Geotechnical Investigation-Top of Bank Stability
For the property at Part Lot 48
(6451 Sixth Line, Milton, ON) – Rev01
Project No. 30291.233

Prepared for:

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APPENDICES

1.0 INTRODUCTION

AME was retained by Neamsby Investment Inc. to carry out a geotechnical investigation for the top of the bank stability on the property at part lot 48 (6451 Sixth line, Milton, ON). To satisfy the requirement of Conservation Halton Policies and guidelines for administration of Ontario Regulation 162/06 and Land use planning Policy Document April 27, 2006 (last amended, November 26, 2020). The Site Location Plan is attached in Appendix A of this report.

A total of fifteen (15) boreholes were drilled at the site between March 16, 2022, and March 22, 2019. The locations of boreholes designated as Borehole BH22-01 through BH22-15, as shown on attached Borehole Location Plan- A2 (Appendix A). Five (5) monitoring wells were installed at location of boreholes BH22-01, BH22-03, BH22-08, BH22-12, and BH22-14.

This report includes the factual results of the investigation carried out at the site, the field-testing information and geotechnical laboratory testing results, and the result of analysis performed for top-of the bank stability. The purpose of this geotechnical investigation was to obtain subsurface conditions in the boreholes, the observations during the site visits, and groundwater conditions to determine the relevant geotechnical properties of substrata condition to assess the top of bank stability.

1.1. PREVIOUS INVESTIGATION

Preliminary geotechnical investigation was carried out in 2019 to assess the ground condition for a future residential/commercial development in bigger area, South of Derry Road between Fifth line and Sixth line. It consisted of drilling twenty (20) explorational boreholes to the depth ranging between 5.0 and 8.0 m. The substrata condition comprised of approximately 250mm of topsoil and 400mm thick layer of sandy silt fill layer underlaid by a native stiff clayey silt/dense sandy silt which was transformed to a clayey silt to silty clay till below 1.5 to 2 m from the ground level.

Accordingly, general foundation design, excavation and groundwater control, and other construction recommendations were proposed for the future development.

1.2. SITE DESCRIPTION

The site is located at Southwest quadrant of Derry Rd and Sixth Line on active creek, flowing east. The intended bank slope is located along the active creek flowing through Lot P48 and part Lot P9. The top of the bank was marked using wooden stakes.

The existing slope conditions, including general topography of the slopes, vegetation cover, erosion conditions and any evidence of slope failure and erosion of the slope surface were examined during the site visit on January 27, 2022, and drilling on March 16, 2022. Photographs of the site taken during the site visits are shown in Appendix E of this report. The neighboring properties consist of agricultural fields.

1.3. REGIONAL GEOGRAPHY

According to "The Physiography of Southern Ontario" (Chapman and Putman, 1984), and Ontario Geological Survey Map 2226; the proposed project site underlain by mostly two different deposits: Glaciolacustrine Deposits (Silt and clay, minor sand, basin and quiet water deposits) and Queenston Formation (Shale, limestone, dolostone and siltstone) in the Town of Milton in the Region of Southern Ontario. Immediately, east of Niagara Escarpment in the regional municipality of Halton, the till plain is fluted, and several recognizable drumlins occur north of Milton. The till here is reddish due to the shale of the Queenston Formation and less calcareous than most of the tills in the south part of the southern Ontario.

2.0 FIELD WORK

The fieldwork for this investigation was carried out during the period between March 16 and March 22, 2022. It was consisted of advancing a total of fifteen (15) exploratory boreholes including five (5) monitoring wells.

The exploratory boreholes were advanced to depth of 9.6 m below existing grade. The depths and locations of the boreholes were determined by **AME** Aecon Materials Engineering and staked out accordingly in the field as shown on the attached Borehole Location Plan as Drawing A-2 in Appendix A.

The fieldwork was performed under the full-time supervision of experienced geotechnical personnel from **AME**. The boreholes were advanced to the sampling depths by means of continuous flight solid stem augers. Standard Penetration Tests (SPT's) were carried out at frequent intervals of depth in the boreholes. Representative soil samples were recovered using split spoon samplers. The results of the SPT tests, in terms of 'N' values, have been used to infer the consistency of the cohesive soils or relative density of the cohesionless soil. All soil samples were examined in the field and carefully preserved for further examination in the laboratory.

The presence of ground water was observed, during the drilling operations, and prior to backfilling. The boreholes were backfilled and plugged upon completion with borehole cuttings and bentonite clay pellets ("Hole Plug") in accordance with O. Reg. 903 as amended.

The boreholes/ wells locations and water level measurement were surveyed by **AME**'s surveyor on April 12, 2022. Table-1 below summarize the borehole numbers, depth of boreholes / wells, ground surface elevation and coordinates in UTM zone 17.

Table 1- Borehole Specification Summary

Borehole No.	Existing Ground Elevations	*Drilling Depth (m)*	UTM Coordinates		*Monitoring Wells Installed (Yes/ No)*
			Northing	Easting	
BH 22 – 1 MW	188.592	9.6	4820789.732	595625.671	Yes
BH 22 – 2	190.286	9.6	4820871.924	595693.945	No
BH 22 – 3 MW	189.820	9.6	4820912.430	595766.003	Yes
BH 22 – 4	189.303	9.6	4820933.350	595807.470	No
BH 22 – 5	188.533	9.6	4820990.391	595881.593	No
BH 22 – 6	189.785	9.6	4821031.973	595939.577	No
BH 22 – 7	189.487	9.6	4821019.050	595965.729	No
BH 22 – 8 MW	189.726	9.6	4821044.029	596050.830	Yes
BH 22 – 9	186.719	9.6	4821092.353	596084.737	No
BH 22 – 10	188.407	9.6	4821095.589	596131.157	No
BH 22 – 11	188.727	9.6	4821072.435	696173.101	No
BH 22 – 12 MW	189.055	9.6	4821086.390	596246.959	Yes
BH 22 – 13	188.207	9.6	4821150.821	596275.760	No
BH 22 – 14 MW	187.946	9.6	4821235.380	596149.065	Yes
BH 22 – 15	188.316	9.6	4821197.449	596084.737	No

3.0 SUBSURFACE AND GROUNDWATER CONDITIONS

The subsurface conditions encountered in the boreholes are detailed in the Logs of Boreholes as Figure Nos. B-1 to B-15 provided in Appendix B. An Explanation of Borehole Logs is also presented in Appendix B as Figure B - (i).

It should be noted that the boundaries of soil types indicated on the borehole logs are inferred from non-continuous soil sampling and observations made during drilling. These boundaries are intended to reflect transition zones for geotechnical design, and therefore, should not be construed as the exact plane of geological changes. The soil

and groundwater conditions are confirmed at the borehole locations only and it may vary at other locations.

3.1. TOPSOIL

Topsoil was encountered in some boreholes. The thickness of the topsoil at the boreholes varied between approximately 25 mm and 300 mm with an average thickness of 50 mm. It should be noted that the topsoil thickness will vary between boreholes. Thicker topsoil than that found in the boreholes may occur at places.

3.2. FILL

Fine grained fill materials or disturbed soils were found underlying the topsoil at ground surface to depth's ranging from 0 m to 1.4 m below grade with a fill layer thickness ranges between 300 mm and 1400 mm approximately. The fill material is composed of clayey sandy silt, silty clay and clayey silt texture with trace to some gravel and organic material (i.e. topsoil and rootlets).

Standard Penetration resistance in the fill material had "N"-values ranging from 4 to 18 blows per 300 mm with full SPT penetration. The measured penetration resistance is indicative of a soil with a loose to compact relative density for non -cohesive soils or firm to very stiff soil consistency for cohesive soils respectively.

The moisture content of the selected samples of fill material ranged from about 8.1 to 28.9 percent by weight indicating moist to wet condition. The higher moisture content of soil samples with organics inclusion is attributed to the contained organic matter. The fill was generally brown to dark brown/ grey/ mottled and moist.

3.3. NATIVE: CLAYEY SILT/ SILTY CLAY/CLAYEY SANDY SILT TILL

Underlying relatively thin layer of fill/disturbed soil, majority of the boreholes encountered undisturbed / native cohesive soil layer of clayey silt and silty clay till deposits. Fine grained deposits of cohesive material, clayey silt found mostly underlying the fill material in almost all boreholes, extending in single layer thickness varying between 0.61m to 9.6m and 1.4m to 9.6m below grade.

Laboratory particle size distribution analysis were completed on a native soil sample taken from selected boreholes and the results according to USCS are summarized below and shown on Figures in Appendix C:

Gravel (greater than 4.75 mm size)	:	2.1 - 8.5 %
Sand (0.075 mm to 4.75 mm size)	:	17.9 - 29.0 %
Silt (0.002 mm to 0.075 mm size)	:	42.9 - 59.6 %
Clay (less than 0.002 mm size)	:	15.8 - 35.6 %

Standard Penetration resistance in the cohesive materials for clayey silt to silty clay till deposits had “N”-values ranging from 18 to 53 blows per 300 mm with full SPT penetration indicative of a very stiff to hard soil consistency and 50 blows per 130mm where the test was curtailed due to the high penetration resistance encountered.

The moisture content of the samples of the cohesive deposit ranged from about 7.5 to 16.8 percent by weight based on laboratory tests, indicating locally damp to moist soil conditions.

Atterberg Limits tests performed on seven (7) selected samples (BH22-1 SS3, BH22-5 SS9, BH22-6 SS2, BH22-8 SS8, BH22-10 SS3, BH22-13 SS6 and BH22-10 SS7) from the native clayey silt and silty clay till deposit yielded that the sample can be classified as clayey silt of low plasticity (CL-ML) and medium plasticity (CL) with sand and gravel matrix.

It should be noted that these deposits can contain cobbles and boulder size particles that could not be representatively recovered in the small diameter of the samples taken.

4.0 LABORATORY TEST RESULTS

Laboratory testing and visual examinations were carried out on selected soil samples. Tests were performed in accordance with the materials testing requirements and procedures outlined in the Laboratory Testing Manual of the Ministry of Transportation, or ASTM/AASHTO, as applicable. All laboratory testing was carried out at **AME**’s geotechnical laboratory. Laboratory test results are presented as Figures, Appendix C. The following laboratory tests were completed:

Test	Number of Samples
Natural Moisture Content	142
Sieve and Hydrometer Analysis	15
Atterberg Limits	7

The soil samples secured by the split barrel sampler of the Standard Penetration Test were properly sealed, labeled and transported to our geotechnical laboratory. The soil samples were visually examined in the laboratory for final classification of soil types.

4.1. GRAIN SIZE ANALYSIS

Laboratory Grain Size Analysis tests were performed on fifteen (15) representative samples of the native soils obtained from Boreholes BH22-1 through BH22-15. The results of the grain size analysis are presented as Figures in Appendix C and summarized in Table 2 below.

Table 2- Summary of Grain Size Analysis

Test No.	Borehole No.	Sample Depth (m)	Sample Description	Percent by Weight			
				Gravel	Sand	Silt	Clay
1	BH 22-1	1.52 – 1.98	Sandy clayey silt, trace gravel (CL)	8.5	26.3	46.4	18.8
2	BH 22-2	6.10 – 6.56	Sandy clayey silt, trace gravel (CL)	5.2	26.0	49.4	19.4
3	BH 22-3	0.76-1.21	Clayey silt, some sand, trace gravel (CL)	5.5	18.6	51.7	24.2
4	BH 22-4	3.05-3.51	Sandy clayey silt, trace gravel (CL)	3.3	25.5	48.1	23.1
5	BH 22-5	9.14 – 9.6	Sandy clayey silt, trace gravel (CL)	7.1	26.6	47.3	19.0
6	BH 22-6	0.76-1.21	Clayey silt, some sand, trace gravel (CL)	4.8	18.3	50.3	26.6
7	BH 22-7	4.57-5.03	Sandy clayey silt, trace gravel (CL)	7.2	26.9	45.5	20.4
8	BH 22-8	6.10 – 6.56	Clayey silt, some sand, trace gravel (CL)	2.1	19.4	42.9	35.6

9	BH 22-9	9.14 – 9.6	Sandy clayey silt, trace gravel (CL)	6.8	25.7	48.8	18.7
10	BH 22-10	1.52 – 1.98	Clayey silt, some sand, trace gravel (CL)	4.7	21.4	49.5	24.4
11	BH 22-11	7.62-8.08	Sandy clayey silt, trace gravel (CL)	6.2	24.1	51.3	18.4
12	BH 22-12	9.14 – 9.6	Sandy clayey silt, trace gravel (CL)	4.9	23.8	50.2	21.1
13	BH 22-13	4.57-5.03	Sandy silt, some clay, trace gravel (CL-ML)	2.6	22.0	59.6	15.8
14	BH 22-14	1.52 – 1.98	Clayey silt, some sand, trace gravel (CL)	2.6	17.9	49.0	30.5
15	BH 22 -15	4.57 - 5.03	Sandy clayey silt, trace gravel (CL -ML)	5.3	28.0	47.8	17.9

4.2. ATTERBERG LIMIT TEST

Atterberg Limits' tests were performed on seven (7) representative sample of the native deposits. The results of these tests are presented in Appendix C and summarized in Table-3 as follows.

Table 3- Atterberg results and USCS Classification of Native Deposit

Borehole I.D.	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	USCS Classification
BH22-1 SS3	23.5	15.5	8.0	CL
BH22-5 SS9	22.0	13.8	8.2	CL
BH22-6 SS2	31.8	19.0	12.8	CL
BH22-8 SS8	29.5	18.2	11.3	CL
BH22-10 SS3	28.1	15.3	12.8	CL
BH22-13 SS6	23.1	17.4	5.7	CL-ML
BH22-15 SS&	20.9	13.8	7.1	CL-ML

The grain size analysis for the above selected samples of native native gravelly clayey silt till and sandy clayey silt till revealed that the soils are fine grained (i.e., silt and clay size particles passing the 75 µm sieve size > 50%). These soils are estimated to have low to very low or practically impermeable at certain zones with permeability values < 10-6 cm/sec.

5.0 GROUNDWATER CONDITION

Ground water observations were made in each of the boreholes as they were drilled and after completion. Water level measurements and depth of cave upon completion of the boreholes are presented in the Logs of Boreholes, in Appendix B.

