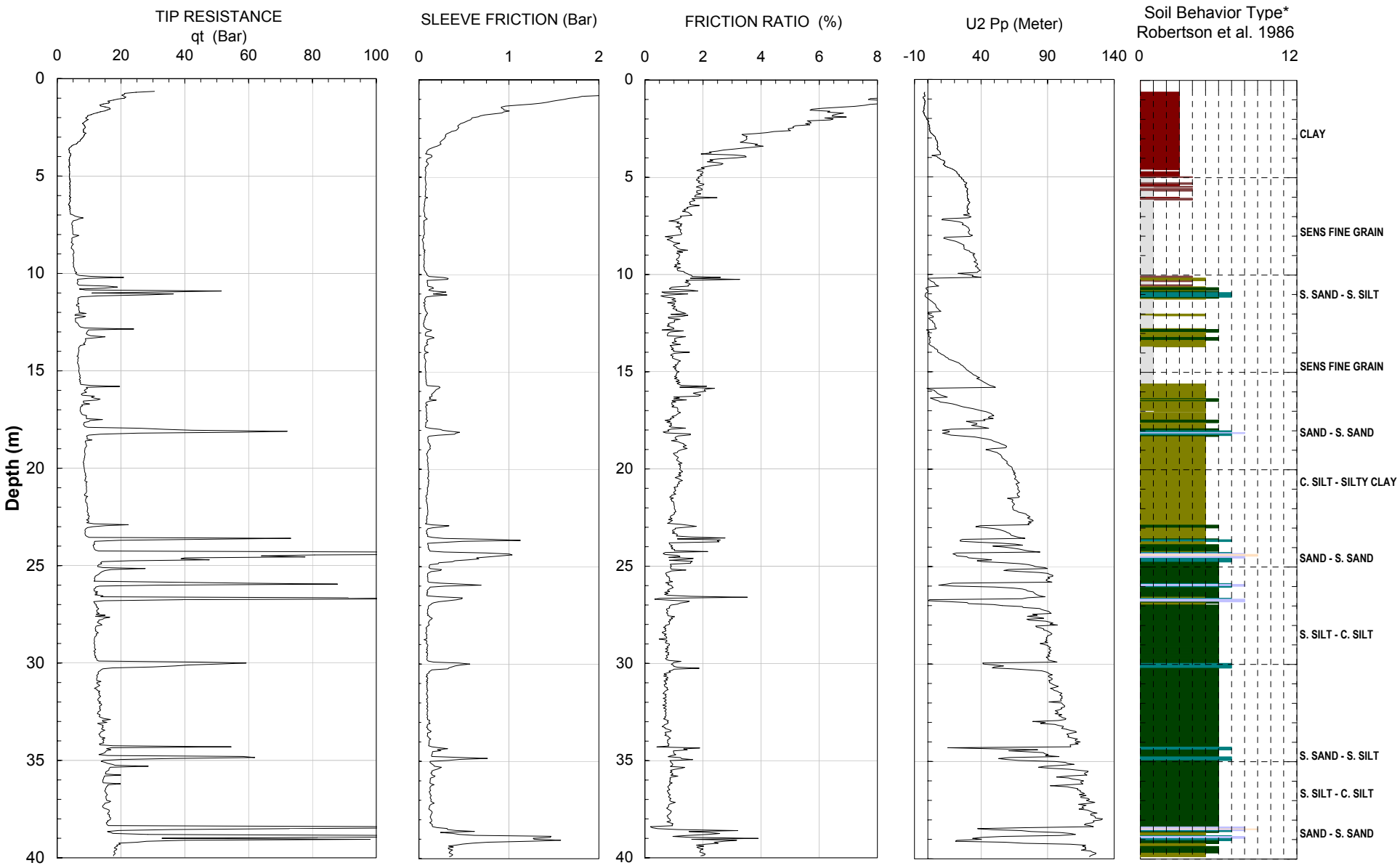
AECOM		TROW ASSOCIATES INC.	
PROPOSED CANADIAN PACIFIC RAILWAY OVERPASS; 232 STREET, LANGLEY, B.C.	Augerhole No. AH10-4	Logged by: MB	Date of Drilling: 2010-FEB-04
		Sheet: 2 of 2	Dwg No. 091-02125-AH4

Trow

Operator: Dynamic Drilling Inc.
Sounding: CPT10 - 4
Cone ID: HT1094 10 Ton

Date: February 3, 2010
Site: 232nd Street Grade Separation
Trow Project No: 091 - 02125

DYNAMIC DRILLING INC.
IN-SITU TESTING SERVICES



Maximum Depth = 39.90 meters

Depth Increment = 0.05 meters

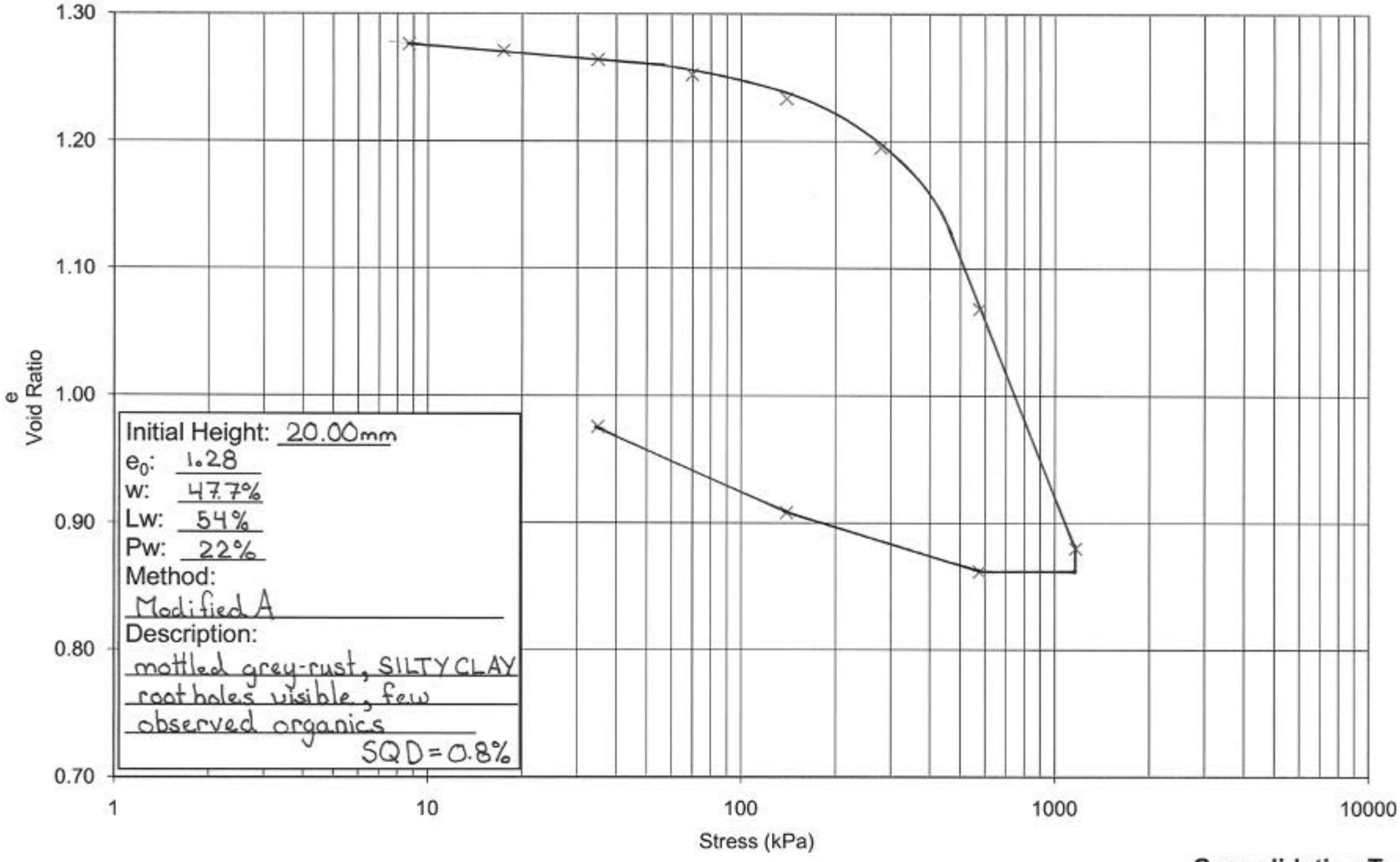
1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

