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**GEOTECHNICAL INVESTIGATION**



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Prepared for:  
**Mr. Navinder Singh Lal**

Project No. FE-P 20-10693Geo.  
November 23, 2020



**Issued to:**

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**Project Name:**

Proposed New Residences

**Project Address:**

12507 Old Kennedy Road, Caledon, ON.



**Project Number:**

FE-P 20-10693Geo

**Issued on:**

November 23, 2020

**Report Prepared by:  
(Primary Contact)**

A circular professional engineer seal for the Province of Ontario. The seal contains the text 'LICENSED PROFESSIONAL ENGINEER', 'R.S. CHAHAL', and 'PROVINCE OF ONTARIO'.

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A circular professional engineer seal for the Province of Ontario. The seal contains the text 'LICENSED PROFESSIONAL ENGINEER', 'D.A. FISHER', and 'PROVINCE OF ONTARIO'.

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**Fisher Engineering Ltd**

Project No. FE-P 20-10693Geo November 23, 2020

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## 1. INTRODUCTION

Fisher Engineering Limited was retained by Mr. Navinder Singh Lal to carry out a geotechnical subsurface investigation for the proposed new residences/lots at 12507 Old Kennedy Road in Caledon, Ontario.

The purpose of the geotechnical investigation was to determine the general subsurface conditions across the site by drilling boreholes and to provide geotechnical recommendations for the design/construction of dwellings on the proposed new residential lots by means of six (6) boreholes.

This report presents the results of the tests performed in accordance with the general terms of reference outlined above.

The report has been prepared specifically and solely for the geotechnical aspects of design & construction of the proposed new dwellings at the site.

## 2. SITE AND PROJECT DESCRIPTION

The subject property is located on the east side of Old Kennedy Road in the predominantly residential neighborhood north of Highway 410 and east of Highway 10 in Caledon.

Currently a two-story dwelling exists in north middle portion of the property. Remainder of the property was generally grass or granular material covered. Frame garage was observed towards south-east of the dwelling.

Relatively new residential dwellings were observed towards north, east & south of the property. A single -family dwelling over estate lot was observed across the road on west side. Stormwater management pond exists on the north side of the above lot.

Site grades were relatively flat with slight drop towards Old Kennedy Road.

We understand that severance of the property into three residential lots is proposed.

## 3. SCOPE OF GEOTECHNICAL WORK

The geotechnical scope of work includes the following:

- Investigation of the subsurface conditions at the site by advancing boreholes, soil sampling and/or visual evaluation.
- Prepare a report with comments and recommendations regarding:



- the geotechnical aspects of the design and construction of the proposed dwellings
- foundation type, ultimate and serviceability bearing capacity
- basement construction
- excavation recommendations etc.

#### **4. METHOD OF INVESTIGATION**

The field work for this investigation was carried out on November 16, 2020, in which a total of six (6) boreholes were put down to the approximate depths of 5.03m to 6.55m below prevailing grades. The approximate locations of the boreholes and borehole elevations are shown on the attached Borehole Location Plan (Appendix A).

The ground surface elevation at each borehole was obtained by interpolation from the topographic survey plan dated July 17, 2018 prepared by Speight, Van Nostrand & Gibson Limited, Ontario Land Surveyors.

All boreholes were advanced using truck mounted drill rig equipped with solid stem augers. The subsurface strata were sampled regularly to the depths explored. Field tests to determine the engineering parameters of the soil were carried out during drilling, which included Standard Penetration Tests (SPT).

All soil samples were taken to our accredited laboratory for final visual assessment, classification, and selected moisture content testing & grain size analyses. The samples were tested and classified in general accordance with the Unified Soil Classification System, ASTM D 2487, and Standard Practice for Classification of Soil for Engineering Purposes.

Soil Description and test results are given in the logs of boreholes presented in Appendix B.

The soil samples recovered during the investigation will be stored in our laboratory for a period of 30 days after which they will be discarded unless further instructions are received.

#### **5. SUBSURFACE CONDITIONS**

The subsurface conditions encountered in boreholes are shown on the Borehole Logs provided in Appendix B.



The Borehole Records include soil stratification at the borehole locations along with detailed soil descriptions. Variations in the soil stratification may occur and should be expected between borehole locations and elsewhere on the site.

### **FILL**

Fill generally consisted of dark brown to brown sand with some gravel & occasional pieces of asphalt in the upper portion to sandy silt with some to trace of topsoil/roots in the lower portion. Fill extended to the following approximate depths below prevailing grades:

<b>BH No.</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
<b>Depth of Fill, m</b>	0.69	0.76	1.37	1.07	0.61	0.69

### **BROWN SANDY SILT TILL**

Fill was underlain by native soils of brown sandy silt till. Relative density of this till varied from compact to very dense and it extended to the approximate depths of 4.27m to 4.72m.

### **GREYISH BROWN TO GREY SAND & SILT TILL**

Brown sandy silt till was followed by greyish brown to grey sand & silt till. Relative density of this deposit varied from dense to very dense and all boreholes were terminated in it between the depths of 5.03m & 6.55m.

Occasional cobbles/boulders were encountered while auguring through the native till soils.

## **6. GROUNDWATER CONDITIONS**

The boreholes were advanced using dry auguring and seepage/ground water was measured at the approximate depths of 6.10m (no. 1), 5.94m (no. 3) & 4.57m (no. 4) on completion of the respective soil boring operations. No measurable amount of water was found in boreholes 2, 5 & 6 on completion of the respective soil borings.

Based on the above information and visual examination of the soil samples, we conclude that water bearing aquifer was not encountered within the depths penetrated by boreholes. However, perched water will likely be encountered from the wet seams/pockets/layers trapped inside the fill and/or native till soils. We consider the water in boreholes 1, 3 & 4 represents this perched water.



## **7. GEOTECHNICAL DISCUSSIONS AND RECOMMENDATIONS**

It is understood/expected that the proposed residences will be one to two-story with basements. Based on the field and laboratory data gathered, we present the following comments and recommendations pertaining to the geotechnical aspects of the design and construction.

### **7.1 Foundation Considerations**

Boreholes indicate that undisturbed native soils of brown sandy silt till can be used for the building foundation support using conventional strip and/or spread footing foundations.

For footings placed over undisturbed native soils at the approximate depths of 1.0m (nos. 1, 2, 5 & 6), 1.5m (no. 3) & 1.2m (no. 4) below the existing grades, soil bearing pressures of 200kPa (SLS) & 300kPa (ULS) can be used for foundation design purposes.