In general, the cohesionless silt / sand / gravel deposits encountered in the boreholes around water shed area (stream/creek) are of medium to low permeability and permit the free flow of water into open excavations in a short period of time. The cohesive soil deposits of clayey silt to silty clay soils encountered in the borehole around watershed area are of very low to low permeability.

The ground water levels are affected by the topography of the site and the relative permeability of the soil deposits. It should be noted that the groundwater levels are subject to seasonal variations depending on the amount of precipitation, surface runoff and surface infiltration. The water table have been measured in the wells on several occasions. Table No.4 below summarizes the depth and elevations of the ground water level and the dates of the water level measurements at the wells.

Table 4- Summary of Groundwater Measurements:

Borehole ID	Ground Surface Elevation (m)	Ground Water Level Measurements (mbgs)		
		Initial Reading	April 12, 2022	May 05, 2022
BH22-1 MW	188.592	Dry Upon Completion	-0.2	0.63
BH22-3 MW	189.820	Dry Upon Completion	3.10	1.90
BH22-8 MW	189.726	Dry Upon Completion	4.77	4.99
BH22-12 MW	189.055	Dry Upon Completion	4.35	4.46
BH22-14 MW	187.946	Dry Upon Completion	4.81	4.46

6.0 DISCUSSION AND RECOMMENDATIONS

The following discussion and recommendations are based on the factual data obtained from this geotechnical investigation and are intended for use by the owner and design engineers only. Contractor's bidding or providing services on these projects should review the factual data and determine their own conclusions regarding construction methods and scheduling.

This geotechnical investigation has revealed in general that the site is covered by a surficial layer of topsoil, followed by a thin layer of clayey silt fill (disturbed) material underlain by native clayey silt to silty clay with sand and gravel matrix in alternate layers or individually to the full depth of investigation containing moist sand and silt seams. Based on our fieldwork, laboratory tests and other pertinent information supplied by the client, the following comments and recommendations are made.

6.1. CONSERVATION HALTON POLICIES FOR ONTARIO REG162/06

Section 2.4.2 of the Conservation Halton (The Halton Region Conservation Authority) Policies and Guidelines for the Administration of Ontario Regulation 162/06 and Land Use Planning Policy Document April 27, 2006 (last amended, November 26, 2020) stated that a stable top of bank requires:

1- A minimum 8-to-15-meter toe erosion allowance for Valleyland (section 2.4.2.1);

2- A maximum 3.0H: 1.0V slope inclination for shoreline (section 2.4.2.2); and

3- A 15m and 7.5m setback from the toe of any major and minor valley slope, respectively (section 2.4.2.3).

6.2. STABILITY ASSESSMENT OF EXISTING SLOPE

A site visit was made by a senior Geotechnical Engineer of **AME** on January 27, 2022, to carry out the visual assessment of the slope condition and to mark the location of the proposed boreholes. The slope conditions are summarized as follow:

- The height of the subject slope was varied from 1 to 8 meters from the top of the bank to the toe of the slope along the stream. It is higher close to the sixth line (BH22-13) and decreased toward west.

- The steepness of the slope generally ranged from 5.0H to 1.0 V to 2.0H:1.0V
- The slope was generally covered with mature trees and other vegetation as shown in the photographs in Appendix E. During the site visit, few bending / tilted trees were noted on the slope; however, majority of trees were generally standing straight.
- No slope slumping or tension cracks were observed on the slope surface.
- No water seepage was observed on the slope surface or at the toe of slope area.

Two (2) slope profiles were derived from the topographical map provided by the client, presented in Appendix D (Figure D1 to D2) of the report. They represent the highest and steepest cross section, respectively.

Based on the borehole information as described in section 4 of this report, soil parameters used in slope stability analysis are given in table 5.

Table 5 – *Geotechnical Parameters of soil strata*

Soil Type	Unit Weight (KN/m^3)	Long-term strength Parameters	
		Cohesion (KPa)	Friction Angle (^{o})
Fill	19.0	0	32
Silty clay – Clayey silt	20.0	10	34
Sandy Silty Clay till	21	50	35

Stability analyses of the slope was carried out using the program SLIDE 7.0 with the Bishop/Janbu's simplified method for the soil profiles based on worst case scenario. The calculated factor of safety (FS) of the existing slope at cross section A-A and B-B is 4.554 and 3.192, respectively, for the most critical slipping plane will be passing through the fill layer which similar thickness has been reported from BH22-13 and BH22-3 (See Figure D-1 and D-2 of Appendix D). The calculated FS is significantly more than the generally acceptable value of 1.5 for long-term stability of slopes. The existing slope at the site is deemed to be stable in terms of long-term stability.

6.3. STABILITY ASSESSMENT OF SLOPE AFTER DEVELOPEMENT

To assess the impact of future development on the stability of the slope; a spread load of 100KPa, representing the building load, was considered fifteen (15) meters from the toe of the slope for section A-A and B-B. The calculated factor of safety (FS) of the slope, with load, at cross section A-A and B-B remains the same showing the load, with this magnitude and location, will not create any more critical slipping plane.

6.4. STABILITY ASSESSMENT FOR THE HERITAGE BUILDING, 6516 SIXTH LINE

AME understands that there is a heritage building at 6516 Sixth Line which appeared to be close to the toe of bank at the eastern most side of the area of investigation. One (1) slope profile was derived from the topographical map provided by the client, presented in Appendix D (Figure D5) of the report. It represents the most critical cross section of slope at this area and to assess the stability of the slope. The calculated factor of safety (FS) of the slope at the cross-section C-C is 1.749 (See figure D-5 Appendix D). The calculated FS is slightly more than the generally acceptable value of 1.5 for long-term stability of slopes. The existing slope at the site is deemed to be stable in terms of long-term stability.

The building is within 15m of Stable top of Bank and no publicly owned access exists within 7.5m of the stable top of bank. Accordingly, the building subjects to action outlines in item 2.35.2 of Conservation Halton (The Halton Region Conservation Authority) Policies and Guidelines for the Administration of Ontario Regulation 162/06 and Land Use Planning Policy Document April 27, 2006 (last amended, November 26, 2020).

6.5. LONG-TERM STABLE SLOPE (LTSS) ASSESSMENT

Long-term stable slope pertains to the stable slope angle projected from the stable toe of slope (see Figure 1).

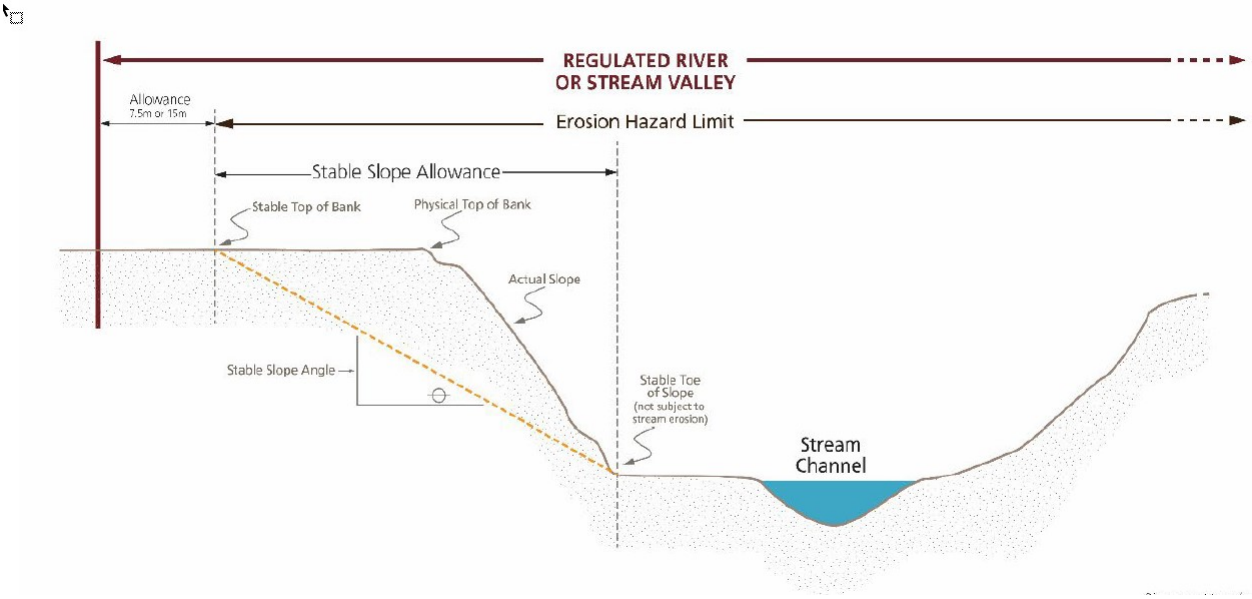

Figure 1 – ***Valley Erosion Hazards – Stable Toe of Slope***
Riverine Erosion Hazard – Apparent (Confined) Valleys with Stable Toe of Slope

The minimum 8 meters toe erosion allowance was considered and the projected slope to the existing top of bank was analyzed, approximately 1.5H:1.0V and 1.0H:1.0V slope for section A-A and B-B, respectively. The calculated factor of safety (FS) of the existing slope at cross section A-A and B-B is 3.563 and 2.370, respectively, for the most critical slipping plane will be passing through the fill layer (See Figure D-6 and D-7 of Appendix D). The calculated FS is significantly more than the generally acceptable value of 1.5 for long-term stability of slopes. Accordingly, no adjustment will be required for the defined allowances in section 6.1 and 6.2.

7.0 CLOSURE

The Limitations of Report that follows this section forms an integral part of this report.

This report is intended solely for the Client named. The material in it reflects our best judgement in light of the information available to Aecon Materials Engineering Corp. at the time of preparation. No portion of this report may be used as a separate entity, it is written to be read in its entirety. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties.

We trust that this report meets with your present requirements. Please do not hesitate to contact us should any questions arise concerning this report.

Yours truly,

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Limitations of Report

The conclusions and recommendations presented in this report are based on the subsurface information determined in the boreholes at the locations indicated on the Borehole Location Plan, Drawing 2, Appendix A. The information contained herein in no way reflects on the environmental aspects of the project, unless otherwise stated. Subsurface conditions between and beyond the test holes may differ from those encountered at the borehole locations, and conditions may become apparent during construction, which could not be detected or anticipated at the time of the site investigation. Our responsibility is limited to the interpretation of the soil and groundwater conditions that prevailed at the locations investigated.

The findings and recommendations of the geotechnical investigation presented in this report are applicable only to the project described in the text, and then only if the work described is completed substantially in accordance with the details stated in this report.

The number of boreholes may not be sufficient to determine all the factors that may affect the horizontal directional drilling and costs. For example, the thickness of granular fill and earth fill layers may vary markedly and unpredictably. Contractors undertaking the implementation of horizontal directional drilling must, therefore, make their own interpretation of the factual information presented and draw their own conclusions as to how the subsurface conditions may affect their work.

This work has been undertaken in accordance with normally accepted geotechnical engineering practices. No other warranty is expressed or implied.

APPENDIX A

Site Plan: Drawing A1
Borehole Location Plan: Drawing A2

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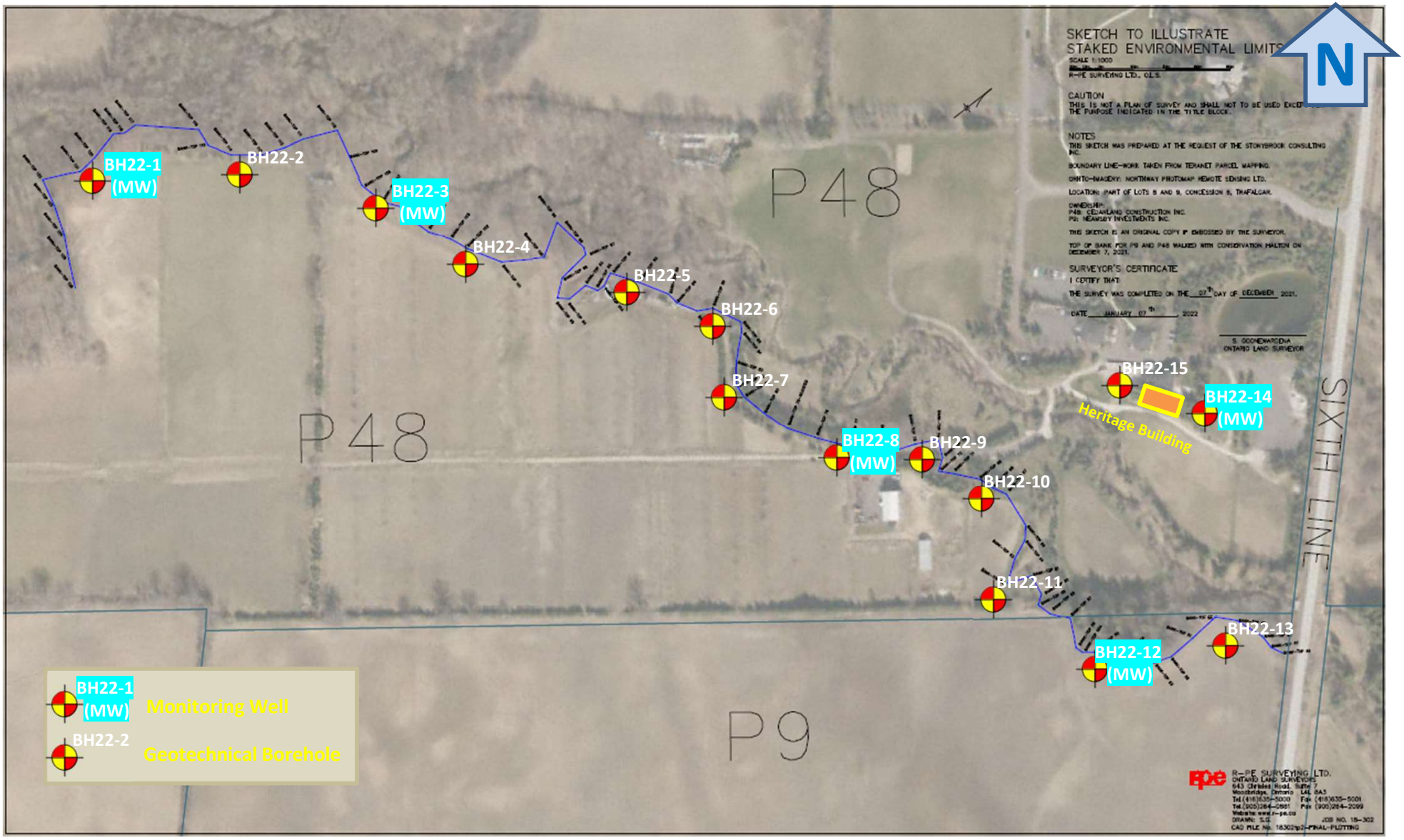
SITE LOCATION PLAN