THURBER

2010 EXP Laboratory Test Results

Appendix B

Consolidation Test Results

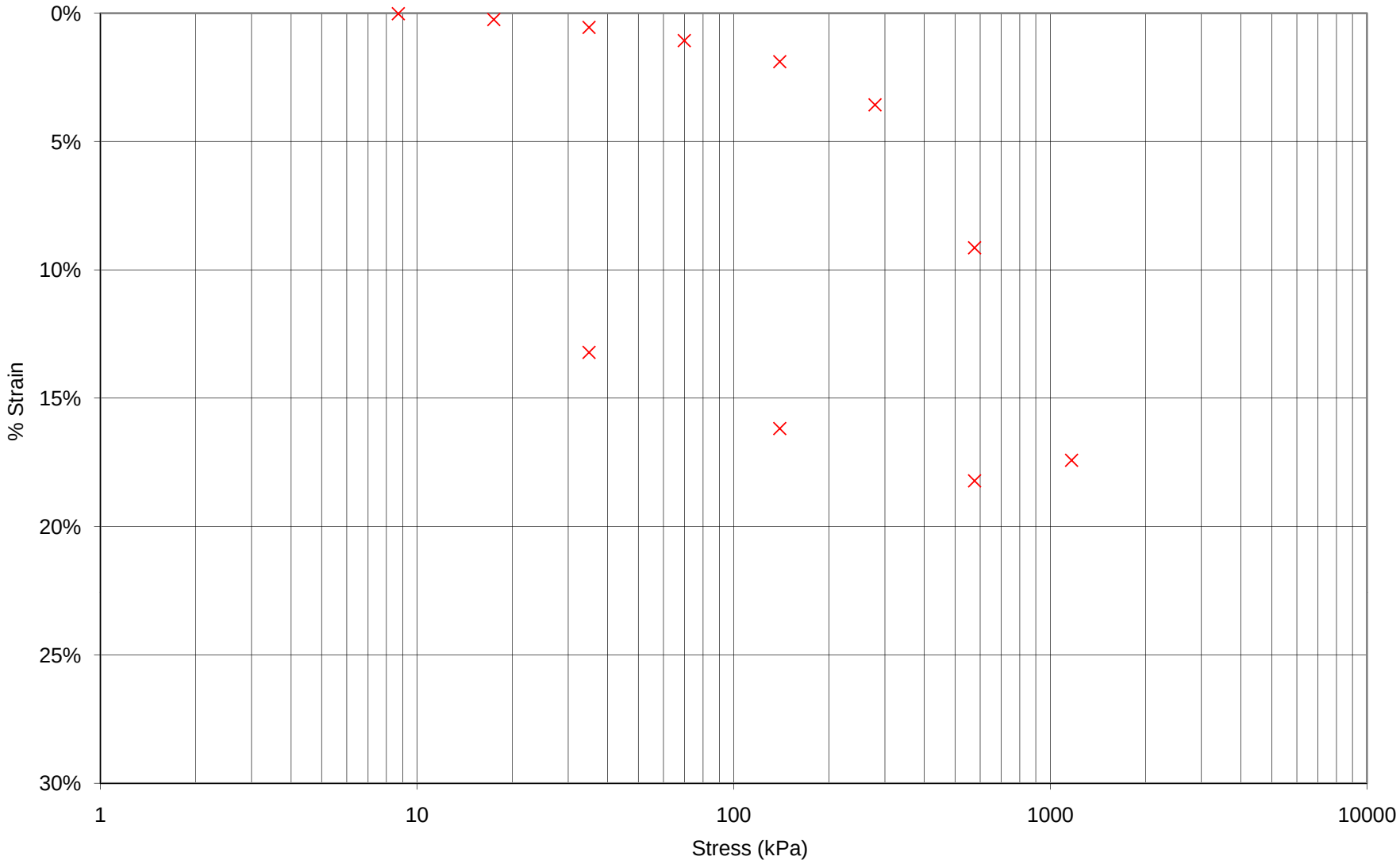


Trow

Consolidation Test
e – log p Graph

Borehole: AH10-2
Sample: S1
Depth: 2.60m

Project #: 091-02125
Date: 2010-02-09



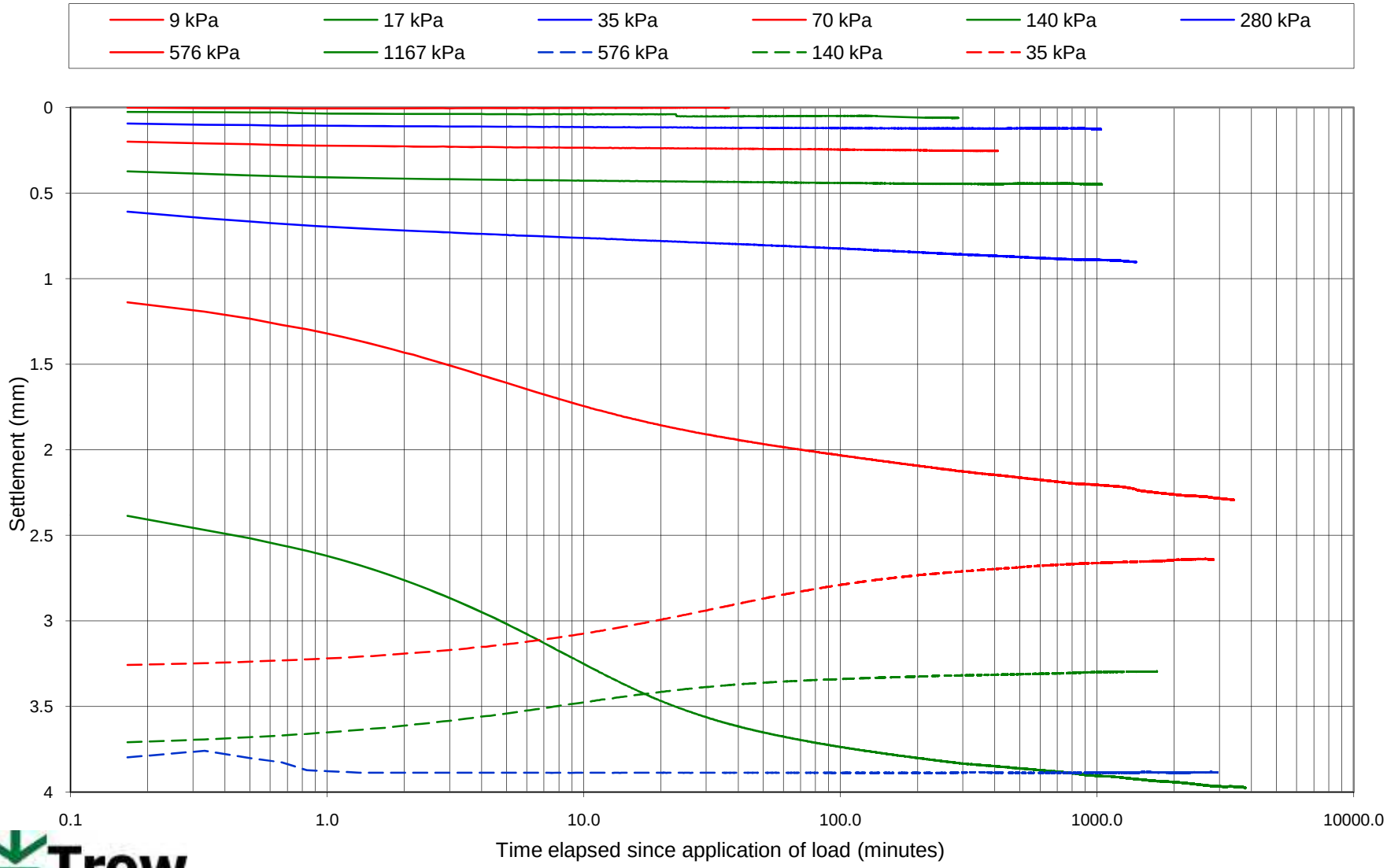
Trow

Consolidation Test
% strain – log p Graph

Borehole: AH10-2
Sample: S1
Depth: 2.60m

Project #: 091-02125
Date: 2010-02-09

091-02125 Consolidation Time Rate of Settlement: AH10-2 / 2.60m / A



Trow

Sample Dimensions

			(Initial)	(End)	
H_o =	20 mm	Ring	65.27	65.27	g
D_o =	63.5 mm	Soil+Ring (w)	178.06	171.32	g
A =	31.67 cm^2	Soil+Ring (d)	141.78	141.78	g
V_o =	63.34 cm^3	Water	36.28	29.54	g
G_s =	2.75	Soil	76.51	76.51	g
H_s =	8.79 mm	w(%)	47.4%	38.6%	
		Saturation		1.02	