Site classification 'D' can be used for earthquake design purposes.

For footings founded at different levels in the vicinity of each other or located adjacent to excavated and backfilled areas, such as sewer/utility trenches/previous excavations etc., the slope of the imaginary line joining the bottom of two footings or the bottom of footing and excavation should not be steeper than 10 horizontal to 7 vertical.

The base conditions at the footing founding levels should be observed by a soils engineer from our office prior to pouring concrete, to ensure that the design bearing pressures are being attained.

For frost protection, a minimum 1.2 m earth cover should be provided for footings exposed to freezing weather conditions.

### **7.2 Basement Construction**

For basement construction, the basement walls should be damp-proofed and a perimeter weeping tile system should be installed. Perforated weeping tile, at least 100mm in diameter and wrapped in filter fabric, should be placed around the exterior of the perimeter basement wall footings. The weeping tile should be covered on top and sides with at least 150mm of 20mm clear stone. The weeping tile should be placed in such a way that the top of the weeping tile is below the bottom of the basement floor slab and it drains under gravity into a sewer or frost-free sump pit from which the water is constantly removed.

The exterior faces of perimeter basement walls may be damp proofed using approved materials and standards of application. In addition, a drainage layer should be installed immediately beside the exterior faces of damp proofed perimeter basement walls. The drainage layer may



consist of at least 0.5m wide free draining granular material or Mira drain or equivalent which has a satisfactory proven record. We recommend that basement walls located below the above damp proofing should be water proofed.

Under free drainage conditions, the basement walls may be designed to resist an earth pressure 'P' given by the expression:

$$P = K ( \gamma h + q )$$

Where K = Coefficient of earth pressure

$\gamma$  = unit weight of retained soil

$h$  = height of the basement wall below finished grade

$q$  = surcharge load, if any

For the design purposes, the following estimated values of the soil parameters may be used.

SOIL PARAMETER	<u>FILL</u>	<u>NATIVE SANDY SILT Till</u>
Unit weight, $\gamma$ , kN/m <sup>3</sup>	18	21
Coefficient of earth pressure at rest ( $K_o$ )	0.50	0.36
Coefficient of active earth pressure ( $K_a$ )	0.40	0.30
Coefficient of passive earth pressure ( $K_p$ )	2.50	3.33

### 7.3 Excavation

In accordance with the Ontario Occupational Health and Safety Act, all excavation deeper than 1.2m should be properly supported or sloped back to a safe angle. Fill and moist weathered native till (to about 1.4m below grade) are Type 3 soils. Native dense till soils are Type 2 Soils. However, wet seams/layers may require flattening of the side slopes.

No significant groundwater problems are anticipated. Small amounts of seepage water can be handled by conventional sump pump methods.





## 8. INFILTRATION/PERCOLATION CHARACTERISTICS

A total of three soil samples were submitted for grain/sieve size analyses. Results of the sieve size analyses are presented in the Appendix C.

Results indicate that on-site native soils predominantly consist of sandy silt till soils of compact relative density in the upper portion. Estimated permeability of the native compact sandy silt till soils is anticipated to be in the range of  $10^{-5}$  cm/sec or less. Estimated percolation time is expected to be 30 min/cm or higher.

## 9. GENERAL CONSIDERATIONS

This report is limited in scope to those items specifically referenced in the text. No other testing and design calculations have been performed except as specifically reported.

The discussions and recommendations presented in this report are intended for the sole guidance of the client named and the design consultants. It should not be relied upon for any other purpose.

The information on which these recommendations are based is subject to confirmation by engineering personnel at the time of construction.

The fact that localised variations in the subsurface conditions may be present between and beyond the boreholes and that those conditions may be significantly different from the general description provided for design purposes should be understood.

Contractors bidding on or undertaking the work should decide on their own investigations, as well as their own interpretations of the factual borehole results. This concern specifically applies to the classification of the subsurface soils and the potential reuse of these soils on/off Site. Contractors must draw their own conclusions as to how the near surface and subsurface conditions may affect them.

It is strongly urged that Fisher be contacted to provide assistance in the interpretation of the borehole records by anyone undertaking work on/or below the ground surface at this site prior to this work being carried out.

The client expressly agrees that it has entered into this agreement with Fisher, both on its own behalf and as agent on behalf of its employees and principals.



The client expressly agrees that Fisher's employees and principals shall have no personal liability to the client in respect of a claim, whether in contract, tort and/or any other cause of action in law. Accordingly, the client expressly agrees that it will bring no proceedings and take no action in any court of law against any of Fisher's employees or principals in their personal capacity.