Geotechnical Investigation for Top of the Bank Stability

Property at Part lot 47

6451 Sixth Line, Milton, ON

Project No.:	30291.233
Scale:	Refer to Plan
Date:	May 2022
Drawing No.	A 1



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BOREHOLE LOCATION PLAN

Geotechnical Investigation for Top of the Bank Stability

Property at Part lot 47

6451 Sixth Line, Milton, ON

Project No.:	30291.233
Scale:	Refer to Plan
Date:	May 2022
Drawing No.	A 2

APPENDIX B

Explanation of Borehole Logs

Logs of Boreholes: Figure Nos. B1 to B15

AME
Materials Engineering

SYMBOLS AND TERMS

SOIL DESCRIPTION

SOIL GENISIS

Topsoil	: Mixture of soils and humus capable of supporting vegetative growth.
Peat	: Mixture of visible and invisible fragments of decayed organic matter
Till	: Unstratified glacial deposit which may range from clay to boulders
Fill	: Materials below the surface identified as placed by humans (excluding buried services)

SOIL STRUCTURE

Desiccated	: Having visible signs of weathering by oxidization of clay minerals, shrinkage cracks, etc.
Fissured	: Having cracks and hence a blocky structure
Varved	: Composed of regular alternating layers of silt and clay
Stratified	: Composed of alternating successions of different soil types, e.g. silt and sand
Layer	: > 75 mm in thickness
Seam	: 2 mm to 75 mm in thickness
Parting	: < 2 mm in Thickness

GRAIN SIZE DISTRIBUTION

MC%	: Natural moisture content or water content of sample, %
LL	: Liquid limit, % (water content above which soils behaves as a liquid)
PL	: Plastic limit, % (water content above which soil behaves plastically)
PI	: Plastic index, % (difference between LL and PL)
Dxx	: Grain size at which xx% of the soil, by weight, is of finer grain sizes. These grain size descriptions are not used below 0.075 mm grain size.
D10	: Grain size at which 10% of the soil is finer (effective grain size)
D60	: Grain size at which 60% of the soil is finer.
Cc	: Concavity coefficient = $(D30)^2$ / (D10 X D60)
Cu	: Uniformity coefficient = D60 / D10

SAMPLE TYPE

SS	: Spilt spoon sample (obtained by performing the standard penetration test)
ST	: Shelby tube or thin wall tube
DP	: Direct-Push sample (small diameter tube sampler hydraulically advanced)
PS	: Piston Sample
BS	: Bulk Sample
WS	: Wash Sample
HQ, NQ, BQ, etc.	: Rock core samples obtained with the use of standard size diamond coring bits

N-VALUE – STANDARD PENETRATION RESISTANCE

Numbers in this column are the field results of the Standard Penetration Test(SPT): the number of blows of a 140 pound(64kg) hammer falling 30 inches (760mm), required to drive a 2 inch (50.8mm) O.D. split spoon sampler one foot (305mm) into the soil. For split spoon samples where insufficient penetration was achieved and N-values cannot be presented, the number of blows are reported over sampler penetration in millimeters (e.g. 50/75). Some design methods make use of N-value corrected for various factors such as overburden pressure, energy ratio, borehole diameter, etc. No corrections have been applied to the N-value presented on the log.

SOIL DESCRIPTION

A) COHESIONLESS SOILS

Density Index (Relative Density)	(Blows / 300mm or Blows / ft)
Very Loose	0 to 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very Dense	Over 50

B) COHESIVE SOILS

Consistency	Undrained Shear Strength	
	Kpa	Psf
Very Soft	0 to 12	0 to 250
Soft	12 to 25	250 to 500
Firm	25 to 50	500 to 1000
Stiff	50 to 100	1000 to 2000
Very Stiff	100 to 200	2000 to 4000
Hard	Over 200	Over 4000

RECOVERY

For soil samples, the recovery is recorded as the length of the soil sample recovered divided by the total length of sampling and is recorded as a percentage on a per sample basis.

Figure No. B-(i)

AME
Materials Engineering

SYMBOLS AND TERMS (CONT'D)

DYNAMIC CONE PENETRATION TEST (DCPT)

Dynamic cone penetration tests are performed using a standard 60 degree apex cone connected to A size drill rods with the same standard fall height and weight as the standard penetration test. The DCPT is used as a probe to assess soil variability.

CONSOLIDATION TEST

P'o	: Present effective overburden pressure at sample depth.
P'c	: Preconsolidation pressure of (maximum past pressure on) sample.
Ccr	: Recompression index (in effect at pressures below P'c)
Cc	: Compression index (in effect at pressures above P'c)
OC ratio	: Overconsolidation retio = P'c / P'o
Void Ratio	: Initial sample void retio = Volume of Voids / Volume of solids
Wo	: Initial water content (at start of consolidation test)

ROCK DESCRIPTION

ROCK WEATHERING

Term	Description
Fresh	: No Visible signs of rock weathering. Slight discoloration along major discontinuities.
Slightly Weathered	: Discoloration indicates weathering of rock on discontinuity surfaces. All the rock material may be discolored.
Moderately Weathered	: Less than half the rock is decomposed and/or disintegrated into the soil.
Highly Weathered	: More than half the rock is decomposed and/or disintegrated into the soil.
Completely Weathered	: All the rock material is decomposed and/or disintegrated into the soil. The original mass structure is still largely intact.

ROCK MASS:

Spacing (mm)	Joint Classification	Bedding, Laminates, Bands
> 6000	Extremely Wide	-
2000 – 6000	Very Wide	Very Thick
600 – 2000	Wide	Thick
200 - 600	Moderate	Medium
60 – 200	Close	Thin
20 – 60	Very Close	Very Thin
< 20	Extremely Close	Laminated
< 6	-	Thinly Laminated

CORE CONDITION

Total Core Recovery (TCR): The percentage of solid drill core recovered regardless of quality or length, measured relative to the length of the total core run

Solid Core Recovery (SCR): The percentage of solid drill core, regardless the length, recovered at the full diameter, measure relative to the length of the total core run.

Rock Quality Designation (RQD): Rock quality classification is based on a modified core recovery percentage (Rock Quality Designation) RQD in which all pieces of sound core over 100mm long are counted as recovery. The smaller pieces are considered to be due to close shearing, jointing, faulting or weathering in the mass and are not counted. RQD was originally intended to be done on NW core; however it can be used on different core sizes if the bulk of the fractures caused by drilling stresses are easily distinguishable from in situ fractures. The terminology describing rock mass quality based on RQD is subjective and is underlain by the resumption that sound strong rock is of higher engineering value than fractured weak rock.

ROCK QUALITY

RQD	Rock Mass Quality
0 to 25	Very Poor
25 to 50	Poor
50 to 75	Fair
75 to 90	Good
90 to 100	Excellent

ROCK STRENGTH

Strength Classification	Unconfined Compressive Strength (MPa)
Extremely Weak	< 1
Very Weak	1 – 5
Weak	5 – 25
Medium Strong	25 – 50
Strong	50 – 100
Very Strong	100 – 250
Extremely Strong	> 250

WATER LEVEL MEASUREMENT

▼: Measured in Standpipe, Piezometer, or well

▽: Inferred

Figure No. B-(ii)

Log of Borehole BH 22-1 MW

AME Materials Engineering

Project No.: 30291.233

Project Name: Sixth Line - Top of Bank Investigation

Figure No. B-1

Location: Sixth Line & Derry Road, Milton, Ontario

E=595625.671; N=4820789.732

Date Drilled: 22-3-22

Drill Type: Solid Stem Auger

Datum: Geodetic

Split Spoon Sample | Auger Sample | SPT (N) Value | Dynamic Cone Test | Shelby Tube | Shear Strength by Vane Test (S)

Combustible Vapour Reading | Natural Moisture Content | Atterberg Limits | Undrained Triaxial at % Strain at Failure | Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH	Standard Penetration Test N Value / Shear Strength kPa	Total Organic Vapours (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Additional Notes
		FILL: clayey sandy silt, trace gravel, trace organics, loose, damp to moist, brown	188.59	0	7	25.6		
		CLAYEY SANDY SILT: trace gravel, very stiff, moist, brown	188.39 / 188.29					
		CLAYEY SILT TILL: trace sand, trace gravel, very stiff, dry to damp, brown / grey	187.19	1	16	12.6		
				2	26	10.4 / 15.5 / 23.5		
					24	11.4		
		SILTY CLAY TILL:trace sand, trace gravel, trace cobble, hard, dry to damp, grey	185.69	3	30	10.3		
				4				
				5	33	9.4		
		CLAYEY SILT TILL: some sand, trace gravel, hard, dry, grey	183.09	6	40	9.3		
		.....trace sand, trace cobble, very stiff		7				
				8	21	9.2		
		SILTY CLAY TILL: trace sand, trace gravel, hard, damp to moist, grey	180.09	9	53	9.1		
		End of borehole at 9.60 m	178.99					

LOG OF BOREHOLE OLD SIXTH LINE TOB INVESTIGATION.GPJ AME_ON.GDT 22-6-7

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
3/22/2022	Dry Upon Completion	9.60
4/12/2022	0.20	
05/19/2022	0.63	

Log of Borehole BH 22-10

AME Materials Engineering

Project No.: 30291.233

Project Name: Sixth Line - Top of Bank Investigation

Figure No. B-10

Location: Sixth Line & Derry Road, Milton, Ontario

E=596131.157; N=4821095.589

Date Drilled: 22-3-18

Drill Type: Solid Stem Auger

Datum: Geodetic

Split Spoon Sample | Auger Sample | SPT (N) Value | Dynamic Cone Test | Shelby Tube | Shear Strength by Vane Test (S)

Combustible Vapour Reading | Natural Moisture Content | Atterberg Limits | Undrained Triaxial at % Strain at Failure | Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH	Standard Penetration Test N Value / Shear Strength kPa	Total Organic Vapours (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Additional Notes
		FILL: clayey silt, trace sand, trace gravel, trace organics, firm, moist, brown	188.41	0	6	22.5		
		FILL: clayey silt, trace sand, trace gravel, trace organics, firm, moist, brown	187.80	1	17	17.4		
		SILTY CLAY: trace sand, trace gravel, very stiff, damp, greyish brown	187.01	2	21	14		
		.....hard, greyish brown/ brown below 2.30m depth		3	31	13.4		
					32	16		
				4	31	9.4		
				5	31	8.9		
		.....trace cobbles, very stiff, red/ grey below 6.10m depth		6	25	12.1		
		.....hard below 7.10m depth		7				
				8	31	8.8		
		.....very stiff, red/ grey below 8.60m depth		9	25	13.5		
		End of borehole at 9.60 m	178.81					

LOG OF BOREHOLE OLD SIXTH LINE TOB INVESTIGATION.GPJ AME_ON.GDT 22-6-7

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
3/18/2022	Dry Upon Completion	9.60

Sheet No. 1 of 1

Log of Borehole BH 22-11

AME Materials Engineering

Project No.: 30291.233

Project Name: Sixth Line - Top of Bank Investigation

Figure No. B-11

Location: Sixth Line & Derry Road, Milton, Ontario

E=696173.101; N=4821072.435

Date Drilled: 22-3-18

Drill Type: Solid Stem Auger

Datum: Geodetic

Split Spoon Sample | Auger Sample | SPT (N) Value | Dynamic Cone Test | Shelby Tube | Shear Strength by Vane Test (S)

Combustible Vapour Reading | Natural Moisture Content | Atterberg Limits | Undrained Triaxial at % Strain at Failure | Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH	Standard Penetration Test N Value / Shear Strength kPa	Total Organic Vapours (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Additional Notes
		~300mm **TOPSOIL**	188.73	0				
		FILL: clayey silt to silty clay, trace sand, trace gravel, trace grass/ rootlets/ organics, stiff, wet, brown	188.43					
		SANDY SILTY CLAY: trace gravel, stiff, moist, brown slightly mottled, occasional oxidised surfaces	188.28					
		.....very stiff below 1.50m depth		1				
		.....red/ brown below 2.30m depth		2				
		.....red/ brown/ grey, hard below 3.00m depth .....occasional trace of cobble		3				
		.....grey below 4.00m depth		4				
		.....trace of weathered red shale pieces below 6.10m depth		6				
		.....hard below 7.00m depth		7				
		End of borehole at 9.60 m	179.13	9				

Standard Penetration Test N Value: 20 40 60 80 — Shear Strength: 50 100 150 200 kPa

Total Organic Vapours (ppm): 25 50 75 — Natural Moisture Content % / Atterberg Limits (% Dry Weight): 20 40 60

Depth	SPT N	Shear Strength (kPa)	Natural Moisture Content %	Total Organic Vapours (ppm)
0	10		25.3	
1	13		14.6	
2	27		12	
3	18		12.1	
4	28		10.9	
5	23		8.6	
6	26		9.3	
8	30		9.4	
9	30		9.3	

LOG OF BOREHOLE OLD SIXTH LINE TOB INVESTIGATION.GPJ AME_ON.GDT 22-6-7

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
3/18/2022	Dry Upon Completion	9.60

Sheet No. 1 of 1

Log of Borehole BH 22-12 MW

AME Materials Engineering

Project No.: 30291.233

Project Name: Sixth Line - Top of Bank Investigation

Figure No. B-12

Location: Sixth Line & Derry Road, Milton, Ontario

E=596246.959; N=4821086.390

Date Drilled: 22-3-21

Drill Type: Solid Stem Auger

Datum: Geodetic

Split Spoon Sample | Auger Sample | SPT (N) Value | Dynamic Cone Test | Shelby Tube | Shear Strength by Vane Test (S)