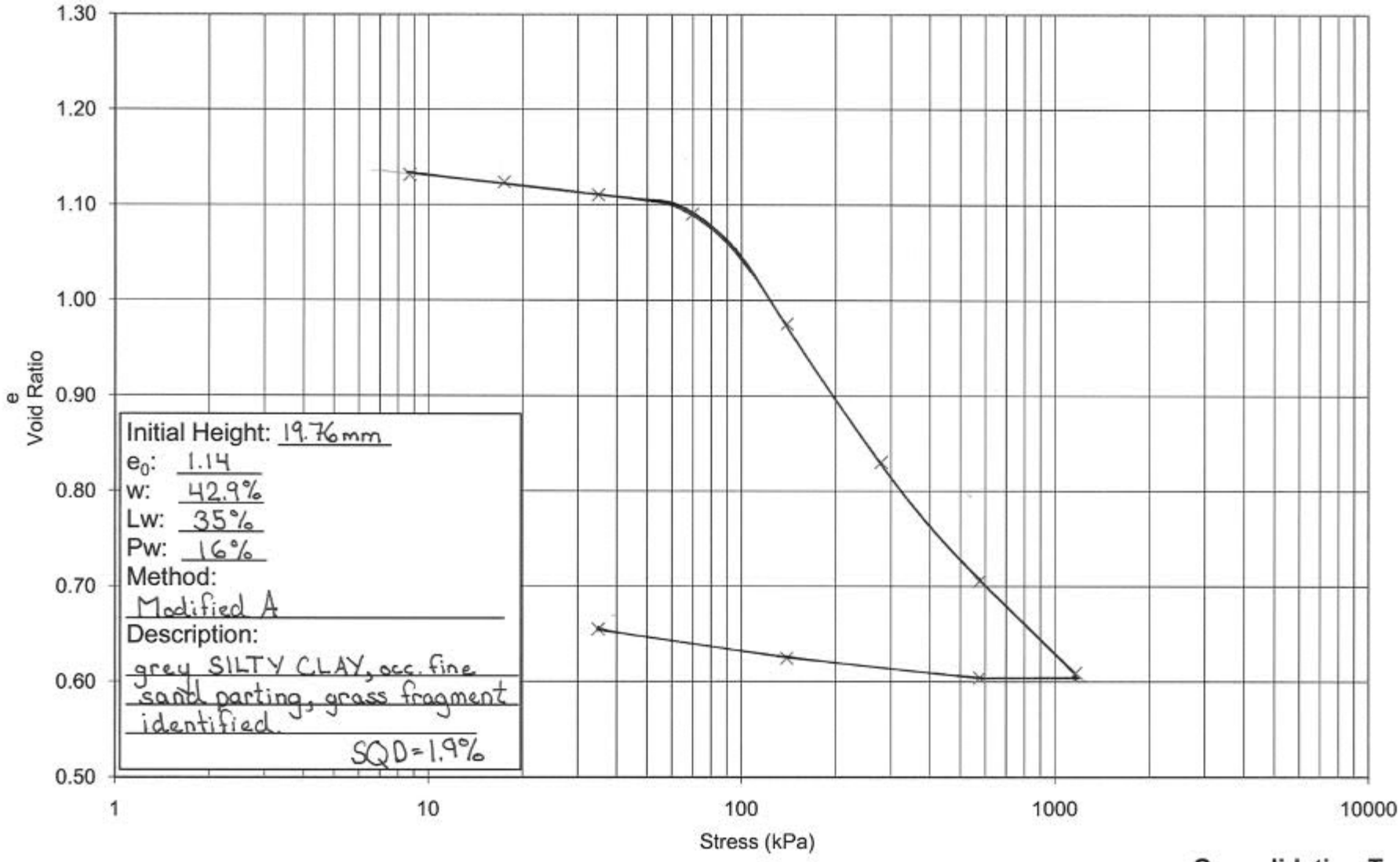
Moisture Content of Cuttings

Tin	157.84		g
Tin+Soil (w)	285.77		g
Tin+Soil (d)	246.1		g
Water	39.67		g
Soil	88.26		g
w(%)	44.9%		

Total Load (kg)	Pressure (kPa)	Correction (mm)	Deformation (mm)	delta-H (mm)	Strain %	H (H_o - delta-H)	H-H_s	e (H-H_s)/H_s	t_{100} for e-log(p)	t_{90} for Cv	Cv (cm^2/s)
			0	0	0.0%	20	11.21	1.28			
0.375	8.7309	0.0011	0.0066	0.01	0.0%	19.99445357	11.21	1.28	40		
0.75	17.4618	0.0011	0.0517	0.05	0.3%	19.94942069	11.16	1.27	40		
1.5	34.9236	0.0072	0.1187	0.11	0.6%	19.88847692	11.10	1.26	40	0.36	3.88E-02
3	69.8472	0.0261	0.2415	0.22	1.1%	19.78457647	11.00	1.25	40	1	1.38E-02
6	139.793	0.0577	0.4358	0.38	1.9%	19.62186667	10.84	1.23	40	0.7225	1.88E-02
12	279.585	0.0840	0.7981	0.71	3.6%	19.2859	10.50	1.20	40	1	1.31E-02
24	575.847	0.1145	1.9435	1.83	9.1%	18.1709875	9.39	1.07	40	6.76	1.73E-03
50	1167.39	0.1311	3.6150	3.48	17.4%	16.51612674	7.73	0.88	40	16	6.02E-04
24	575.847	0.1145	3.7591	3.64	18.2%	16.3553875	7.57	0.86			
6	139.793	0.0577	3.2938	3.24	16.2%	16.76386667	7.98	0.91			
1.5	34.9236	0.0072	2.6503	2.64	13.2%	17.35687692	8.57	0.98			

Trow

Project: 091-02125
Borehole: AH10-2 **Sample:** S1 **Depth:** 2.60m
Consolidometer: A **Linear Voltmeter:** J15487
Method: Modified A
Comments:

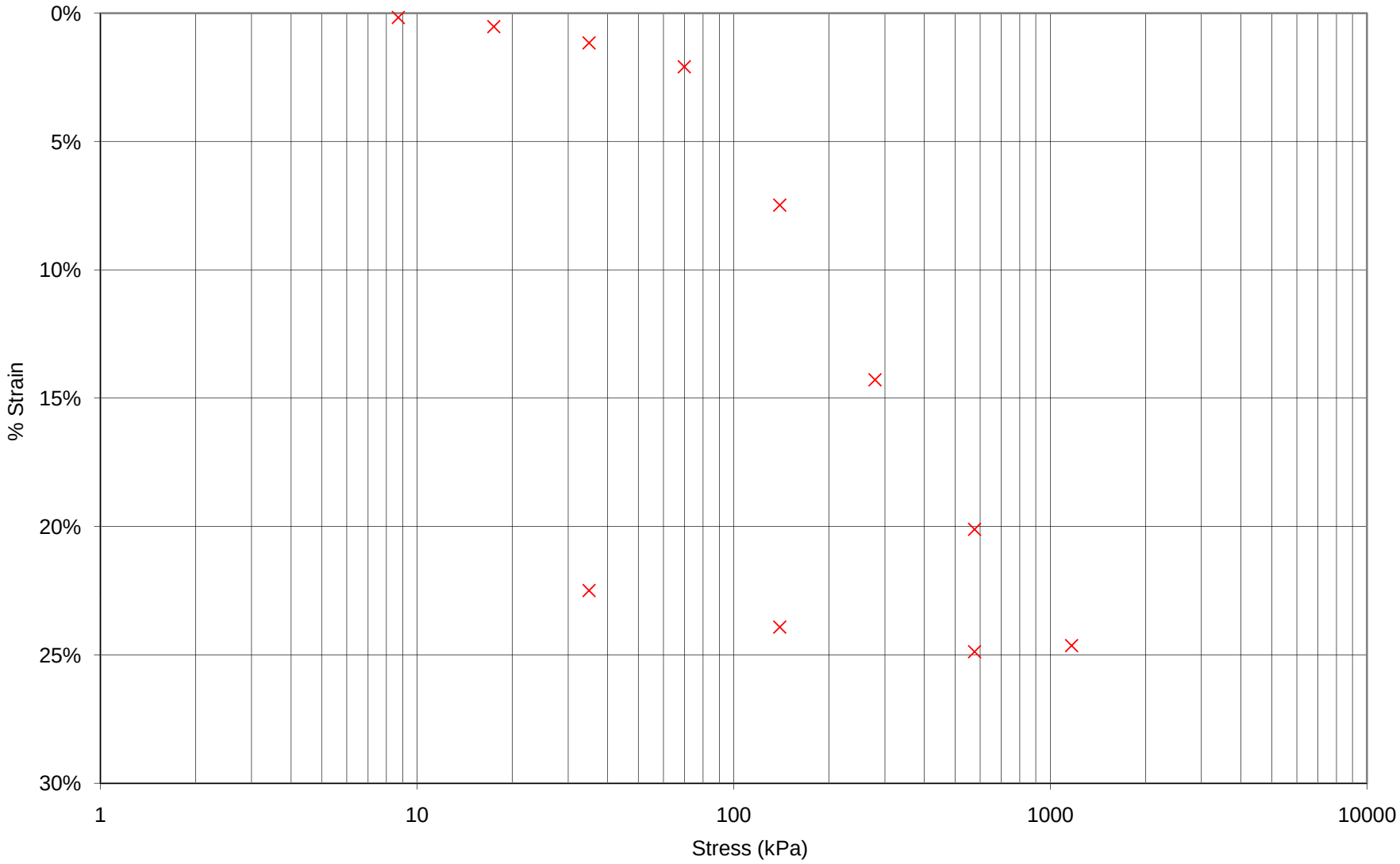


Trow

Consolidation Test
e – log p Graph

Borehole: AH10-2
Sample: S2
Depth: 5.35m

Project #: 091-02125
Date: 2010-02-09



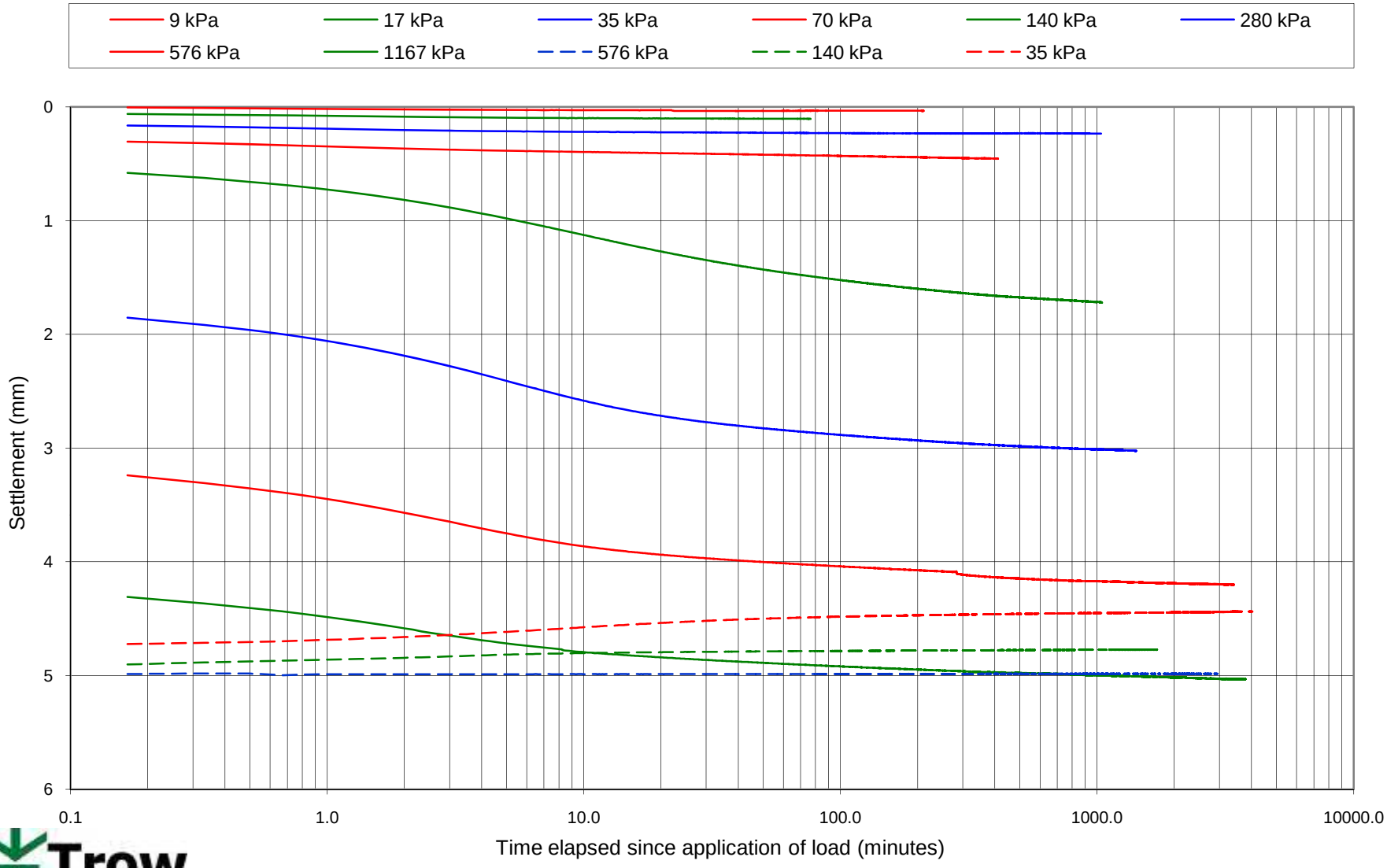
Trow

Consolidation Test
% strain – log p Graph

Borehole: AH10-2
Sample: S2
Depth: 5.35m

Project #: 091-02125
Date: 2010-02-09

091-02125 Consolidation Time Rate of Settlement: AH10-2 / 5.35m / B



Trow

Sample Dimensions

			(Initial)	(End)	
H_o =	19.76 mm	Ring	65.29	65.29	g
D_o =	63.54 mm	Soil+Ring (w)	180.56	167.22	g
A =	31.71 cm^2	Soil+Ring (d)	145.97	145.97	g
V_o =	62.66 cm^3	Water	34.59	21.25	g
G_s =	2.75	Soil	80.68	80.68	g
H_s =	9.25 mm	w(%)	42.9%	26.3%	
		Saturation		1.04	

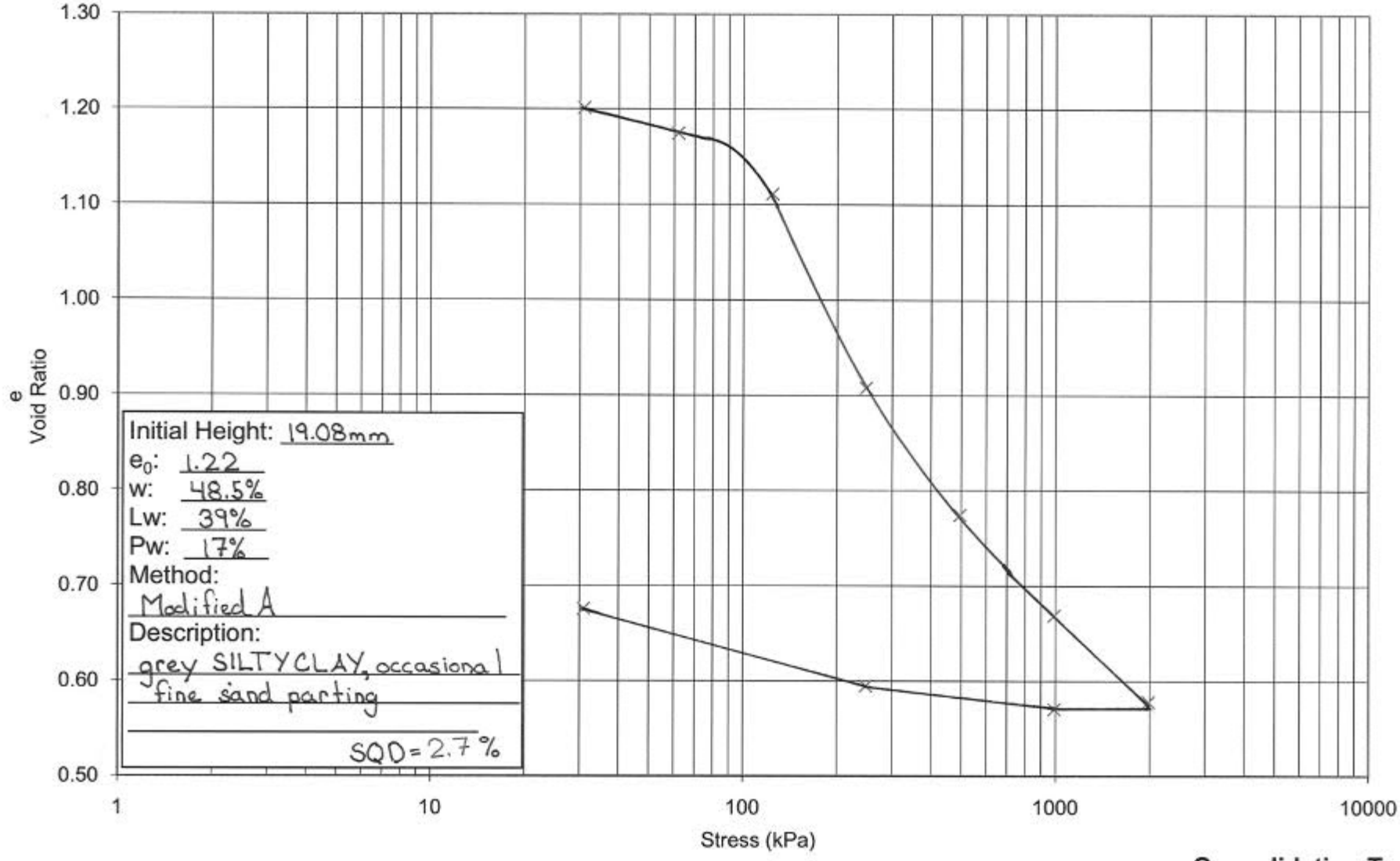
Moisture Content of Cuttings

Tin	148.45		g
Tin+Soil (w)	275.21		g
Tin+Soil (d)	229.23		g
Water	45.98		g
Soil	80.78		g
w(%)	56.9%		