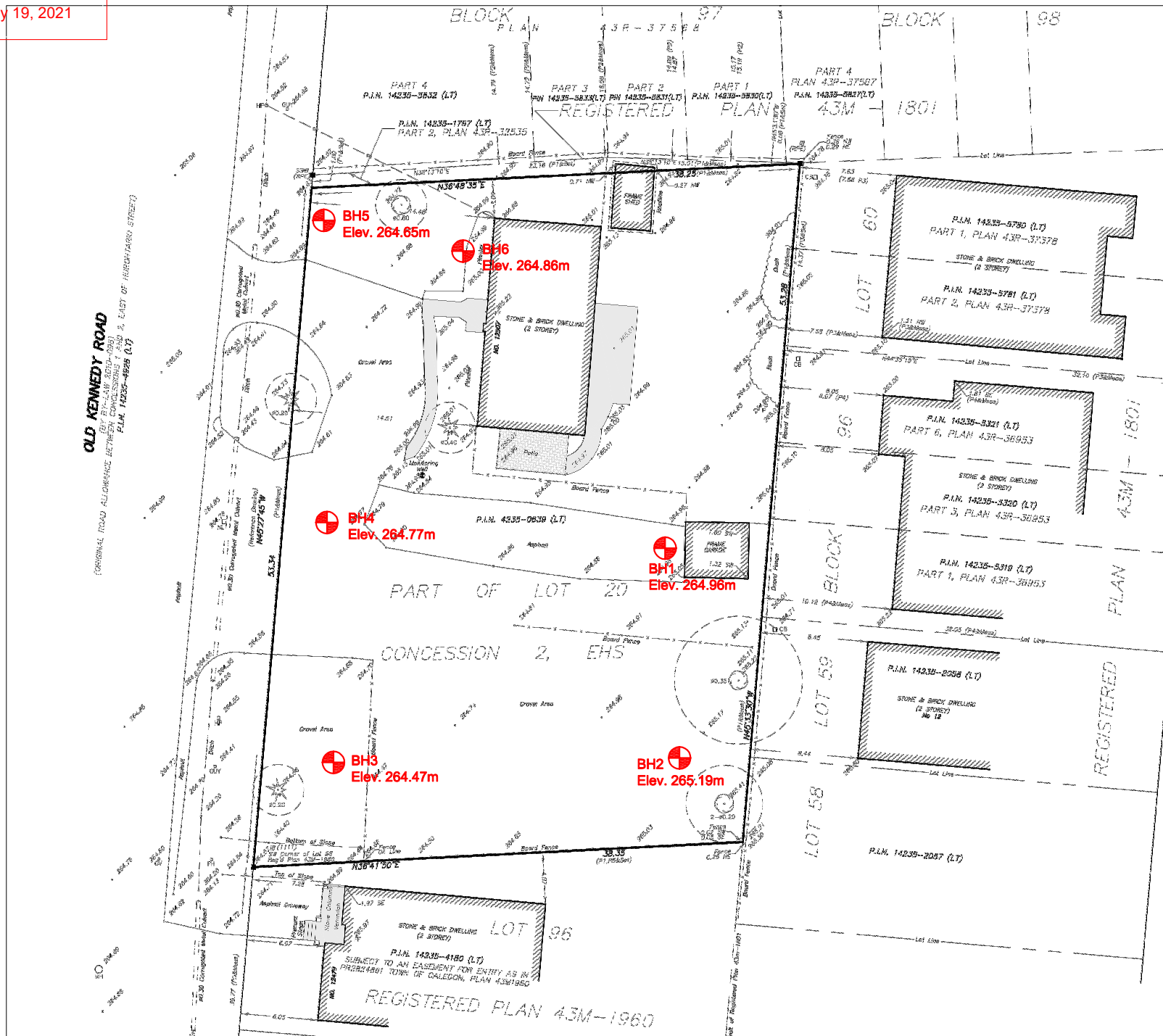
## 10.CLOSING

We trust that the foregoing information is sufficient for your present needs and will be pleased to review the contents of this report in greater detail should you so require. Should you require our services further in this regard, please do not hesitate to contact our office.



## APPENDIX A – SITE PLAN





400 Esna Park Dr., #15 Tel: 905 475-7755  
Markham, Ontario Fax: 905 475-7718  
L3R 3K2

NORTH



LEGEND



Borehole

PROJECT NAME AND ADDRESS

GEOTECHNICAL INVESTIGATION

12507 OLD KENNEDY ROAD,  
CALEDON, ONTARIO

FIGURE 1:

SITE PLAN WITH BOREHOLE LOCATIONS

PROJECT NO.

FE-P 20-10693

DATE

NOVEMBER 2020

SCALE

AS SHOWN

SHEET NO.

1

## APPENDIX B – LOG OF BOREHOLES





LOG OF BOREHOLE No. BH1 SHEET. 1 of 1

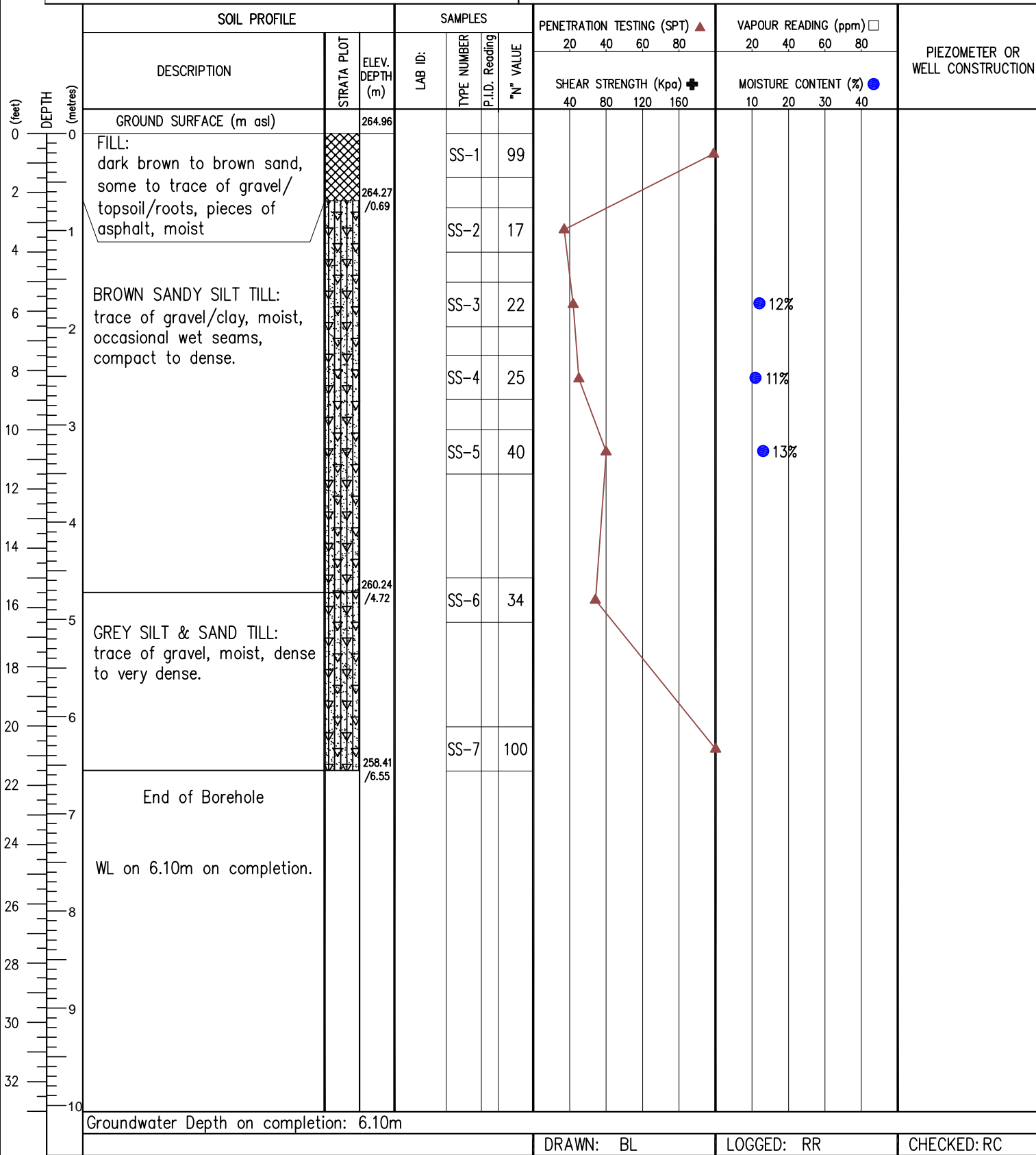
PROJECT NO.: FE-P 20-10693

PROJECT NAME: Geotechnical Investigation

LOCATION: 12507 Old Kennedy Road, Caledon, ON.