Combustible Vapour Reading | Natural Moisture Content | Atterberg Limits | Undrained Triaxial at % Strain at Failure | Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		FILL: clayey silt, trace sand, trace gravel, trace grass/ rootlets/ organics, firm, moist, brown	189.06	0
		CLAYEY SILT TILL: trace sand, trace gravel, very stiff, damp to dry, brown/ grey slightly mottled, occasional oxidised surfaces	187.86	1
		.....red/ brown below 2.30m depth		2
		.....hard, dry, red/ brown/ grey below 3.00m depth .....occasional trace of cobble	184.71	3
		SILTY CLAY: trace sand, trace gravel, very stiff, moist to wet, brownish grey	184.34	4
		CLAYEY SILT TILL: some sand, trace gravel,hard, damp to moist, brown/ grey	183.58	5
		.....trace of weathered red shale pieces below 6.10m depth		6
		.....hard below 7.00m depth		7
		.....very stiff, moist to wet, grey below 7.60m depth		8
		.....hard below 8.60m depth		9
		End of borehole at 9.60 m	179.46	

Standard Penetration Test N Value: 7, 22, 27, 27, 32, 26, 36, 29, 31

Shear Strength (kPa): 20 40 60 80 / 50 100 150 200

Total Organic Vapours (ppm): 25 50 75

Natural Moisture Content % / Atterberg Limits (% Dry Weight): 20 40 60

Natural Moisture Content: 21.8, 14.4, 12.2, 13.5, 14.9, 12, 9.1, 12.1, 11

SAMPLES

Additional Notes

LOG OF BOREHOLE OLD SIXTH LINE TOB INVESTIGATION.GPJ AME_ON.GDT 22-6-7

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
3/21/2022	Dry Upon Completion	9.60
4/12/2022	4.35	
05/19/2022	4.46	

Sheet No. 1 of 1

Log of Borehole BH 22-13

AME Materials Engineering

Project No.: 30291.233

Project Name: Sixth Line - Top of Bank Investigation

Figure No. B-13

Location: Sixth Line & Derry Road, Milton, Ontario

E=596275.760; N=4821150.821

Date Drilled: 22-3-21

Drill Type: Solid Stem Auger

Datum: Geodetic

Split Spoon Sample | Auger Sample | SPT (N) Value | Dynamic Cone Test | Shelby Tube | Shear Strength by Vane Test (S)

Combustible Vapour Reading | Natural Moisture Content | Atterberg Limits | Undrained Triaxial at % Strain at Failure | Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH	Standard Penetration Test N Value / Shear Strength kPa	Total Organic Vapours (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Additional Notes
		FILL: clayey silt, trace sand, trace gravel, trace grass/ rootlets/ organics, firm, moist, brown	188.21	0	11	28.4		
			187.60					
		CLAYEY SILT TILL: trace sand, trace gravel, stiff, damp to dry, brown/ grey slightly mottled, occasional oxidised surfaces		1	24	14.8		
		.....very stiff below 1.50m		2	21	13.6		
					16	14.2		
			185.31	3				
		SILTY CLAY: trace sand, trace gravel, very stiff, damp to moist, brown			29	14.7		
			183.81	4				
		CLAYEY SILT TILL: trace sand, trace gravel, very stiff, damp to moist, grey		5	28	18.5		
		.....hard below 6.10m depth		6	30	11		
		.....very stiff below 7.60m depth		7	25	11		
		.....wet at 9.00m depth		8				
				9	31	12.8		
		End of borehole at 9.60 m	178.61					

LOG OF BOREHOLE OLD SIXTH LINE TOB INVESTIGATION.GPJ AME_ON.GDT 22-6-7

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
3/21/2022	Dry Upon Completion	9.60

Sheet No. 1 of 1

Log of Borehole BH 22-14 MW

AME Materials Engineering

Project No.: 30291.233

Project Name: Sixth Line - Top of Bank Investigation

Figure No. B-14

Location: Sixth Line & Derry Road, Milton, Ontario

E=596149.065; N=4821235.380

Date Drilled: 22-3-18

Drill Type: Solid Stem Auger

Datum: Geodetic

Split Spoon Sample | Auger Sample | SPT (N) Value | Dynamic Cone Test | Shelby Tube | Shear Strength by Vane Test (S)

Combustible Vapour Reading | Natural Moisture Content | Atterberg Limits | Undrained Triaxial at % Strain at Failure | Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		~50mm **TOPSOIL**	187.95	0
		~100mm **GRANULAR**	187.90	
		Sandy gravel mixed with crusher run limestone, moist, grey/ brown	187.80	
		FILL: clayey silt, trace sand, trace gravel, trace grass/ rootlets/ organics, very stiff, moist to wet, brown	187.19	1
		CLAYEY SILT TILL: trace sand, trace gravel, slightly mottled, very stiff, moist, brown		2
		.....hard below 3.00m depth .....fine sand seams at 3.0m depth		3
				4
		.....red/ grey below 5.00m depth	183.14	5
				6
				7
				8
				9
		End of borehole at 9.60 m	178.35	

Standard Penetration Test N Value: 11, 21, 25, 18, 38, 36, 30, 28, 37

Shear Strength kPa: 20 40 60 80 / 50 100 150 200

Total Organic Vapours (ppm): 25 50 75

Natural Moisture Content % / Atterberg Limits (% Dry Weight): 20 40 60

Natural Moisture Content: 23, 18.4, 16.6, 17.1, 15.5, 9.6, 9.5, 9.7, 11.3

SAMPLES | Additional Notes

LOG OF BOREHOLE OLD SIXTH LINE TOB INVESTIGATION.GPJ AME_ON.GDT 22-6-7

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
3/18/2022	Dry Upon Completion	9.60
4/12/2022	4.81	

Sheet No. 1 of 1

Log of Borehole BH 22-15

Materials Engineering

Project No.: 30291.233

Project Name: Sixth Line - Top of Bank Investigation

Figure No. B-15

Location: Sixth Line & Derry Road, Milton, Ontario

E=596092.311; N=4821197.449

Date Drilled: 22-3-18

Drill Type: Solid Stem Auger

Datum: Geodetic

Split Spoon Sample | Auger Sample | SPT (N) Value | Dynamic Cone Test | Shelby Tube | Shear Strength by Vane Test (S)

Combustible Vapour Reading | Natural Moisture Content | Atterberg Limits | Undrained Triaxial at % Strain at Failure | Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
			188.32	0
		50mm **TOPSOIL**	188.27	
		FILL: clayey silt, trace sand, trace gravel, trace grass/ rootlets/ organics, firm, moist, brown, slightly mottled		
			187.26	1
		CLAYEY SILT TILL: trace sand, trace gravel, slightly mottled, very stiff, moist, brown		
		.....occasional weathered cobble pieces		
		.....sand seams at 1.50m depth		2
		occasional gravelly sand pockets		
		.....red brown/ green brown		3
			184.32	4
		SANDY SILT TILL: trace clay, trace gravel, dense, moist red/ brown - red/ grey		
		.....dense, occasional cobble at 4.60m depth		5
			182.82	
		CLAYEY SILT TILL: trace sand, trace gravel, slightly mottled, hard, moist, red/ grey		6
				7
				8
				9
			178.72	
		End of borehole at 9.60 m		

Standard Penetration Test N Value: 20 40 60 80 — Shear Strength kPa: 50 100 150 200

Total Organic Vapours (ppm): 25 50 75 — Natural Moisture Content % / Atterberg Limits (% Dry Weight): 20 40 60

Depth	SPT (N)	Shear Strength (kPa)	Natural Moisture Content (%)	Total Organic Vapours (ppm)
0	8		25	
1	8		21.9	
2	13		25.4	
3	18		14	
4	24		13.1	
5	40		11	
6	32		9.1	
7	37		10.8	
8	31		9.8	
9	30		10.1	

SAMPLES | Additional Notes

LOG OF BOREHOLE OLD SIXTH LINE TOB INVESTIGATION.GPJ AME_ON.GDT 22-6-7

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
3/18/2022	Dry Upon Completion	9.60

Sheet No. 1 of 1

Log of Borehole BH 22-2

AME Materials Engineering

Project No.: 30291.233

Project Name: Sixth Line - Top of Bank Investigation

Figure No. B-2

Location: Sixth Line & Derry Road, Milton, Ontario

E=595693.945; N=4820871.924

Date Drilled: 22-3-22

Drill Type: Solid Stem Auger

Datum: Geodetic

Split Spoon Sample | Auger Sample | SPT (N) Value | Dynamic Cone Test | Shelby Tube | Shear Strength by Vane Test (S)

Combustible Vapour Reading | Natural Moisture Content | Atterberg Limits | Undrained Triaxial at % Strain at Failure | Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		FILL: clayey sandy silt, trace gravel, trace organics, loose, damp to moist, brown	190.29	0
		CLAY AND SILT: trace gravel, very stiff, moist, brown	189.99	
		CLAYEY SILT TILL: trace sand, trace gravel, very stiff, dry to damp, brown / grey	188.89	1
		CLAYEY SILT TO SANDY SILT: trace gravel, trace cobble, hard, dry to damp, brown/ grey	187.59	2
		SILTY CLAY TILL:trace sand, trace gravel, trace cobble, very stiff, damp, grey	186.29	3
		End of borehole at 9.60 m	180.69	4

Standard Penetration Test N Value: 6, 16, 18, 19, 31, 21, 20, 23, 14

Shear Strength (kPa): 20 40 60 80 / 50 100 150 200

Total Organic Vapours (ppm): 25 50 75

Natural Moisture Content % / Atterberg Limits (% Dry Weight): 20 40 60

Natural Moisture Content: 26.2, 18.6, 20.6, 14.3, 11, 10, 10.4, 9.3, 11.6

SAMPLES

Additional Notes

LOG OF BOREHOLE OLD SIXTH LINE TOB INVESTIGATION.GPJ AME_ON.GDT 22-6-7

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
3/22/2022	Dry Upon Completion	9.60

Sheet No. 1 of 1

Log of Borehole BH 22-3 MW

AME Materials Engineering

Project No.: 30291.233

Project Name: Sixth Line - Top of Bank Investigation

Figure No. B-3

Location: Sixth Line & Derry Road, Milton, Ontario

E=595766.003; N=4820912.430

Date Drilled: 22-3-17

Drill Type: Solid Stem Auger

Datum: Geodetic

Split Spoon Sample | Auger Sample | SPT (N) Value | Dynamic Cone Test | Shelby Tube | Shear Strength by Vane Test (S)

Combustible Vapour Reading | Natural Moisture Content | Atterberg Limits | Undrained Triaxial at % Strain at Failure | Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
			189.82	0
		~25mm **TOPSOIL**	189.80	
		FILL: clayey silt to silty clay, trace sand, trace gravel, trace grass rootlets, firm, moist to wet, dark brown/ reddish brown	189.22	
		SILTY AND CLAY TILL: trace sand, trace gravel, very stiff, dry to damp, brown, mottled with green/ red pockets		1
				2
		.....hard, damp, reddish brown below 2.30m depth		
		.....occasional alternate seams of silt and fine sand at 3.3m depth	186.72	3
				4
				5
		.....very stiff below 6.10m depth		6
				7
				8
		.....trace of red shale fragments		9
			180.22	
		End of borehole at 9.60 m		

Standard Penetration Test N Value (20 40 60 80) / Shear Strength (50 100 150 200 kPa)

Depth	SPT N	Shear Strength (kPa)
0	7	
1	11	>225
2	24	>225
3	35	>225
4	50/130mm	>225
5	57	>225
6	31	>225
7	27	225
8	22	225
9	18	225

Total Organic Vapours (ppm) (25 50 75) / Natural Moisture Content % Atterberg Limits (% Dry Weight) (20 40 60)

Depth	Natural Moisture Content %
0	27.7
1	13.6
2	12.8
3	12.7
4	8.1
5	7.8
6	8.6
7	9.7
8	9.9
9	11.1

SAMPLES | Additional Notes

LOG OF BOREHOLE OLD SIXTH LINE TOB INVESTIGATION.GPJ AME_ON.GDT 22-6-7

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
3/17/2022	Dry Upon Completion	9.60
4/12/2022	3.10	
05/19/2022	2.78	

Log of Borehole BH 22-4

AME Materials Engineering

Project No.: 30291.233

Project Name: Sixth Line - Top of Bank Investigation

Figure No. B-4

Location: Sixth Line & Derry Road, Milton, Ontario

E=595807.470; N=4820933.350

Date Drilled: 22-3-22

Drill Type: Solid Stem Auger

Datum: Geodetic

Split Spoon Sample | Auger Sample | SPT (N) Value | Dynamic Cone Test | Shelby Tube | Shear Strength by Vane Test (S)

Combustible Vapour Reading | Natural Moisture Content | Atterberg Limits | Undrained Triaxial at % Strain at Failure | Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		FILL: silty clayey sand, trace gravel, trace grass rootlets, loose, moist, dark brown/ brown	189.30	0
		CLAYEY SILT TILL: trace sand, trace gravel, very stiff, dry to damp, brown, mottled with green/ red/ brown pockets	188.70	
		.....trace coble		1
				2
		.....hard, dry, brown at 3.00m depth		3
				4
				5
		.....hard at 6.10m depth		6
				7
		.....damp to moist sandy silt seams at 8.00m depth		8
		SILTY CLAY TILL: trace sand, trace gravel, very stiff, damp, grey	180.70	
		End of borehole at 9.60 m	179.70	9

Standard Penetration Test N Value: 20 40 60 80 — Shear Strength: 50 100 150 200 kPa

Total Organic Vapours (ppm): 25 50 75 — Natural Moisture Content % Atterberg Limits (% Dry Weight): 20 40 60

SAMPLES | Additional Notes

Test	Depth	Shear Strength (kPa)	Natural Moisture Content (%)
7	0	50	28.7
17	1	50	17
29	2	100	13.8
26	2	100	14.4
43	3	150	13.8
24	5	100	9.4
31	6	150	9.6
24	8	100	10.4
20	9	100	11

LOG OF BOREHOLE OLD SIXTH LINE TOB INVESTIGATION.GPJ AME_ON.GDT 22-6-7

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
3/22/2022	Dry Upon Completion	9.60

Sheet No. 1 of 1

Log of Borehole BH 22-5

AME Materials Engineering

Project No.: 30291.233

Project Name: Sixth Line - Top of Bank Investigation

Figure No. B-5

Location: Sixth Line & Derry Road, Milton, Ontario

E=595881.593; N=4820990.391

Date Drilled: 22-3-22

Drill Type: Solid Stem Auger

Datum: Geodetic

Split Spoon Sample | Auger Sample | SPT (N) Value | Dynamic Cone Test | Shelby Tube | Shear Strength by Vane Test (S)