Total Load (kg)	Pressure (kPa)	Correction (mm)	Deformation (mm)	delta-H (mm)	Strain %	H (H_o - delta-H)	H-H_s	e (H-H_s)/H_s	t_{100} for e-log(p)	t_{90} for Cv	Cv (cm^2/s)
			0	0	0.0%	19.76	10.51	1.14			
0.375	8.7309	0.0005	0.034	0.03	0.2%	19.72652083	10.47	1.13	100		
0.75	17.4618	0.0010	0.1059	0.10	0.5%	19.65507931	10.40	1.12	100		
1.5	34.9236	0.0028	0.2315	0.23	1.2%	19.53125	10.28	1.11	100		
3	69.8472	0.0180	0.4306	0.41	2.1%	19.34738125	10.10	1.09	100	1	1.32E-02
6	139.793	0.0450	1.5241	1.48	7.5%	18.28092667	9.03	0.98	100	9	1.31E-03
12	279.585	0.0619	2.884	2.82	14.3%	16.93785	7.69	0.83	100	10.24	9.90E-04
24	575.847	0.0661	4.0402	3.97	20.1%	15.78590952	6.53	0.71	100	6.76	1.30E-03
50	1167.39	0.0509	4.9198	4.87	24.6%	14.89111081	5.64	0.61	100	6.25	1.25E-03
24	575.847	0.0661	4.9811	4.91	24.9%	14.84500952	5.59	0.60			
6	139.793	0.0450	4.7708	4.73	23.9%	15.03422667	5.78	0.62			
1.5	34.9236	0.0028	4.4465	4.44	22.5%	15.31625	6.06	0.66			

Trow

Project: 091-02125
Borehole: AH10-2 **Sample:** S2 **Depth:** 5.35m
Consolidometer: B **Linear Voltmeter:** J15192
Method: Modified A
Comments:

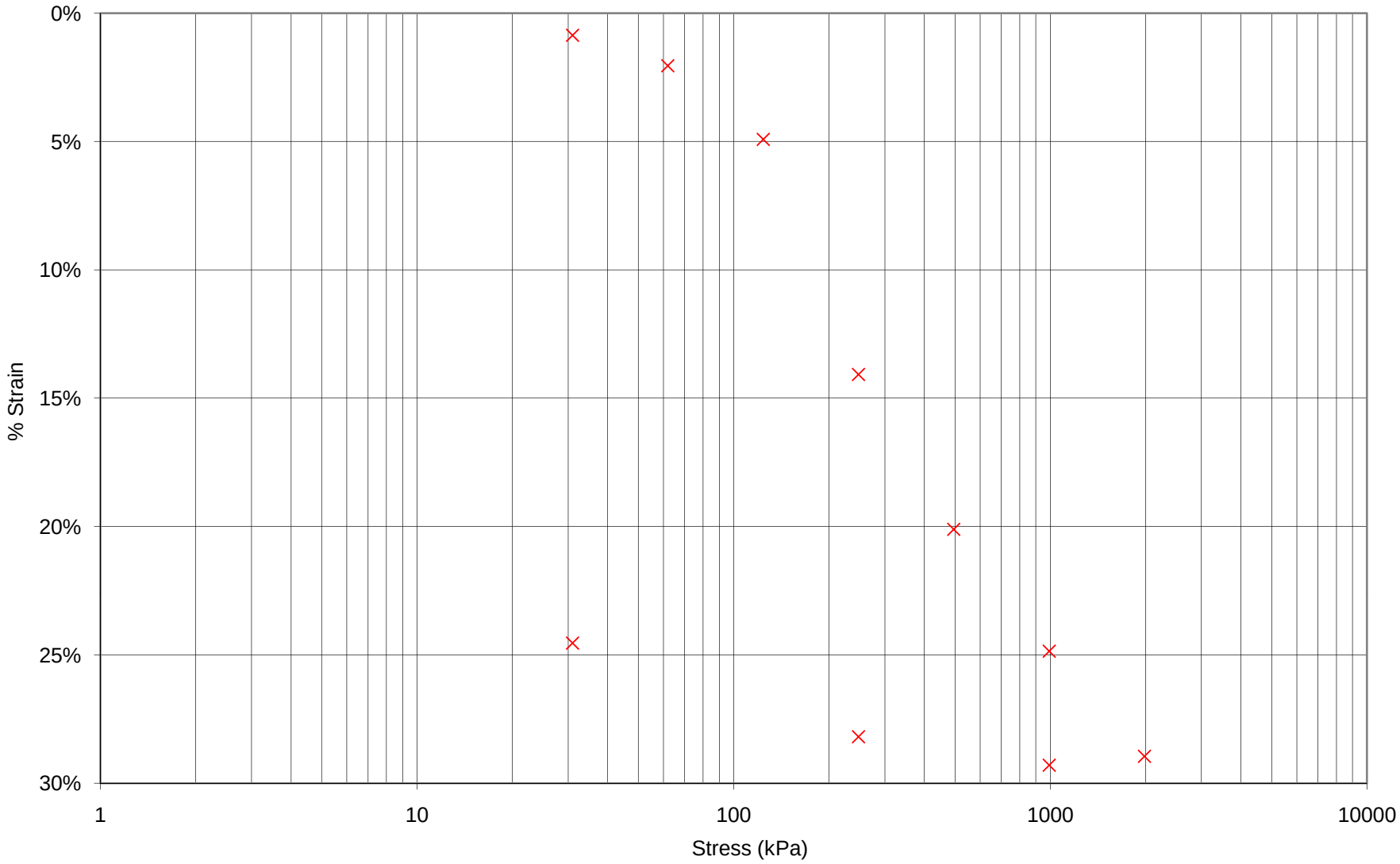


Trow

Borehole: AH10-2
Sample: S3
Depth: 10.26m

Consolidation Test
e – log p Graph

Project #: 091-02125
Date: 2010-02-09



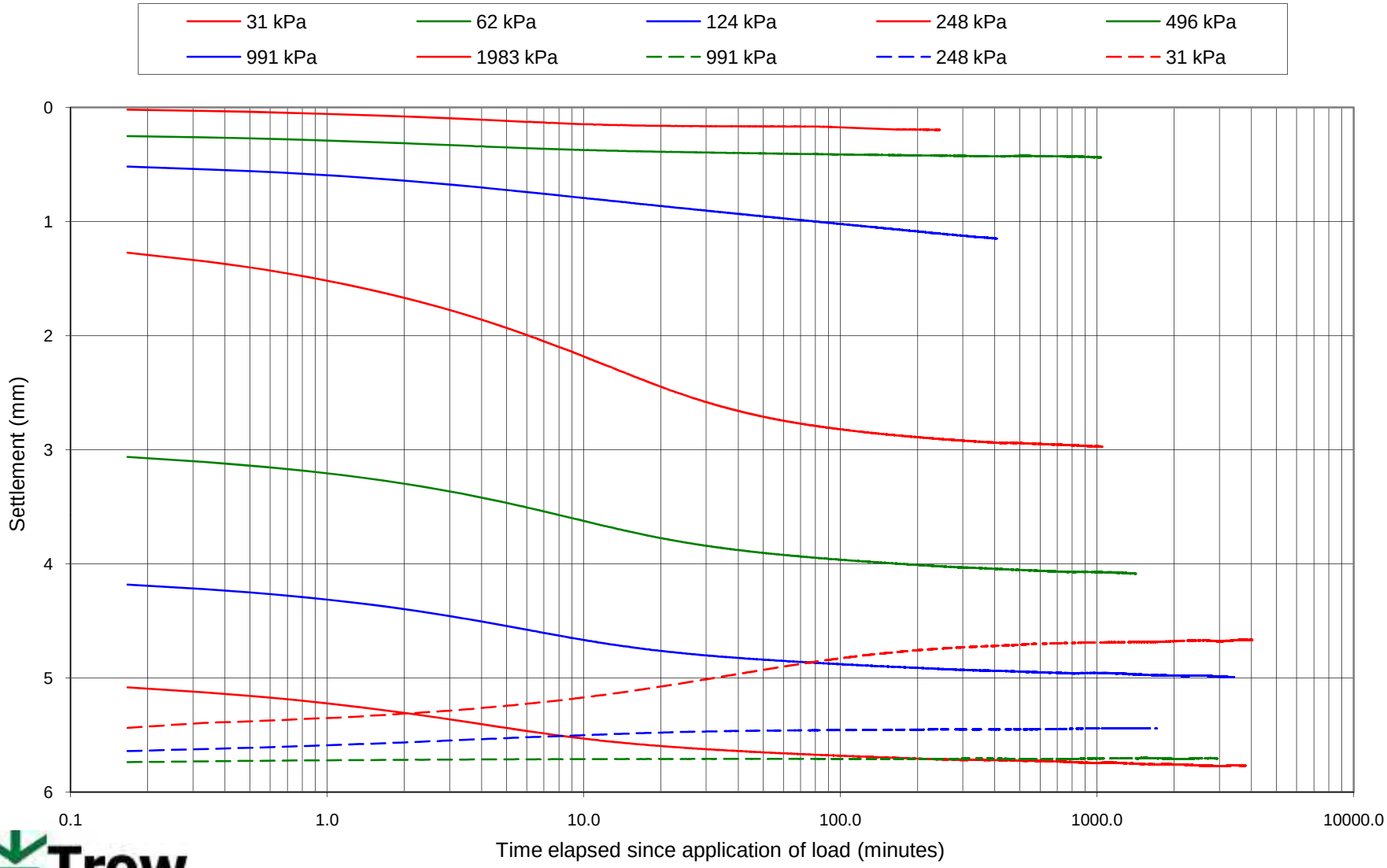
Trow

Consolidation Test
% strain – log p Graph

Borehole: AH10-2
Sample: S3
Depth: 10.26m

Project #: 091-02125
Date: 2010-02-09

091-02125 Consolidation Time Rate of Settlement: AH10-2 / 10.23m / C



Trow

Sample Dimensions

			(Initial)	(End)	
H_o =	19.08 mm	Ring	134.64	134.64	g
D_o =	63.05 mm	Soil+Ring (w)	244.14	228.71	g
A =	31.22 cm^2	Soil+Ring (d)	208.4	208.4	g
V_o =	59.57 cm^3	Water	35.74	20.31	g
G_s =	2.75	Soil	73.76	73.76	g
H_s =	8.59 mm	w(%)	48.5%	27.5%	
		Saturation		1.09	

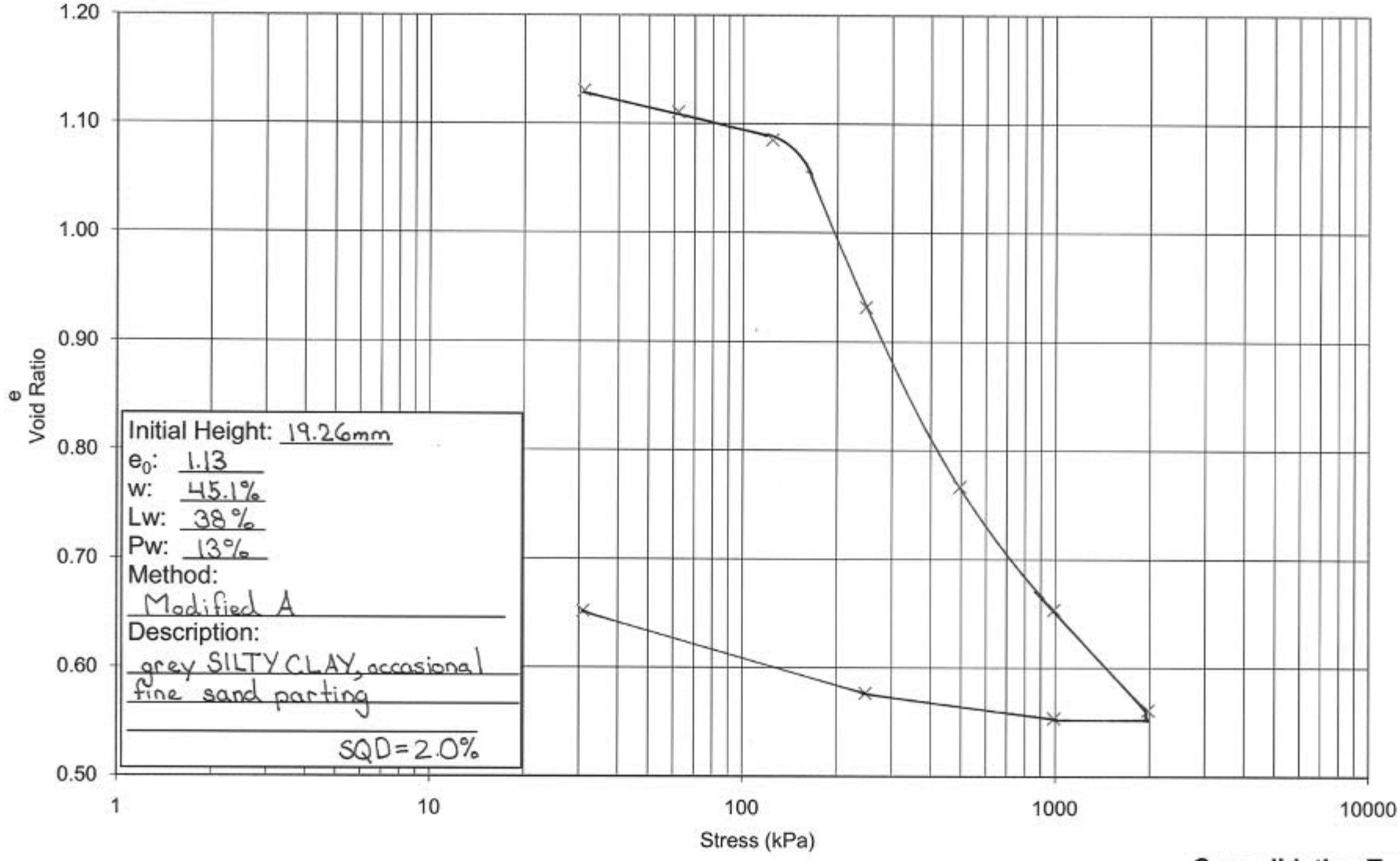
Moisture Content of Cuttings

Tin	158.23		g
Tin+Soil (w)	258.38		g
Tin+Soil (d)	227.43		g
Water	30.95		g
Soil	69.2		g
w(%)	44.7%		

Total Load (kg)	Pressure (kPa)	Correction (mm)	Deformation (mm)	delta-H (mm)	Strain %	H (H_o - delta-H)	H-H_s	e (H-H_s)/H_s	t_{100} for e-log(p)	t_{90} for Cv	Cv (cm^2/s)
			0	0	0.0%	19.08	10.49	1.22			
1	30.98	0.0006	0.1661	0.17	0.9%	18.91447778	10.32	1.20	60		
2	61.96	0.0130	0.4053	0.39	2.1%	18.68771563	10.10	1.18	60	4	3.08E-03
4	123.92	0.0341	0.9721	0.94	4.9%	18.14201111	9.55	1.11	60	10.89	1.07E-03
8	247.84	0.0599	2.7453	2.69	14.1%	16.3945871	7.80	0.91	60	22.54	4.21E-04
16	495.68	0.0847	3.9208	3.84	20.1%	15.24395	6.65	0.77	60	19.36	4.24E-04
32	991.36	0.1083	4.85	4.74	24.9%	14.33831429	5.75	0.67	60	13.3225	5.45E-04
64	1982.72	0.1350	5.6591	5.52	29.0%	13.55586774	4.97	0.58	60	9	7.21E-04
32	991.36	0.1083	5.6980	5.59	29.3%	13.49031429	4.90	0.57			
8	247.84	0.0599	5.4386	5.38	28.2%	13.7012871	5.11	0.59			
1	30.98	0.0006	4.682	4.68	24.5%	14.39857778	5.81	0.68			

Trow

Project: 091-02125
Borehole: AH10-2 **Sample:** S3 **Depth:** 10.23m
Consolidometer: C **Linear Voltmeter:** J15484
Method: Modified A
Comments:

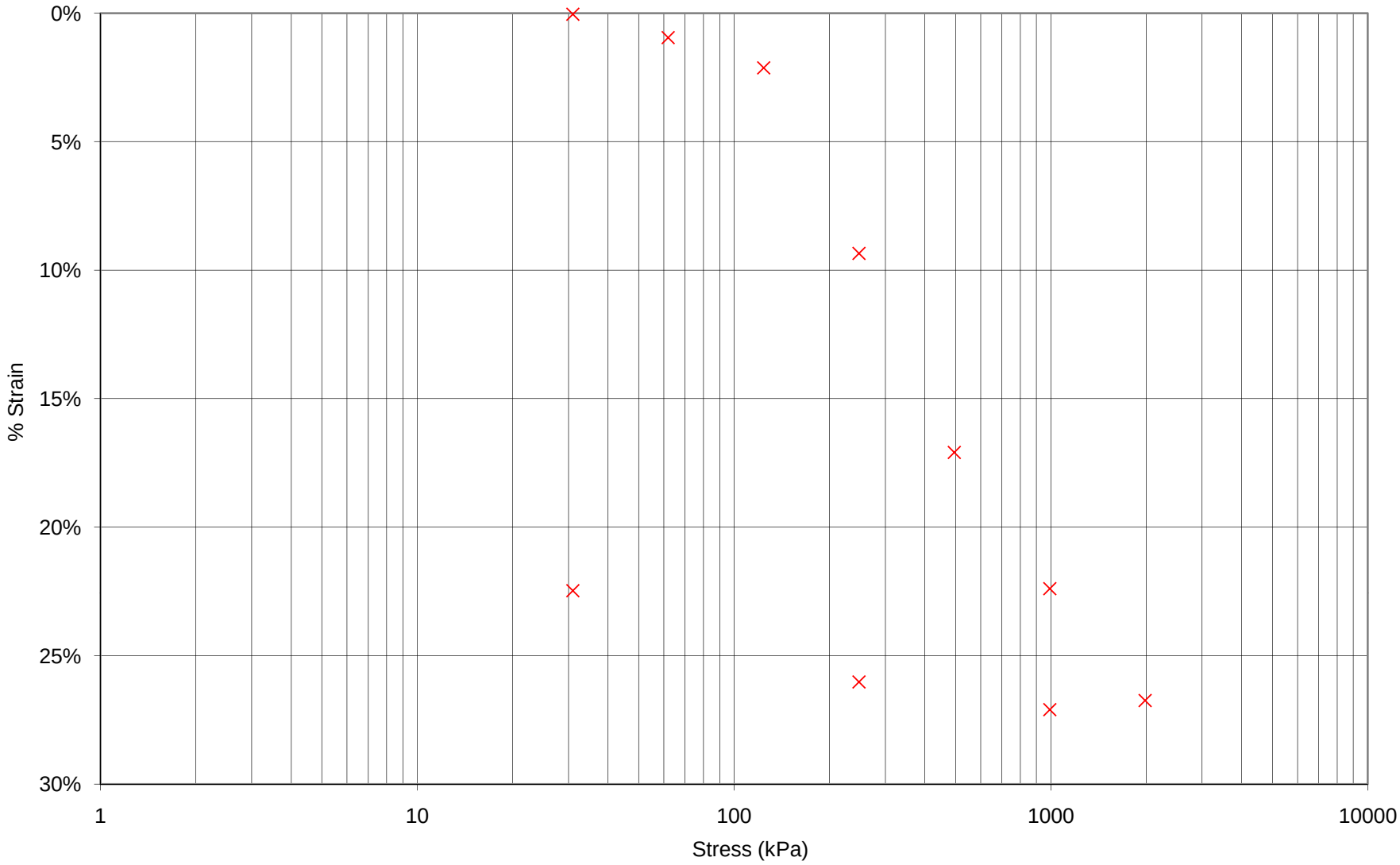


Trow

Borehole: AH10-2
Sample: S4
Depth: 14.36m

Consolidation Test
e – log p Graph

Project #: 091-02125
Date: 2010-02-09



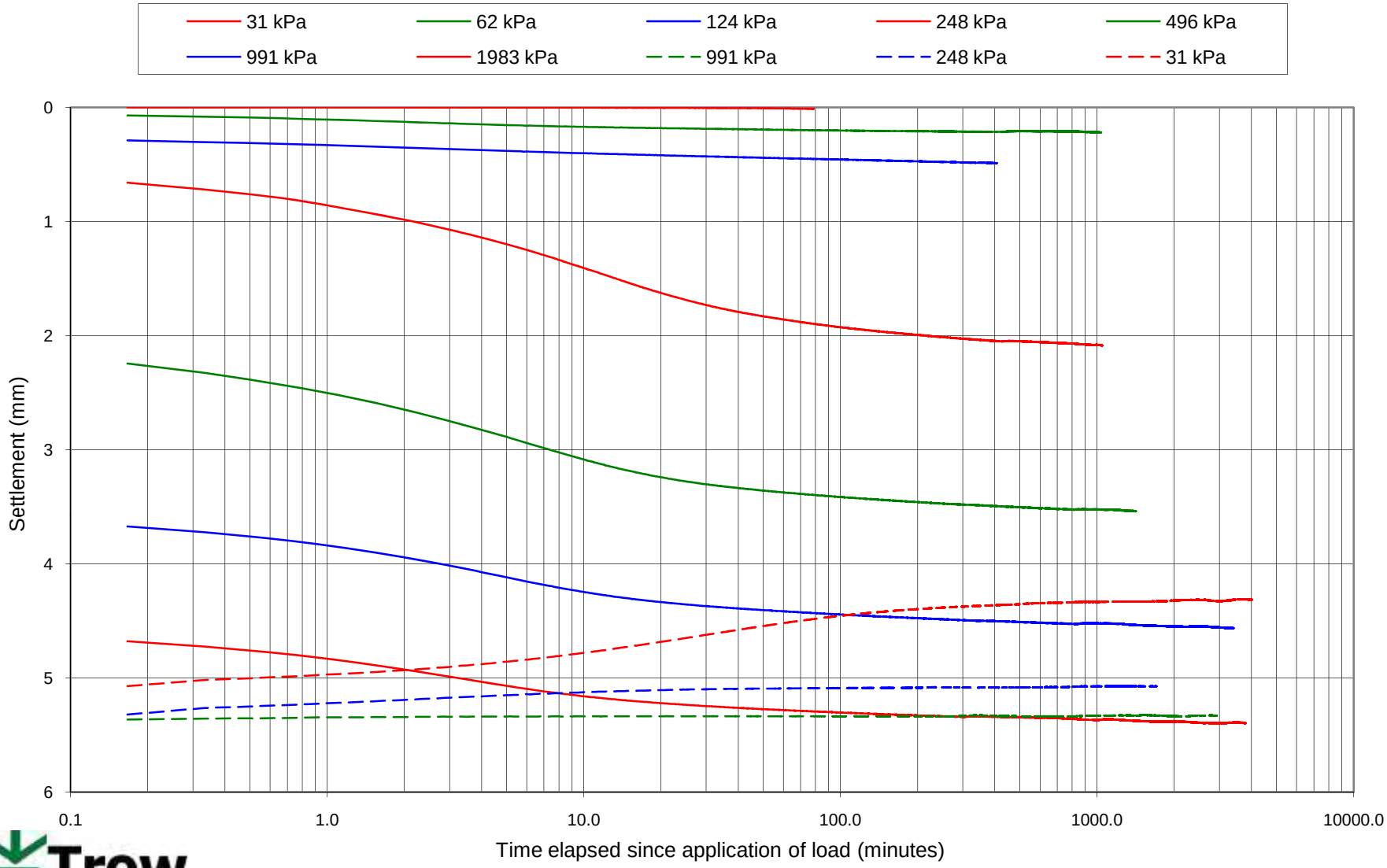
Trow

Consolidation Test
% strain – log p Graph

Borehole: AH10-2
Sample: S4
Depth: 14.36m

Project #: 091-02125
Date: 2010-02-09

091-02125 Consolidation Time Rate of Settlement: AH10-2 / 14.36m / D



Trow

Sample Dimensions

			(Initial)	(End)	
H_o =	19.26 mm	Ring	132.66	132.66	g
D_o =	63.6 mm	Soil+Ring (w)	247.19	233.35	g
A =	31.77 cm^2	Soil+Ring (d)	211.61	211.61	g
V_o =	61.19 cm^3	Water	35.58	21.74	g
G_s =	2.75	Soil	78.95	78.95	g
H_s =	9.04 mm	w(%)	45.1%	27.5%	
		Saturation		1.10	

Moisture Content of Cuttings

Tin	148.85		g
Tin+Soil (w)	246.02		g
Tin+Soil (d)	219.18		g
Water	26.84		g
Soil	70.33		g
w(%)	38.2%		

Total Load (kg)	Pressure (kPa)	Correction (mm)	Deformation (mm)	delta-H (mm)	Strain %	H (H_o - delta-H)	H-H_s	e (H-H_s)/H_s	t_{100} for e-log(p)	t_{90} for Cv	Cv (cm^2/s)
			0	0	0.0%	19.26	10.22	1.13			
1	30.98	0.0005	0.0086	0.01	0.0%	19.25187183	10.22	1.13	60		
2	61.96	0.0128	0.1958	0.18	1.0%	19.07702692	10.04	1.11	60		
4	123.92	0.0357	0.4453	0.41	2.1%	18.85040455	9.81	1.09	60	3.4225	3.67E-03
8	247.84	0.0586	1.8584	1.80	9.3%	17.46018065	8.42	0.93	60	16	6.73E-04
16	495.68	0.0818	3.3739	3.29	17.1%	15.96792258	6.93	0.77	60	9	1.00E-03
32	991.36	0.1028	4.4162	4.31	22.4%	14.94661667	5.91	0.65	60	9	8.77E-04
64	1982.72	0.1308	5.2815	5.15	26.7%	14.1092963	5.07	0.56	60	6.25	1.13E-03
32	991.36	0.1028	5.3216	5.22	27.1%	14.04121667	5.00	0.55			
8	247.84	0.0586	5.0706	5.01	26.0%	14.24798065	5.21	0.58			
1	30.98	0.0005	4.3276	4.33	22.5%	14.93287183	5.90	0.65			