DRILLING METHOD: CME 75 – Solid Stem

DRILLING DATE: November 16, 2020



May 19, 2021



LOG OF BOREHOLE No. BH2 SHEET. 1 of 1

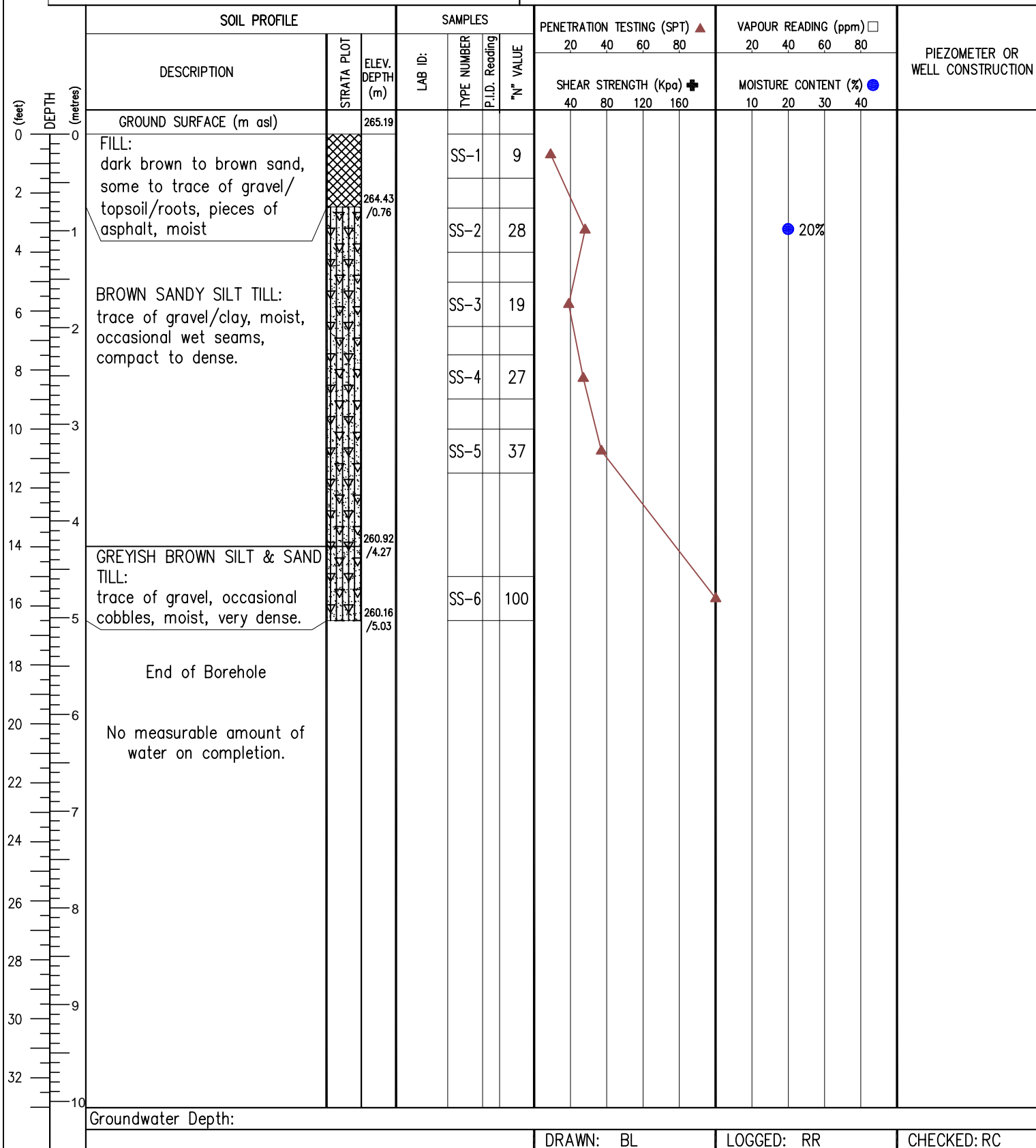
PROJECT NO.: FE-P 20-10693

PROJECT NAME: Geotechnical Investigation

LOCATION: 12507 Old Kennedy Road, Caledon, ON.