Combustible Vapour Reading | Natural Moisture Content | Atterberg Limits | Undrained Triaxial at % Strain at Failure | Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		FILL: clayey silt, trace sand, trace gravel, trace organics, firm to stiff, moist, brown	188.53	0
		CLAYEY SILT TO SILTY CLAY: trace sand, trace gravel, stiff to very stiff, damp, brown	187.33	1
		CLAYEY SANDY SILT: trace gravel, very stiff, moist to wet, brown - brown/ grey .....hard at 3.00m depth	185.93	2
		SILT AND CLAY: trace sand, trace gravel, hard, damp, grey	184.43	3
		.....very stiff, moist		4
		.....hard, moist to wet, grey at 7.60m depth		5
		.....very stiff below 9.1m depth		6
		End of borehole at 9.60 m	178.93	7

Standard Penetration Test N Value: 20 40 60 80 — Shear Strength kPa: 50 100 150 200

Total Organic Vapours (ppm): 25 50 75 — Natural Moisture Content % / Atterberg Limits (% Dry Weight): 20 40 60

SAMPLES | Additional Notes

Depth	Shear Strength (kPa)	Natural Moisture Content / Atterberg Limits (% Dry Weight)
0	5	27.6
1	9	20.5
2	20	16.1
3	28	16.1
4	41	10.6
5	32	20.6
6	18	12
7	31	11.5
8	17	12.4 — 13.8 — 22

LOG OF BOREHOLE OLD SIXTH LINE TOB INVESTIGATION.GPJ AME_ON.GDT 22-6-7

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
3/22/2022	Dry Upon Completion	9.60

Sheet No. 1 of 1

Log of Borehole BH 22-6

Materials Engineering

Project No.: 30291.233

Project Name: Sixth Line - Top of Bank Investigation

Figure No. B-6

Location: Sixth Line & Derry Road, Milton, Ontario

E=595939.577; N=4821031.973

Date Drilled: 22-3-17

Drill Type: Solid Stem Auger

Datum: Geodetic

Split Spoon Sample | Auger Sample | SPT (N) Value | Dynamic Cone Test | Shelby Tube | Shear Strength by Vane Test (S)

Combustible Vapour Reading | Natural Moisture Content | Atterberg Limits | Undrained Triaxial at % Strain at Failure | Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m
		FILL: clayey silt, trace sand, trace gravel, trace grass/ rootlets/ organics, firm, moist, dark brown/ brown	189.79
		CLAYEY SILT: trace sand, trace gravel, stiff to very stiff, damp to moist, brown/ reddish brown	189.19
		SILT AND CLAY: trace sand, trace gravel, hard, dry to damp, reddish brown	187.09
		.....sandy silt seams, very stiff, reddish brown/ grey	
		.....dry, hard at 4.6m depth	
		.....very stiff	
		.....grey below 5.80m depth	
		CLAYEY SILT TILL: trace sand, trace gravel, very stiff, damp to moist, grey	182.79
		.....occasional interbedded silt seams	
		End of borehole at 9.60 m	180.19

Standard Penetration Test N Value: 20 40 60 80

Shear Strength kPa: 50 100 150 200

Total Organic Vapours (ppm): 25 50 75

Natural Moisture Content % / Atterberg Limits (% Dry Weight): 20 40 60

DEPTH: 0 1 2 3 4 5 6 7 8 9

SAMPLES

Additional Notes

6 | 16 | 21 | 29 | 33 | 24 | 46 | 23 | 18 | 25

LOG OF BOREHOLE OLD SIXTH LINE TOB INVESTIGATION.GPJ AME_ON.GDT 22-6-7

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
3/17/2022	Dry Upon Completion	9.60

Log of Borehole BH 22-7

AME Materials Engineering

Project No.: 30291.233

Project Name: Sixth Line - Top of Bank Investigation

Figure No. B-7

Location: Sixth Line & Derry Road, Milton, Ontario

E=595965.729; N=4821019.050

Date Drilled: 22-3-17

Drill Type: Solid Stem Auger

Datum: Geodetic

Split Spoon Sample | Auger Sample | SPT (N) Value | Dynamic Cone Test | Shelby Tube | Shear Strength by Vane Test (S)

Combustible Vapour Reading | Natural Moisture Content | Atterberg Limits | Undrained Triaxial at % Strain at Failure | Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		FILL: clayey silt, trace sand, trace gravel, trace grass/ rootlets/ organics, firm, damp to moist, dark brown/ reddish brown	189.49	0
		SILTY CLAY: trace sand, trace gravel, very stiff, damp, brown/ grey, slightly mottled	188.09	1
		.....brown/ grey with trace of red weathered shale pieces		2
				3
		.....occasional cobble		4
				5
		CLAYEY SILT TILL: trace sand, trace gravel, very stiff, damp, reddish brown/ grey	183.89	6
				7
				8
				9
		End of borehole at 9.60 m	179.89	

Standard Penetration Test N Value: 20 40 60 80

Shear Strength kPa: 50 100 150 200

Total Organic Vapours (ppm): 25 50 75

Natural Moisture Content % / Atterberg Limits (% Dry Weight): 20 40 60

Depth	Standard Penetration Test N Value	Natural Moisture Content %
0	4	28.9
1	7	18.7
2	20	14.8
3	27	15.1
4	14	16.8
5	24	10
6	28	9.9
7	28	10.4
8	28	10.3
9	29	10.8

SAMPLES | Additional Notes

LOG OF BOREHOLE OLD SIXTH LINE TOB INVESTIGATION.GPJ AME_ON.GDT 22-6-7

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
3/17/2022	Dry Upon Completion	9.60

Sheet No. 1 of 1

Log of Borehole BH 22-8 MW

AME Materials Engineering

Project No.: 30291.233

Project Name: Sixth Line - Top of Bank Investigation

Figure No. B-8

Location: Sixth Line & Derry Road, Milton, Ontario

E=596050.830; N=4821044.029

Date Drilled: 22-3-16

Drill Type: Solid Stem Auger

Datum: Geodetic

Split Spoon Sample | Auger Sample | SPT (N) Value | Dynamic Cone Test | Shelby Tube | Shear Strength by Vane Test (S)

Combustible Vapour Reading | Natural Moisture Content | Atterberg Limits | Undrained Triaxial at % Strain at Failure | Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		FILL: clayey silt, trace sand, trace gravel, trace grass/ rootlets/ organics, firm, moist, dark brown/ brown	189.73	0
		SILT AND CLAY: trace sand, trace gravel, trace rootlets, very stiff, damp, brown/ grey, slightly mottled	189.13	
		.....hard at 2.3m depth		1
		.....hard below 4.40m depth		2
			184.96	3
		CLAYEY SILT TILL: some sand, trace gravel, hard, damp, reddish brown	182.63	4
				5
				6
				7
				8
			180.13	9
		End of borehole at 9.60 m		

Standard Penetration Test N Value: 20 40 60 80

Shear Strength kPa: 50 100 150 200

Total Organic Vapours (ppm): 25 50 75

Natural Moisture Content % / Atterberg Limits (% Dry Weight): 20 40 60

SAMPLES

Additional Notes

Sample	Shear Strength (kPa)	Natural Moisture Content (%)
8		24
21		16.5
26		13.1
41		13.4
22		16.6
14		16.3
42		10.8
48		15.1
43		7.5
31		8

LOG OF BOREHOLE OLD SIXTH LINE TOB INVESTIGATION.GPJ AME_ON.GDT 22-6-7

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
3/16/2022	Dry Upon Completion	9.60
4/12/2022	4.77	
05/19/2022	4.46	

Sheet No. 1 of 1

Log of Borehole BH 22-9

AME Materials Engineering

Project No.: 30291.233

Project Name: Sixth Line - Top of Bank Investigation

Figure No. B-9

Location: Sixth Line & Derry Road, Milton, Ontario

E=596084.737; N=4821092.353

Date Drilled: 22-3-16

Drill Type: Solid Stem Auger

Datum: Geodetic

Split Spoon Sample | Auger Sample | SPT (N) Value | Dynamic Cone Test | Shelby Tube | Shear Strength by Vane Test (S)

Combustible Vapour Reading | Natural Moisture Content | Atterberg Limits | Undrained Triaxial at % Strain at Failure | Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH	Standard Penetration Test N Value / Shear Strength kPa	Total Organic Vapours (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Additional Notes
		~25mm **TOPSOIL**	186.72	0				
		~375mm **GRANULAR**	186.69					
			186.32					
		Sandy gravel, trace asphalt, trace concrete pieces, compact, moist, brown	186.16					
		~160mm **GRANULAR**	186.11					
		Sandy gravel, trace asphalt, trace concrete pieces, compact, moist, grey	185.35	1				
		~40mm **GRANULAR**						
		Sandy silt, trace clay, trace to some gravel, compact, wet to saturated, brown						
		CLAYEY SILT: trace sand, trace gravel, stiff, moist, reddish brown/ brown		2				
		SILT AND CLAY: trace to some sand, trace gravel, very stiff, moist, red/ brown						
		.....hard, reddish brown/ grey below 2.10m depth		3				
		.....very stiff, below 3.70m depth						
		.....interbedded gravelly sand seams at 3.70m depth		4				
				5				
				6				
				7				
		SANDY SILTY CLAY TILL: trace gravel, very stiff, damp, reddish brown	179.62					
				8				
				9				
			177.12					
		End of borehole at 9.60 m						

Sample	Standard Penetration Test N Value	Natural Moisture Content %	Total Organic Vapours (ppm)
1	17	8.1	
2	14	19.3	
3	21	21.2	
4	64	11.1	
5	34	9.3	
6	19	14.4	
7	26	12.4	
8	19	10.9	
9	18	18.1	
10	16	12.6	

LOG OF BOREHOLE OLD SIXTH LINE TOB INVESTIGATION.GPJ AME_ON.GDT 22-6-7

Notes:

Date/Time	Water Level (m)	Depth to Cave (m)
3/16/2022	Dry Upon Completion	9.60

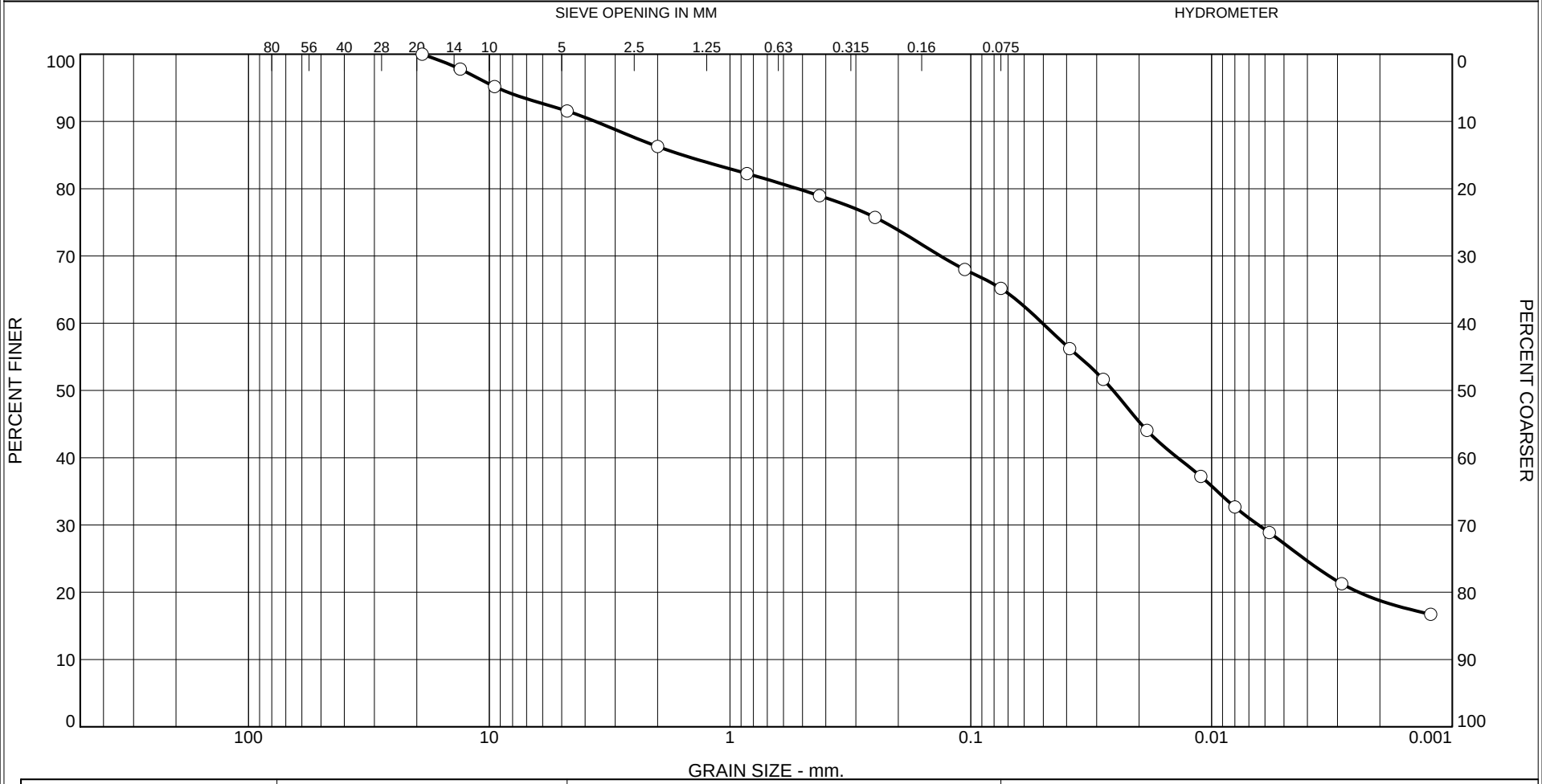
Sheet No. 1 of 1

APPENDIX C

Laboratory Test Results

Particle Size Distribution Reports: Figure Nos. C1 to C11

Particle Size Distribution Report



	% +75mm	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	8.5	5.2	7.3	13.8	46.4	18.8

Identification	Date Sampled	Date Received	Date Tested
Location: BH1 SS3 Sample Number: MG-35650	Mar 22, 2022	Apr 8, 2022	Apr 12, 2022

Client Neamsby Investment Inc.