Trow

Project: 091-02125
Borehole: AH10-2 **Sample:** S4 **Depth:** 14.63m
Consolidometer: D **Linear Voltmeter:** J2664
Method: Modified A
Comments:

THURBER

2009 Golder Test Pit Logs

APPENDIX I

Test Pit Summary Log Sheets

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SUMMARY

SUMMARY

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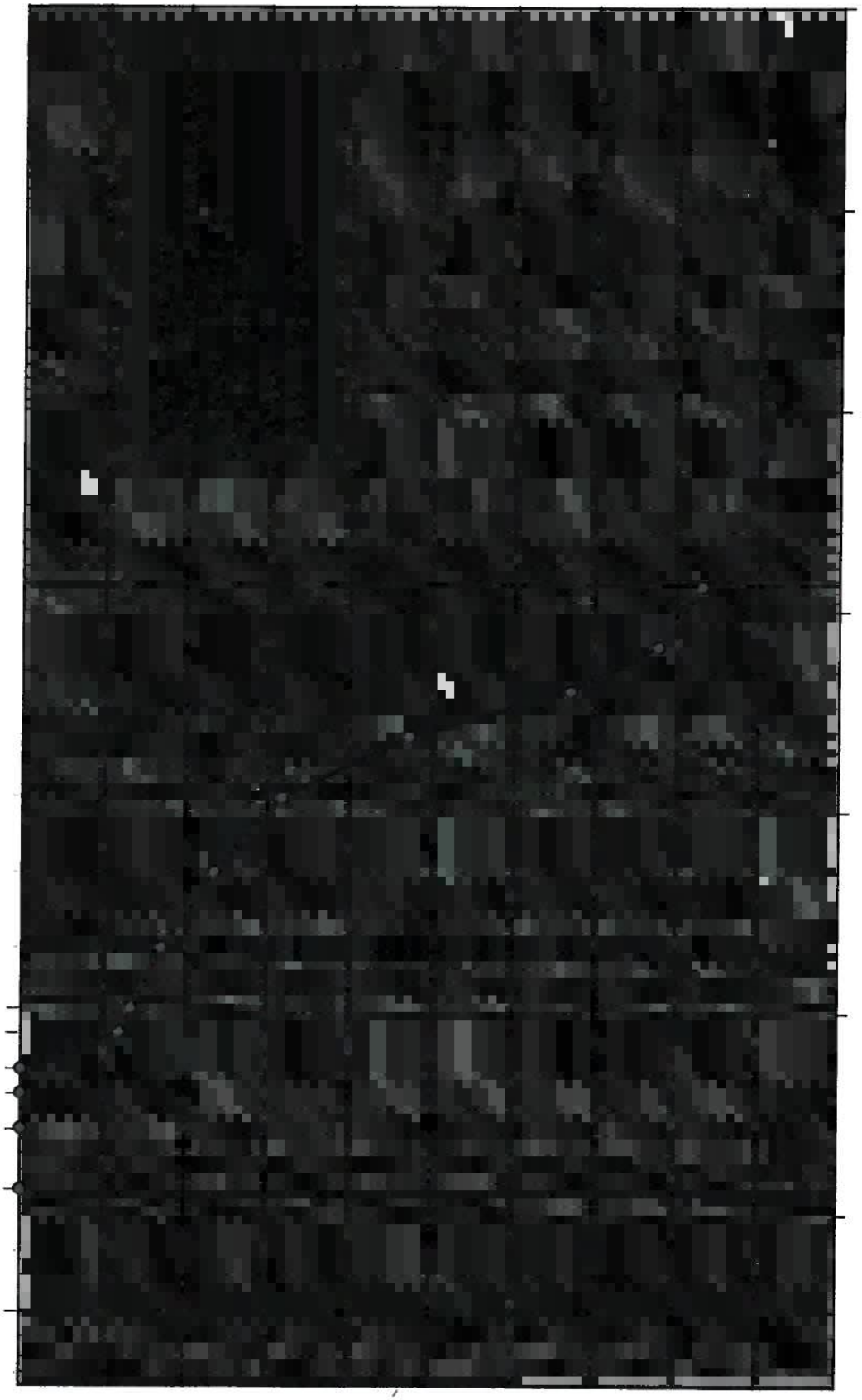
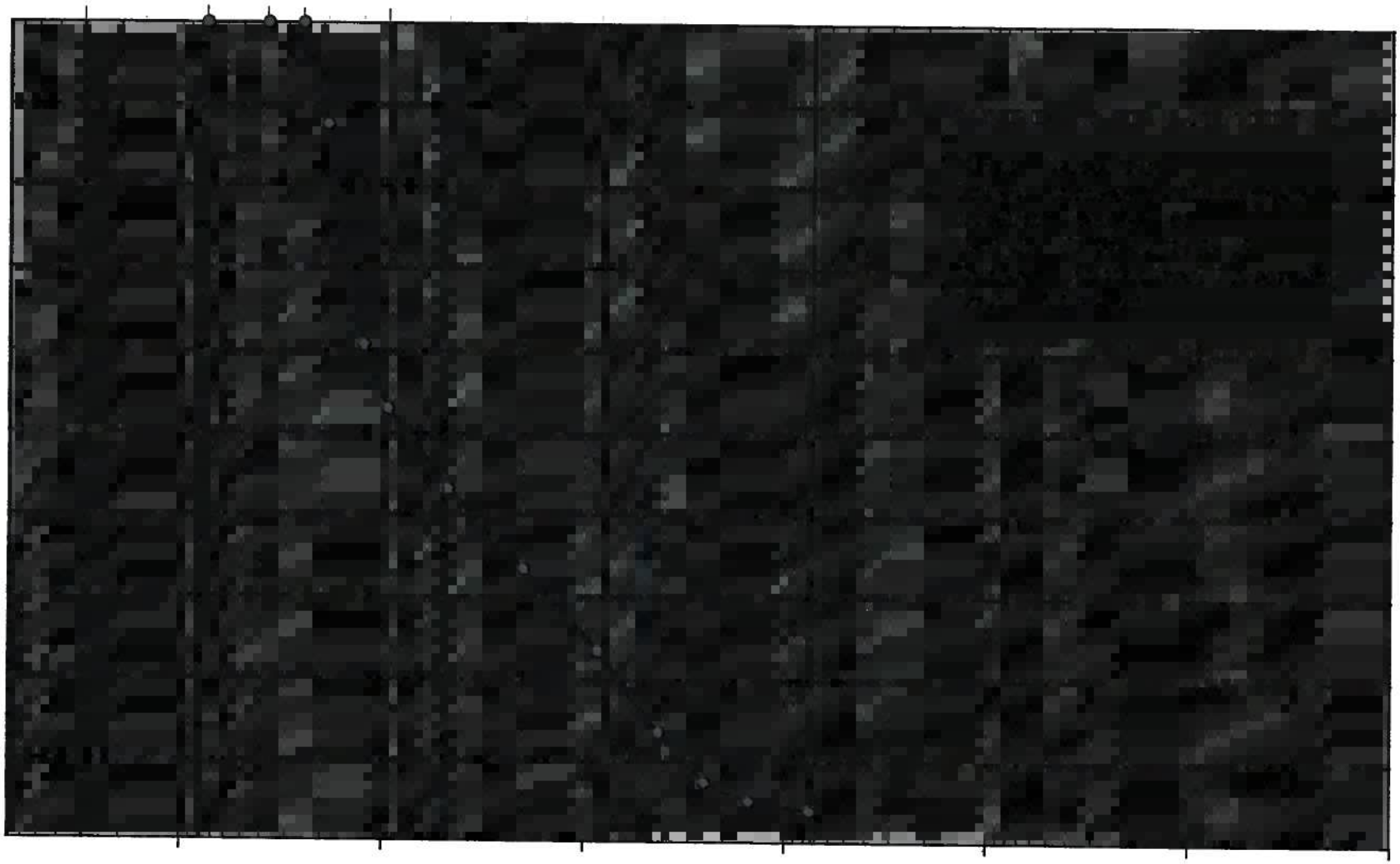
THURBER

2009 Golder Laboratory Test Results

APPENDIX II

Laboratory Test Results



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