DRILLING METHOD: CME 75 – Solid Stem

DRILLING DATE: November 16, 2020



DRAWN: BL

LOGGED: RR

CHECKED: RC

May 19, 2021



LOG OF BOREHOLE No. BH3 SHEET. 1 of 1

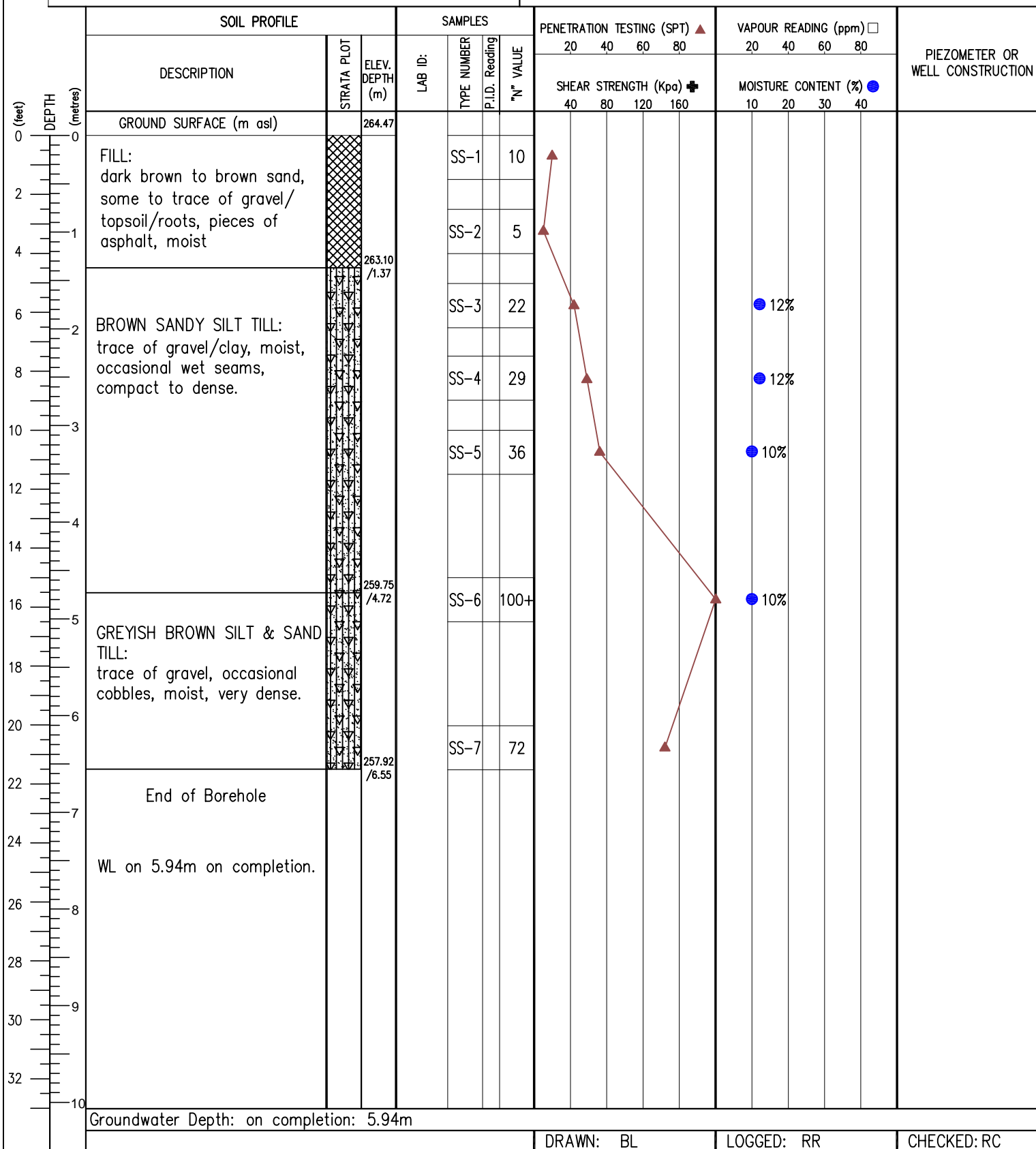
PROJECT NO.: FE-P 20-10693

PROJECT NAME: Geotechnical Investigation

LOCATION: 12507 Old Kennedy Road, Caledon, ON.

DRILLING METHOD: CME 75 – Solid Stem

DRILLING DATE: November 16, 2020





May 19, 2021



LOG OF BOREHOLE No. BH4 SHEET. 1 of 1

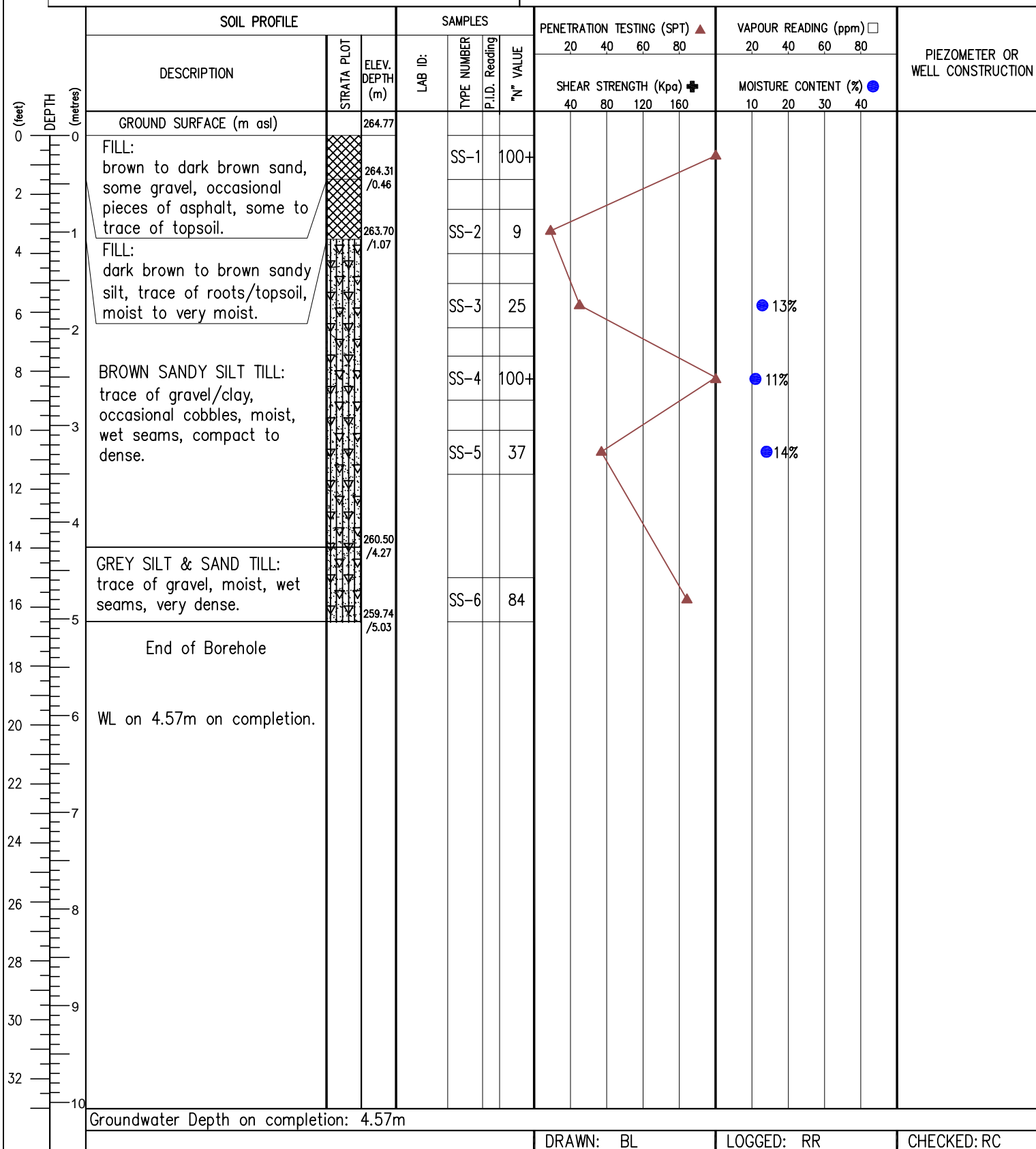
PROJECT NO.: FE-P 20-10693

PROJECT NAME: Geotechnical Investigation

LOCATION: 12507 Old Kennedy Road, Caledon, ON.