Project Six Line Top Bank Investigation

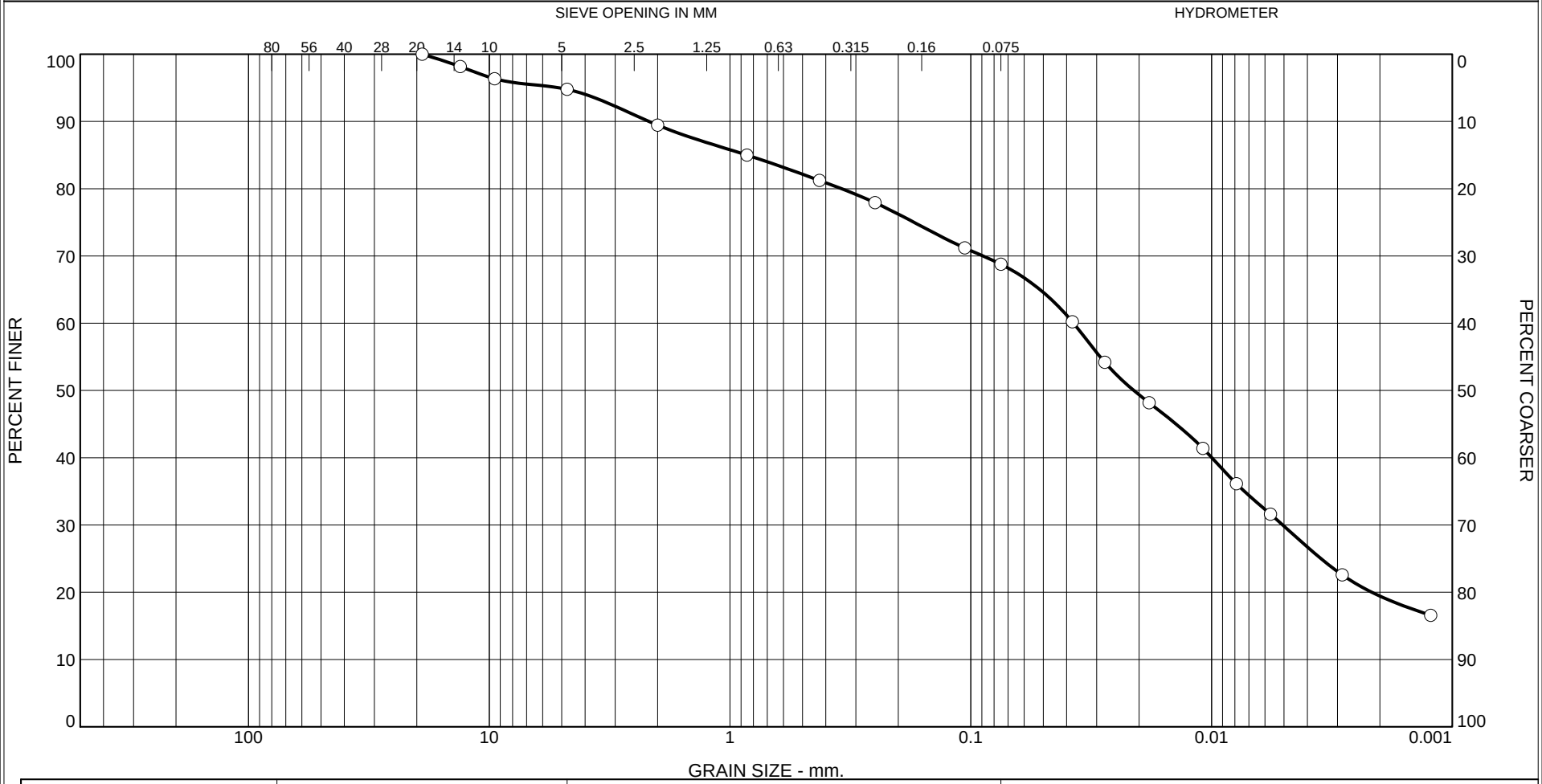
Project No. 30291.233 Figure

AME Materials Engineering

○ Description: Clayey Sandy Silt, trace Gravel

Tested By: TZ **Checked By:** JY

Particle Size Distribution Report



	% +75mm	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	5.2	5.3	8.3	12.4	49.4	19.4

Identification	Date Sampled	Date Received	Date Tested
Location: BH2 SS7 Sample Number: MG-35651	Mar 22, 2022	Apr 8, 2022	Apr 12, 2022

Client Neamsby Investment Inc.

Project Six Line Top Bank Investigation

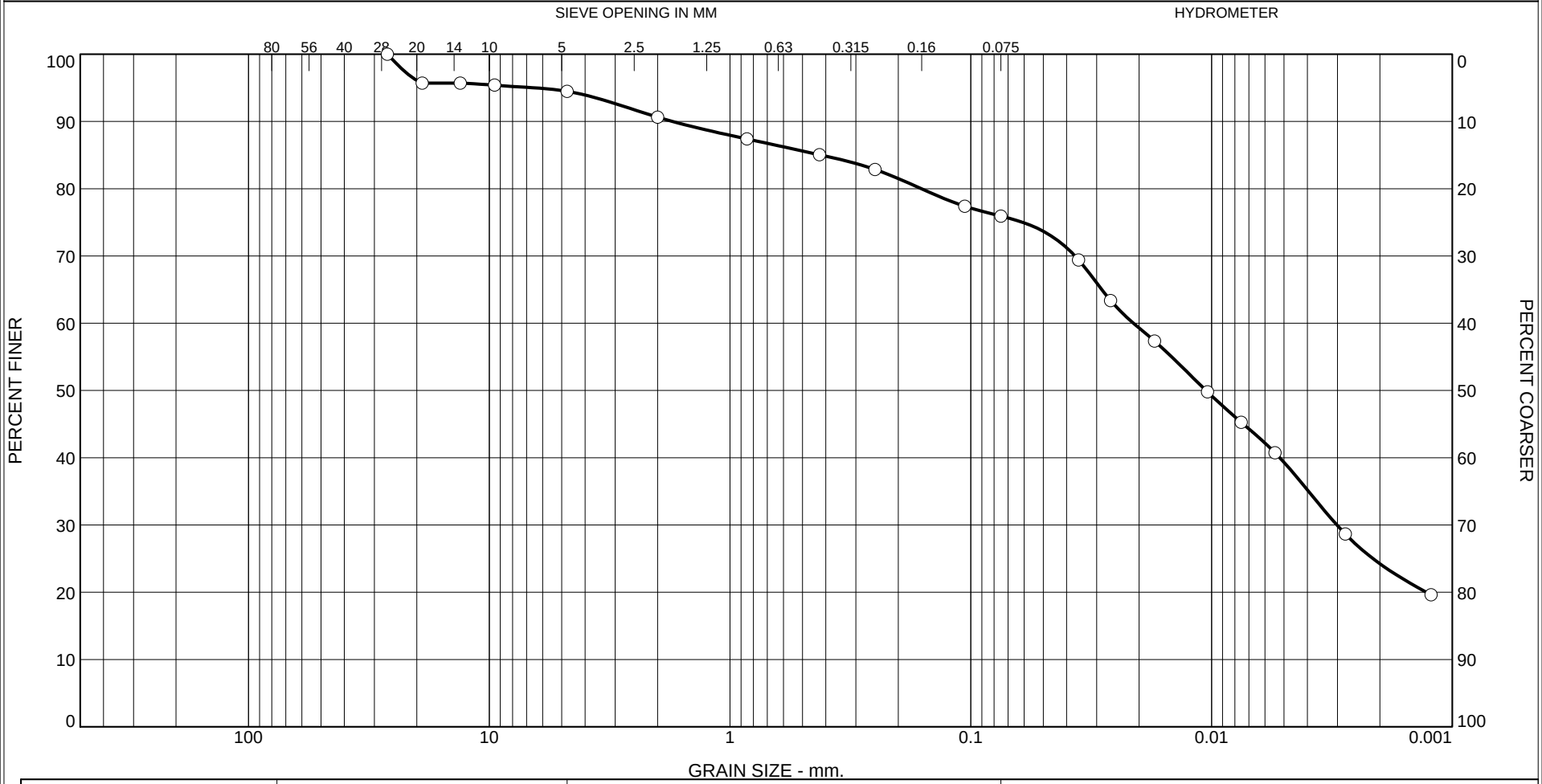
Project No. 30291.233 Figure

AME Materials Engineering

○ Description: Sandy Claeyey Silt, trace Gravel

Tested By: TZ **Checked By:** JY

Particle Size Distribution Report



	% +75mm	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	4.3	1.2	3.9	5.6	9.1	51.7	24.2

Identification	Date Sampled	Date Received	Date Tested
Location: BH3 SS2 Sample Number: MG-35652	Mar 22, 2022	Apr 8, 2022	Apr 12, 2022

Client Neamsby Investment Inc.

Project Six Line Top Bank Investigation

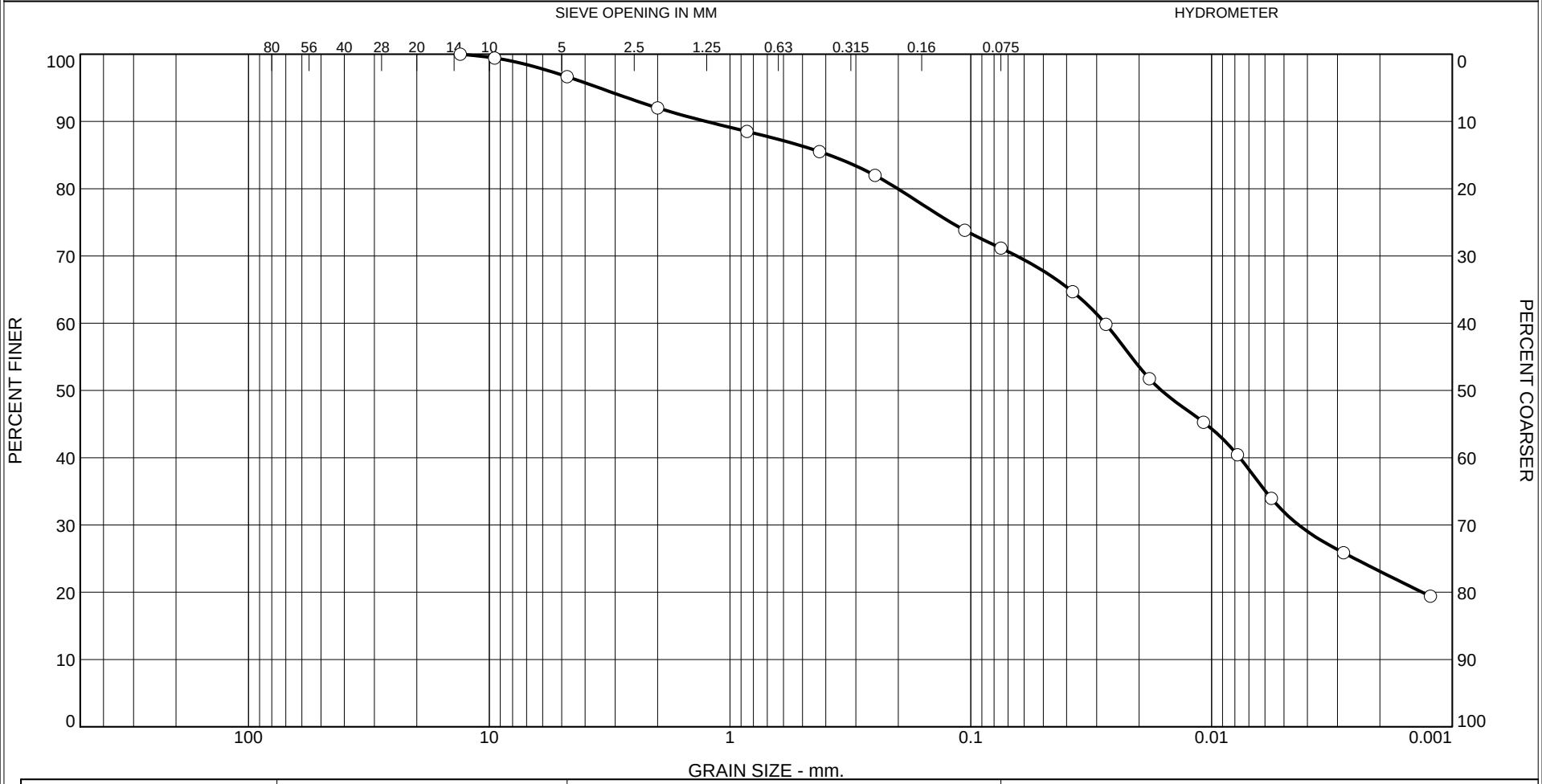
Project No. 30291.233 Figure

AME Materials Engineering

○ Description: Clayey Silt, some Sand, trace Silt

Tested By: TZ **Checked By:** JY

Particle Size Distribution Report



	% +75mm	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	3.3	4.7	6.5	14.3	48.1	23.1

Identification	Date Sampled	Date Received	Date Tested
Location: BH4 SS5 Sample Number: MG-35648	Mar 22, 2022	Apr 8, 2022	Apr 12, 2022

Client Neamsby Investment Inc.