DRILLING METHOD: CME 75 – Solid Stem

DRILLING DATE: November 16, 2020



May 19, 2021



LOG OF BOREHOLE No. BH5 SHEET. 1 of 1

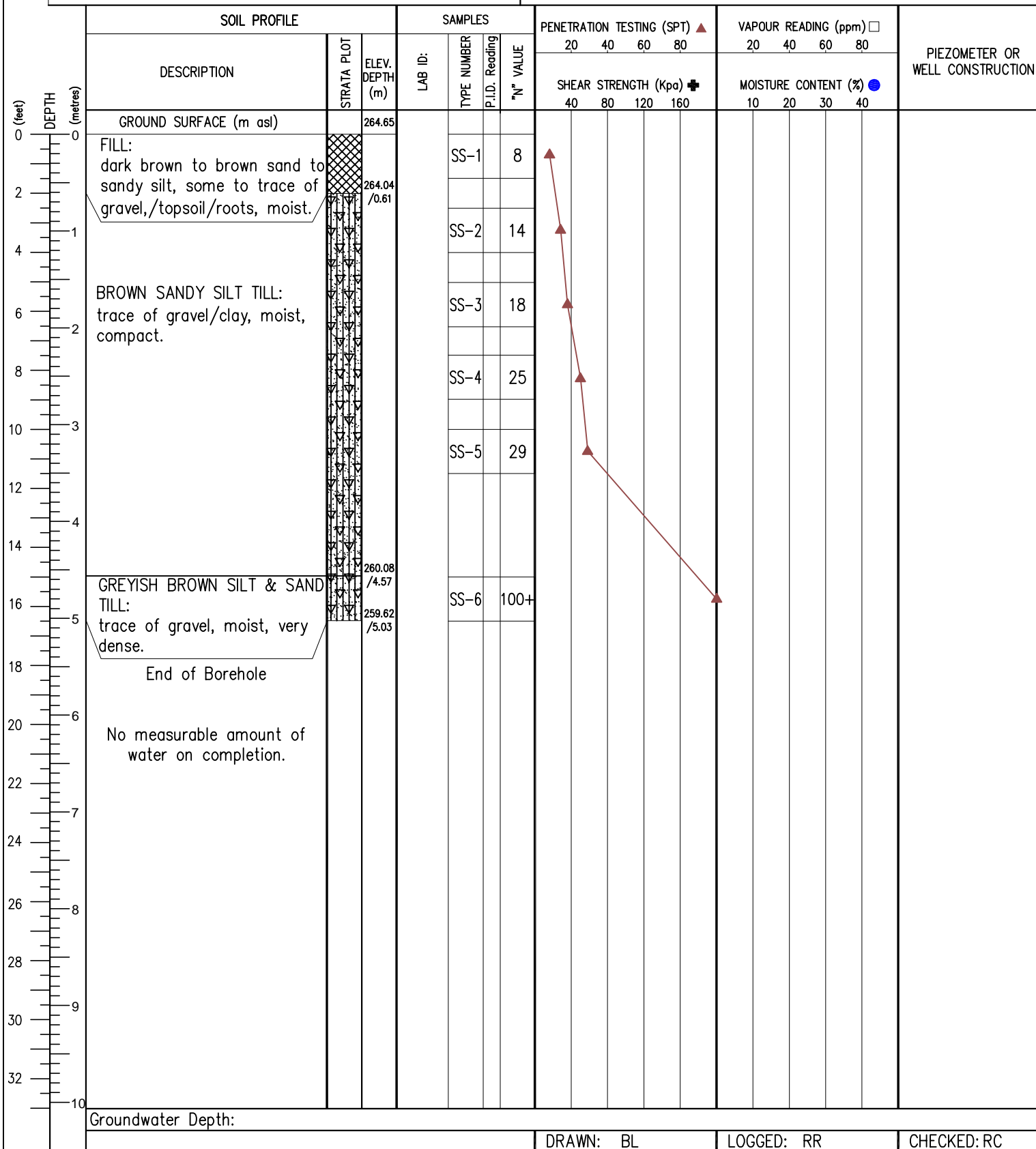
PROJECT NO.: FE-P 20-10693

PROJECT NAME: Geotechnical Investigation

LOCATION: 12507 Old Kennedy Road, Caledon, ON.

DRILLING METHOD: CME 75 – Solid Stem

DRILLING DATE: November 16, 2020



DRAWN: BL

LOGGED: RR

CHECKED: RC



LOG OF BOREHOLE No. BH6 SHEET. 1 of 1

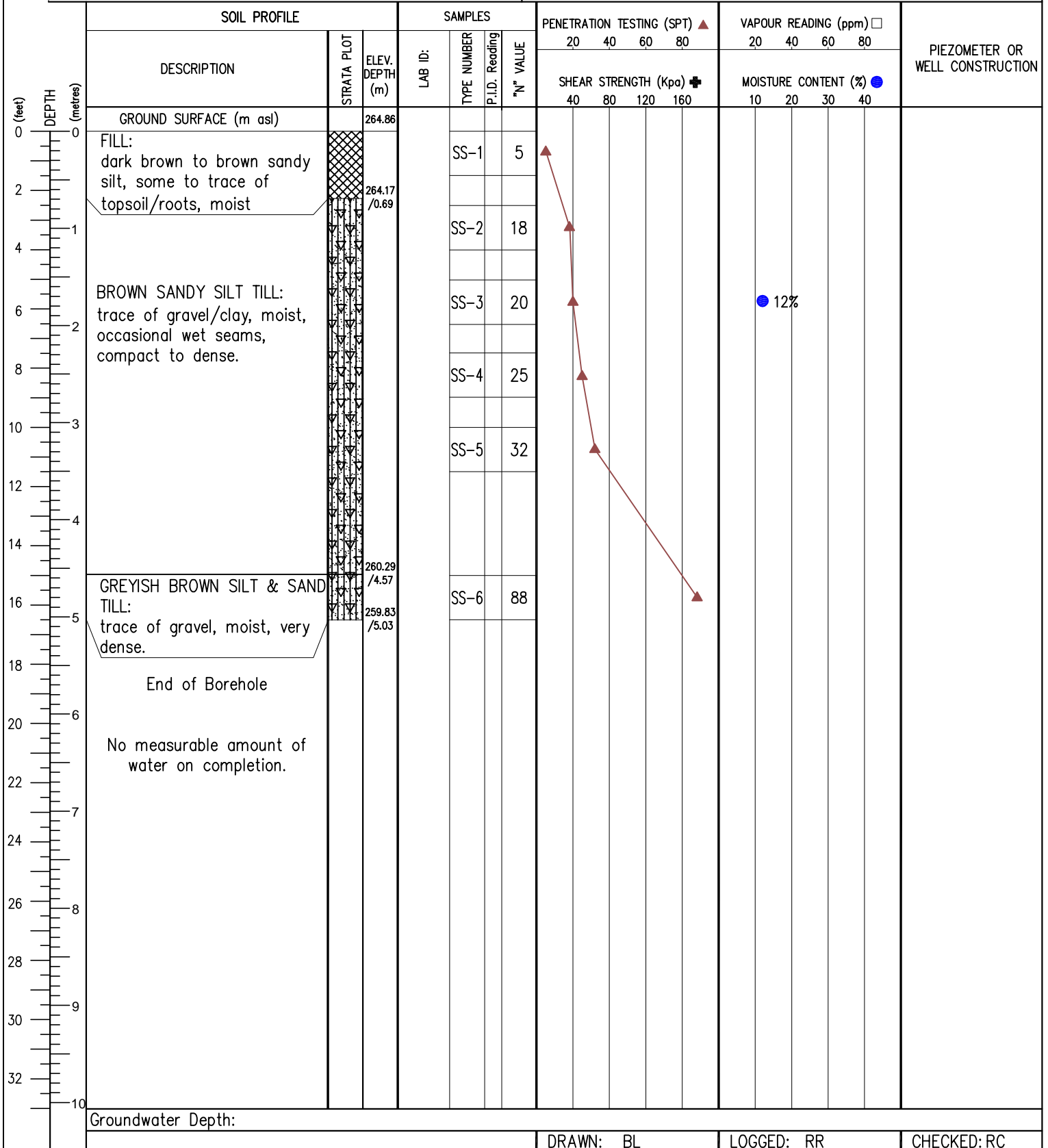
PROJECT NO.: FE-P 20-10693

PROJECT NAME: Geotechnical Investigation

LOCATION: 12507 Old Kennedy Road, Caledon, ON.

DRILLING METHOD: CME 75 – Solid Stem

DRILLING DATE: November 16, 2020



## APPENDIX C – GRAIN SIZE ANALYSES





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**Client:** 12507 Old Kennedy Road  
**Address:**

**Tel.:**  
**Email:**  
**Attn.:**

**F.E. Job #:** 20-5598  
**Project Name:** Geotechnical Investigation  
**Project ID:** FE-P 20-10693  
**Date Sampled:** 16-Nov-2020  
**Date Received:** 27-Nov-2020  
**Date Reported:** 30-Nov-2020  
**Location:** 12507 Old Kennedy Road  
Caledon, ON

## Certificate of Analysis

Analyses	Matrix	Quantity	Date Extracted	Date Analyzed	Lab SOP	Method Reference
Moisture Content	Soil	3	N/A	30-Nov-20	Support Procedures F-99	Carter (1993)
Grain Size	Soil	3	N/A	30-Nov-20	Grain Size F-28	ASTM D6913-04

Fisher Environmental Laboratories is accredited by CALA (the Canadian Association for Laboratory Accreditation Inc.) for specific parameters as required by Ontario Regulation 153/04. All analytical testing has been performed in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act published by Ontario Ministry of the Environment.

Authorized by:



Roger Lin, Ph. D., C. Chem.  
Laboratory Manager



## Certificate of Analysis

<b>Analysis Requested:</b>	Moisture Content, Grain Size					
<b>Sample Description:</b>	9 Soil Sample(s) ( <i>Rush</i> )					
<b>Parameter</b>	<b>20-5598-1</b> BH1 1.50-1.95m	<b>20-5598-2</b> BH2 0.75-1.20m	<b>20-5598-3</b> BH6 1.50-1.95m			
<b>Moisture Content (%)</b>	12	20	12			

## QA/QC Report

Parameter	Blank	RL	LCS	AR	Duplicate	AR
				<b>Recovery (%)</b>		<b>RPD (%)</b>
<b>Moisture Content (%)</b>	<0.1	0.1	100	70-130	0.4	0-20

**LEGEND:**

RL - Reporting Limit  
LCS - Laboratory Control Sample  
AR - Acceptable Range  
RPD - Relative Percent Difference

## Certificate of Analysis

<b>Analysis Requested:</b>	Moisture Content, Grain Size					
<b>Sample Description:</b>	9 Soil Sample(s) (Rush)					
<b>Parameter</b>	<b>20-5598-1</b> BH1 1.50-1.95m	<b>20-5598-2</b> BH2 0.75-1.20m	<b>20-5598-3</b> BH6 1.50-1.95m			
<b>Grain Size (%)</b>						
>19mm	0.0	0.0	0.0			
9.5mm-19mm	0.0	1.3	2.3			
4.75mm-9.5mm	4.5	0.7	2.5			
1.18mm-4.75mm	6.7	7.4	6.9			
300um-1.18mm	7.7	7.0	7.9			
75um-300um	16.7	18.1	16.2			
<75um	64.4	65.5	64.2			
<b>Clay &amp; Silt</b>	<b>64</b>	<b>65</b>	<b>64</b>			
<b>Sand</b>	<b>31</b>	<b>33</b>	<b>31</b>			
<b>Gravel</b>	<b>4</b>	<b>2</b>	<b>5</b>			