Project Six Line Top Bank Investigation

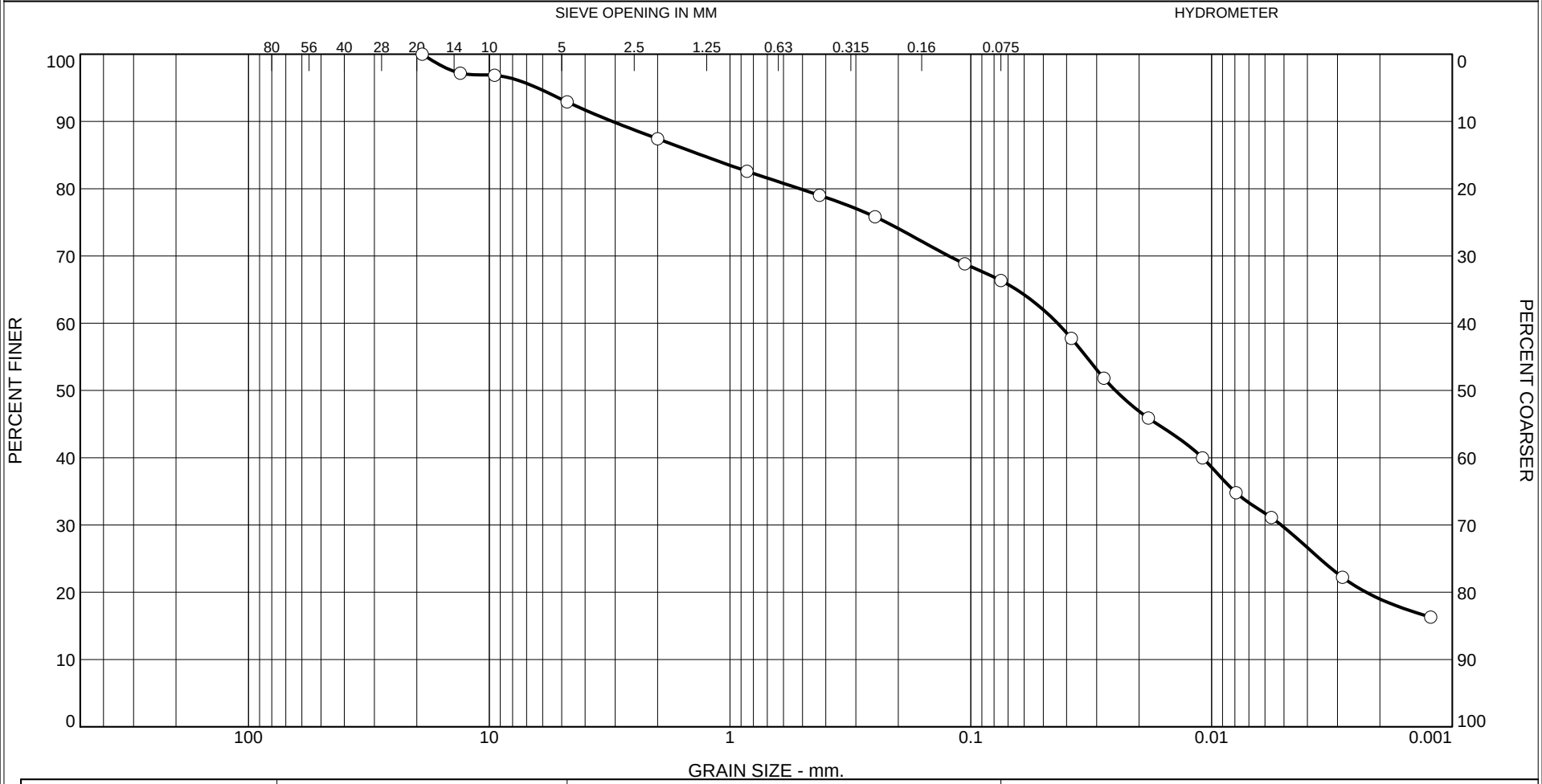
Project No. 30291.233 Figure

AME Materials Engineering

○ Description: Sandy Clayey Silt, trace Gravel

Tested By: TZ **Checked By:** JY

Particle Size Distribution Report



	% +75mm	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	7.1	5.5	8.4	12.7	47.3	19.0

Identification	Date Sampled	Date Received	Date Tested
Location: BH5 SS9 Sample Number: MG-35649	Mar 22, 2022	Apr 8, 2022	Apr 12, 2022

Client Neamsby Investment Inc.

Project Six Line Top Bank Investigation

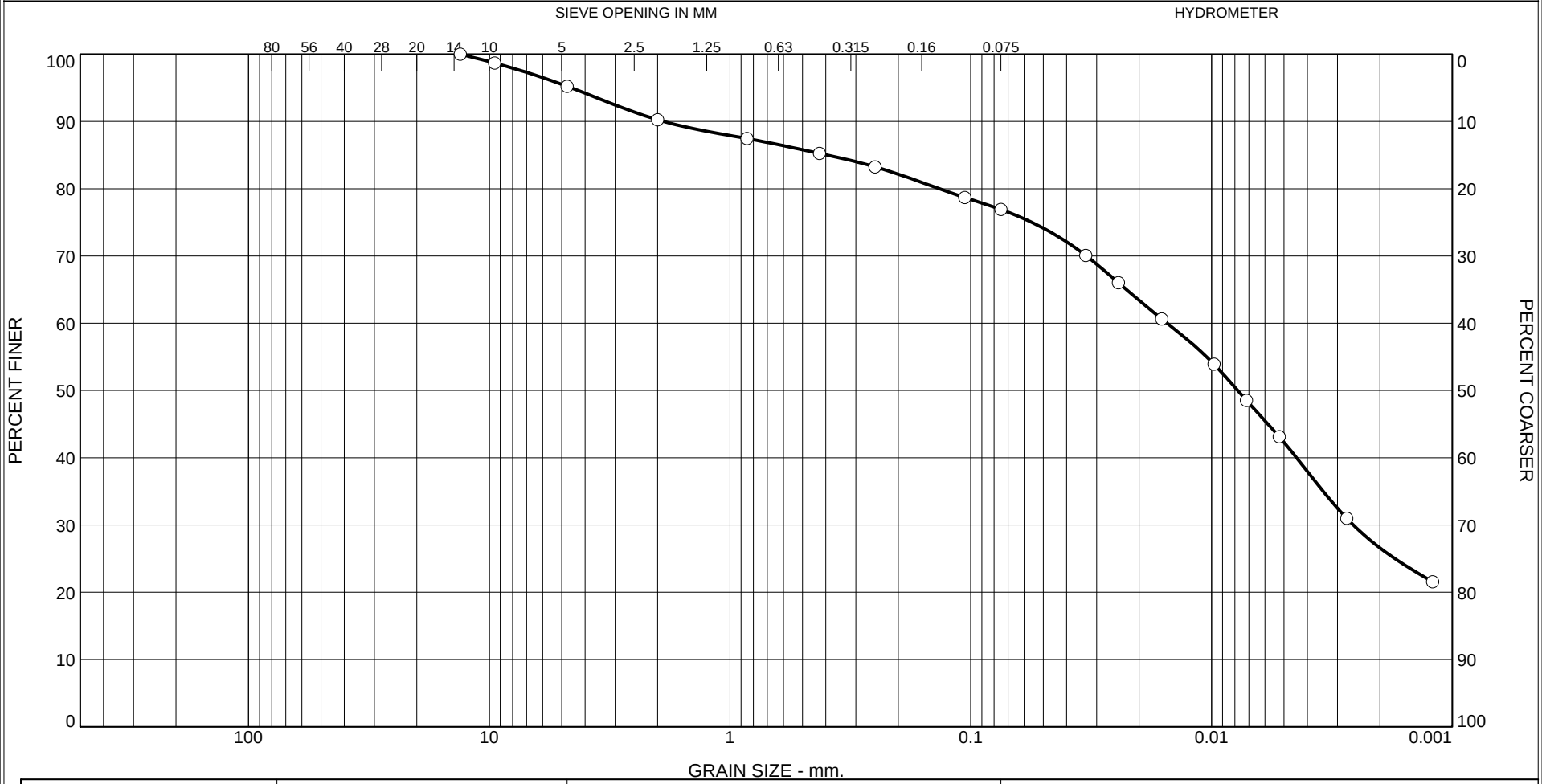
Project No. 30291.233 Figure

AME Materials Engineering

○ Description: Sandy Clayey Silt, trace Gravel

Tested By: TZ **Checked By:** JY

Particle Size Distribution Report



	% +75mm	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	4.8	4.9	5.0	8.4	50.3	26.6

Identification	Date Sampled	Date Received	Date Tested
Location: BH6 SS2 Sample Number: MG-35658	Mar 22, 2022	Apr 6, 2022	Apr 13, 2022

Client Neamsby Investment Inc.

Project Six Line Top Bank Investigation

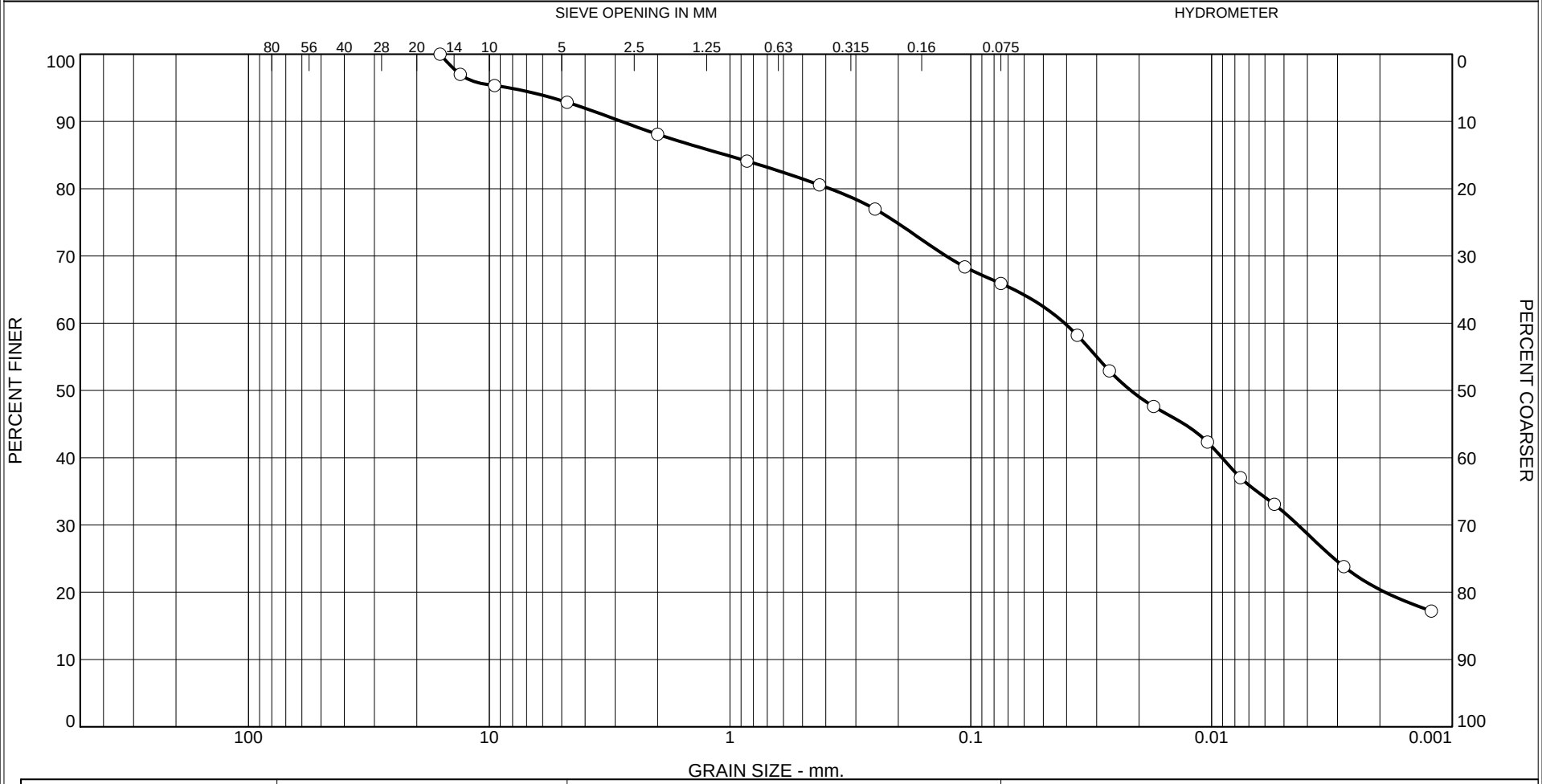
Project No. 30291.233 Figure

AME Materials Engineering

○ Description: Clayey Silt, some Sand, trace Gravel

Tested By: SH **Checked By:** JY

Particle Size Distribution Report



	% +75mm	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	7.2	4.7	7.5	14.7	45.5	20.4

Identification	Date Sampled	Date Received	Date Tested
Location: BH7 SS7 Sample Number: MG-35659	Mar 22, 2022	Apr 8, 2022	Apr 13, 2022

Client Neamsby Investment Inc.

Project Six Line Top Bank Investigation

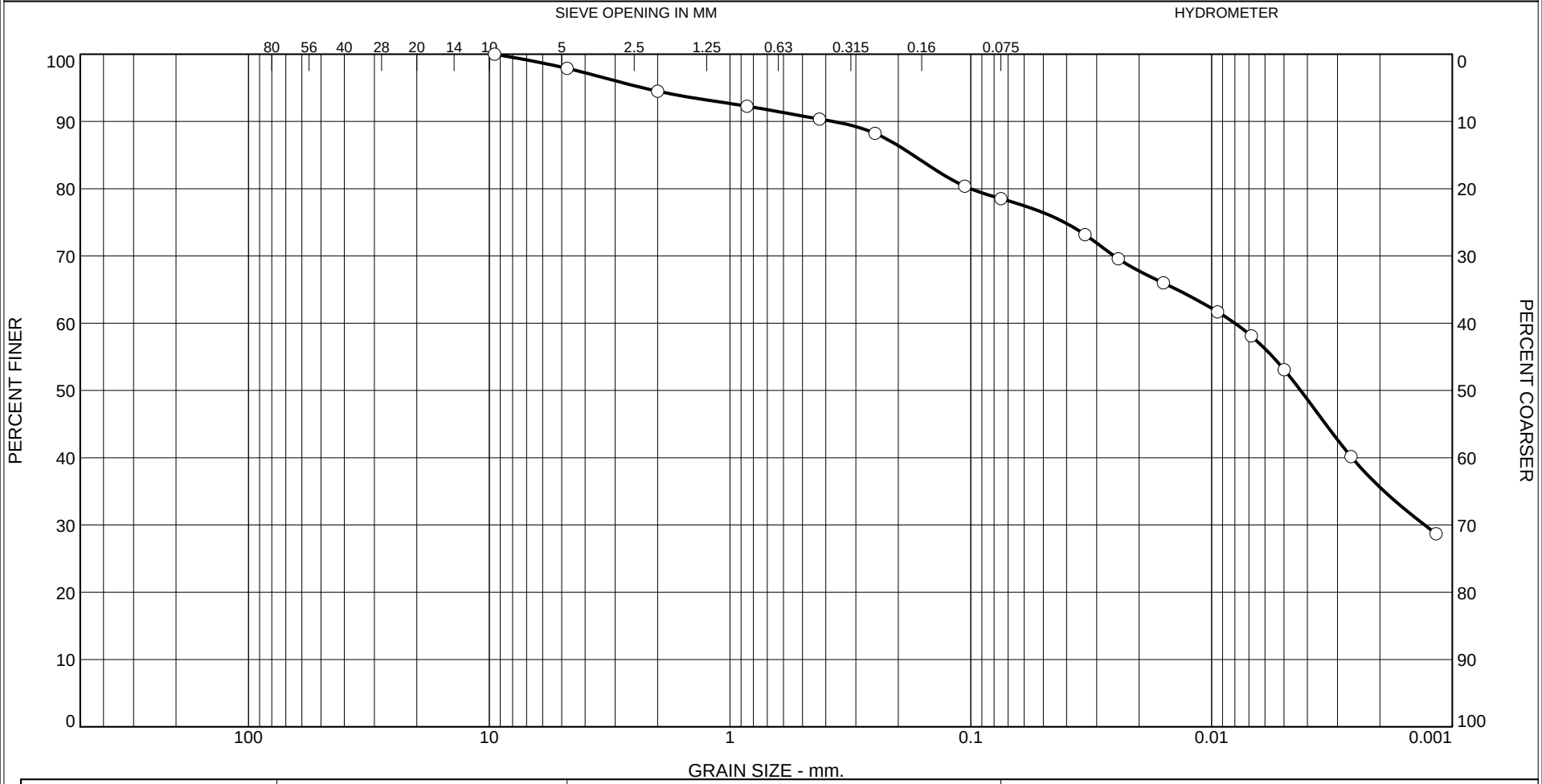
Project No. 30291.233 Figure

AME Materials Engineering

○ Description: Sandy Clayey Silt, trace Gravel

Tested By: TZ **Checked By:** JY

Particle Size Distribution Report



	% +75mm	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	2.1	3.4	4.1	11.9	42.9	35.6

Identification	Date Sampled	Date Received	Date Tested
Location: BH8 SS8 Sample Number: MG-35660	Mar 22, 2022	Apr 6, 2022	Apr 13, 2022

Client Neamsby Investment Inc.