## Grain Size Distribution

Sample ID: 20-5598-1

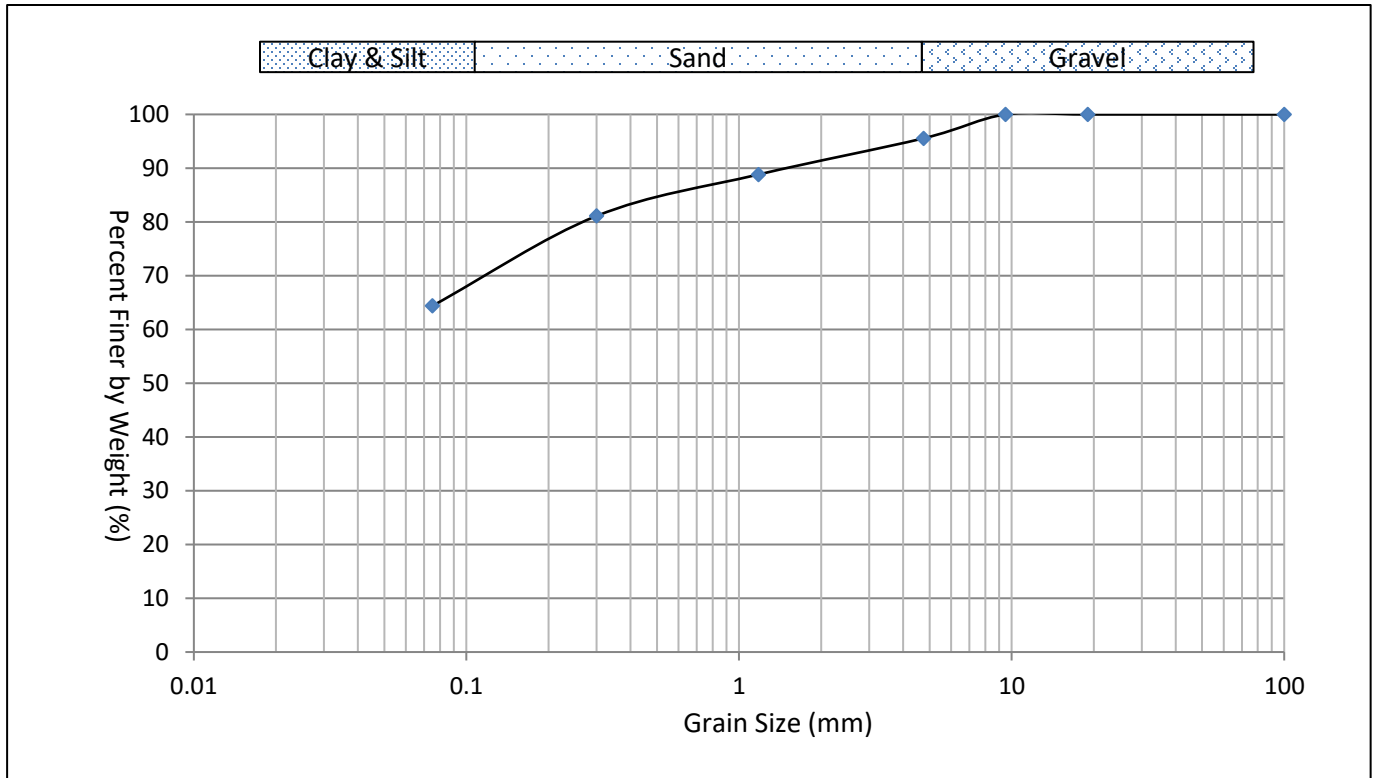
BH1

1.50-1.95m

Clay & Silt: 64%

Sand: 31%

Gravel: 4%

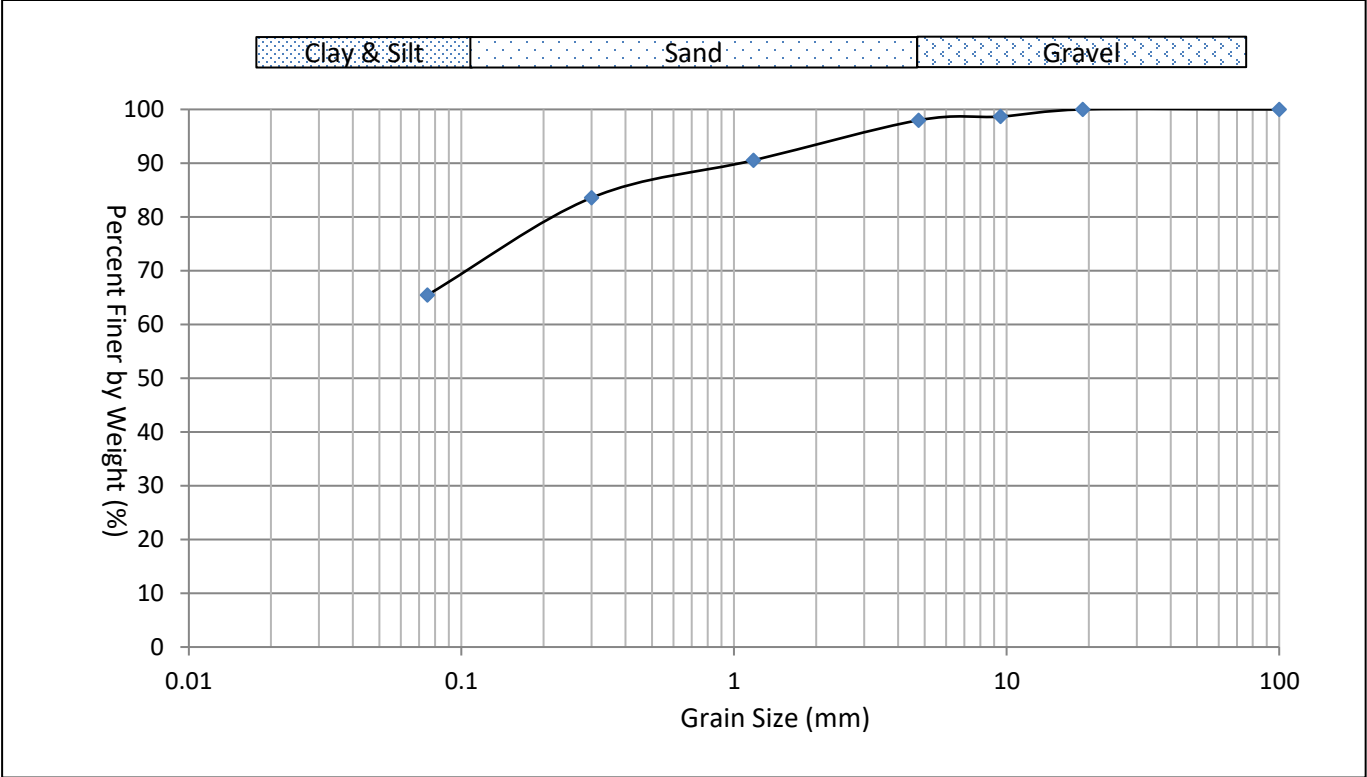




Grain Size Distribution

Sample ID: 20-5598-2      BH2      0.75-1.20m

Clay & Silt: 65%      Sand: 33%      Gravel: 2%



Grain Size Distribution

Sample ID: 20-5598-3      BH6      1.50-1.95m

Clay & Silt: 64%      Sand: 31%      Gravel: 5%