Project Six Line Top Bank Investigation

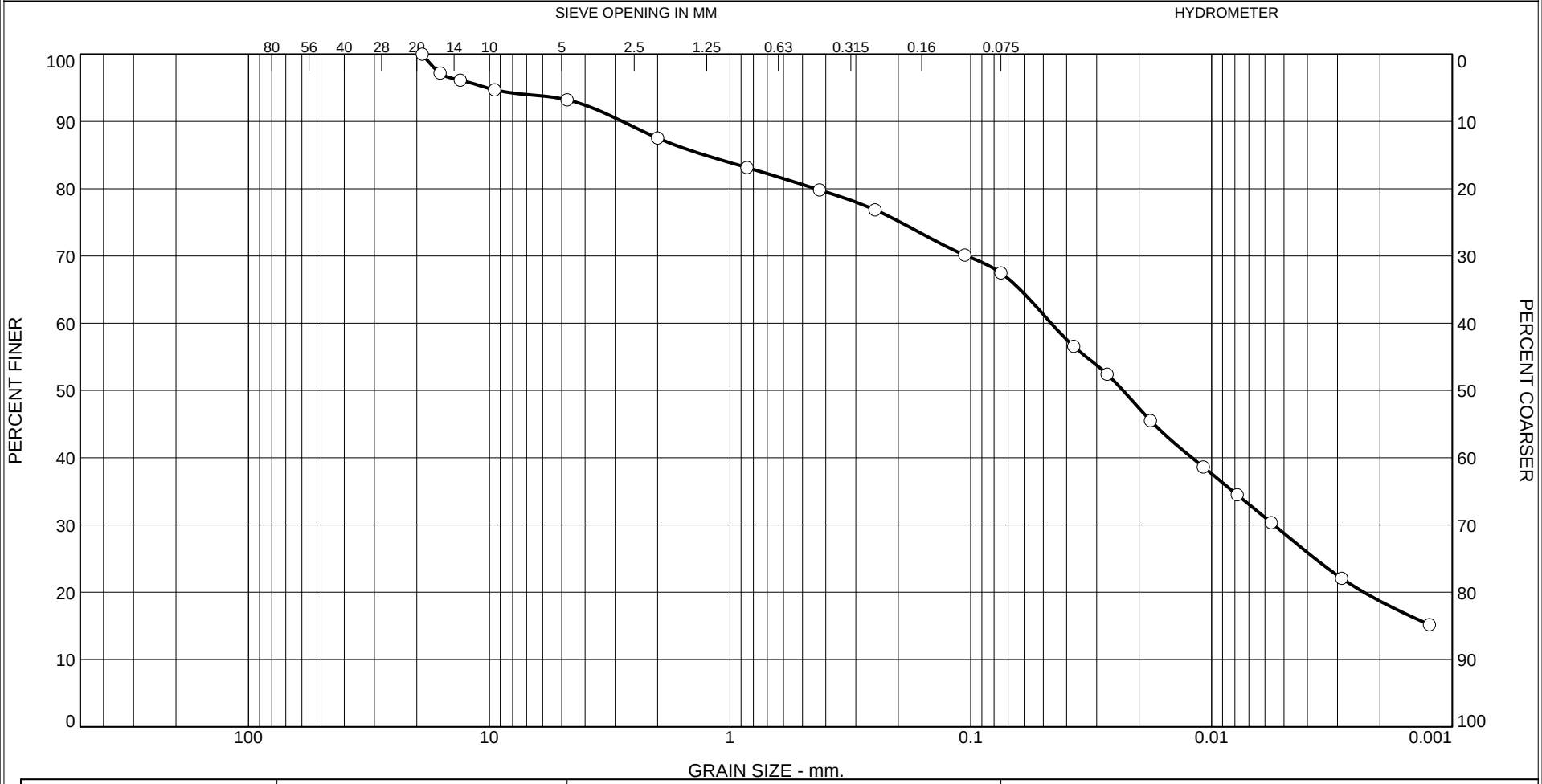
Project No. 30291.233 Figure

AME Materials Engineering

○ Description: Clayey Silt, some Sand, trace Gravel

Tested By: SH **Checked By:** JY

Particle Size Distribution Report



	% +75mm	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	6.8	5.7	7.7	12.3	48.8	18.7

Identification	Date Sampled	Date Received	Date Tested
Location: BH9 SS10 Sample Number: MG-35655	Mar 22, 2022	Apr 8, 2022	Apr 13, 2022

Client Neamsby Investment Inc.

Project Six Line Top Bank Investigation

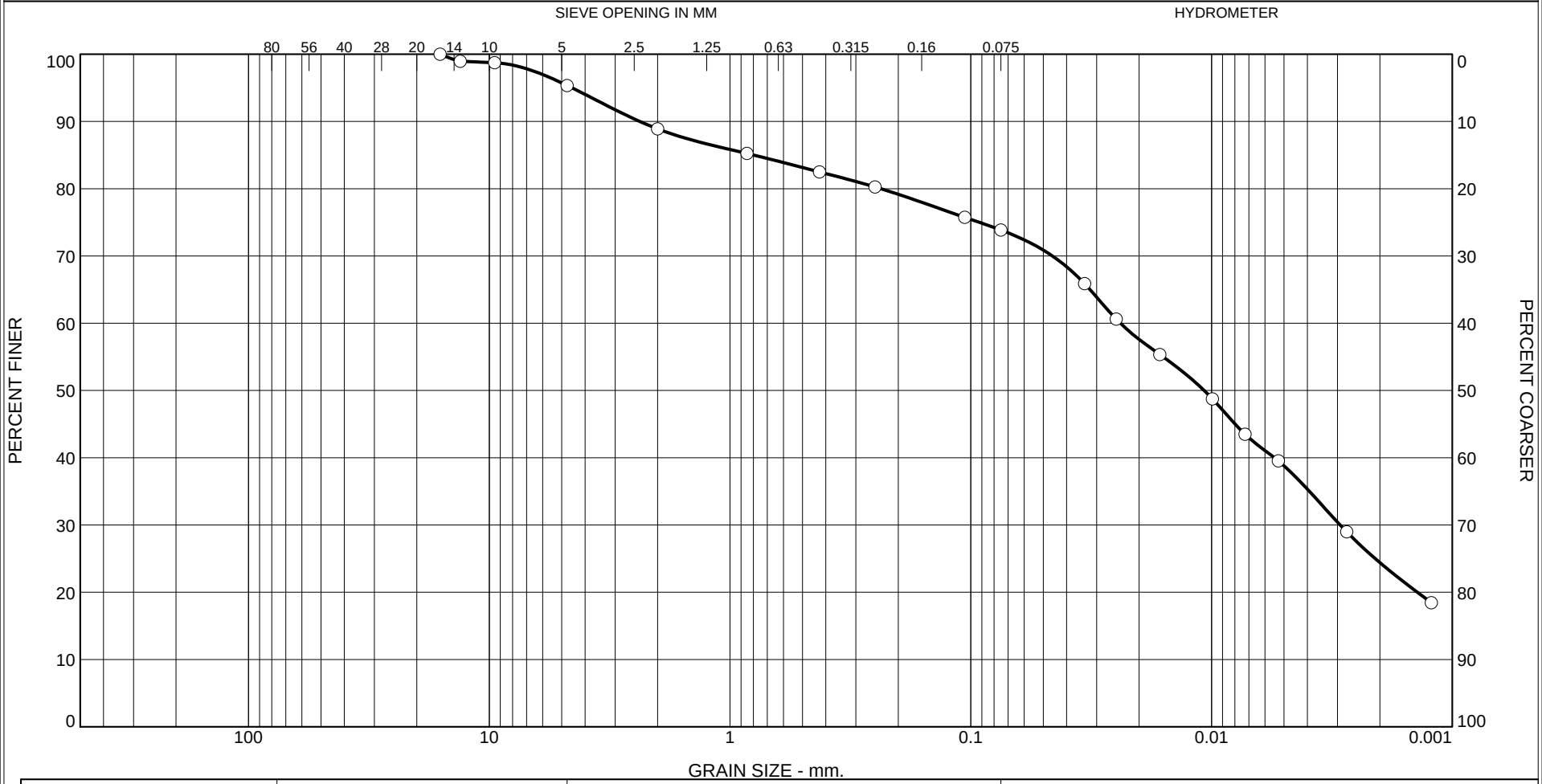
Project No. 30291.233 Figure

AME Materials Engineering

○ Description: Sandy Silt, some Clay, trace Gravel

Tested By: TZ **Checked By:** JY

Particle Size Distribution Report



	% +75mm	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	4.7	6.4	6.4	8.6	49.5	24.4

Identification	Date Sampled	Date Received	Date Tested
Location: BH10 SS3 Sample Number: MG-35656	Mar 22, 2022	Apr 6, 2022	Apr 13, 2022

Client Neamsby Investment Inc.

Project Six Line Top Bank Investigation

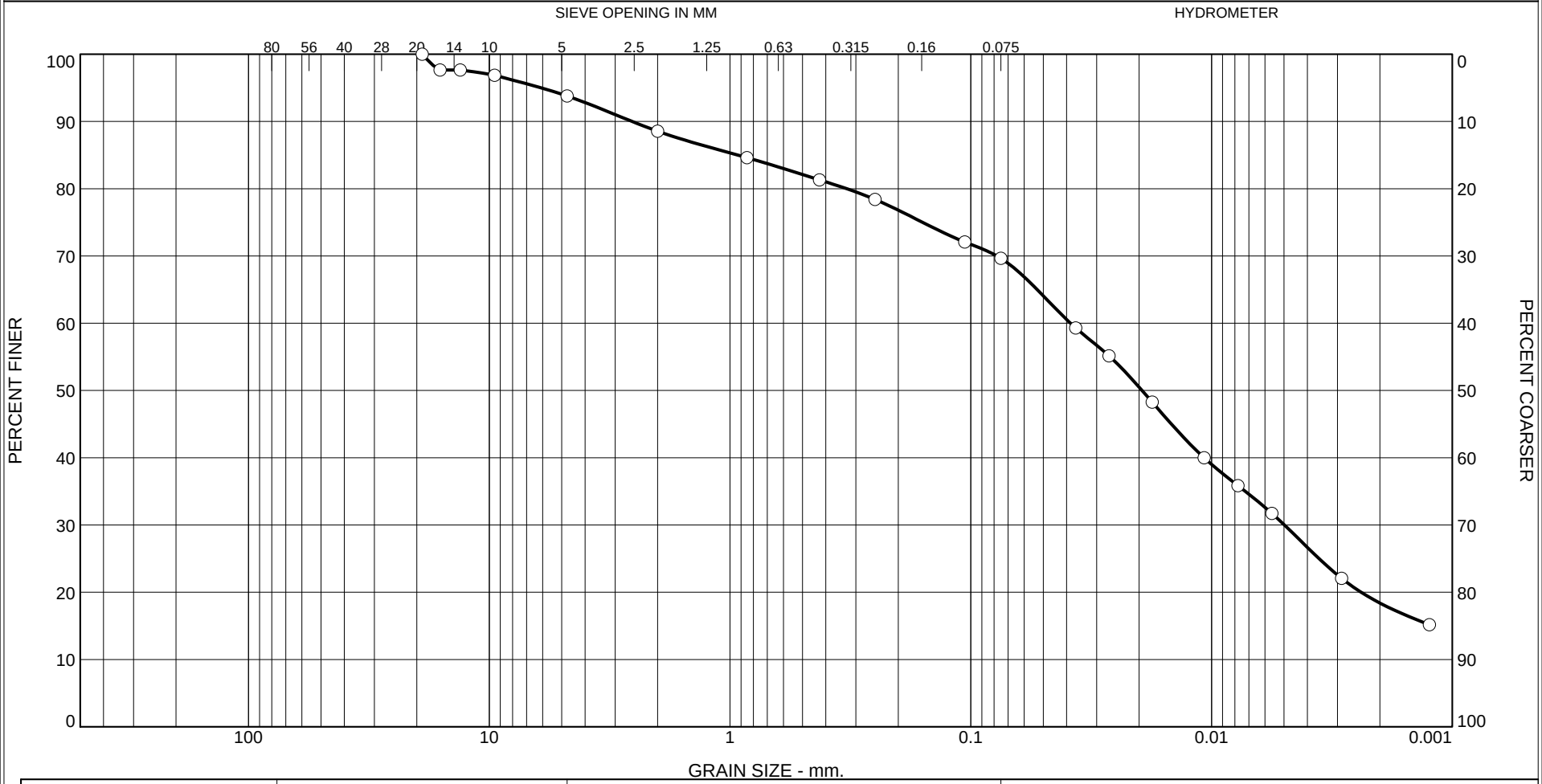
Project No. 30291.233 Figure

AME Materials Engineering

○ Description: Sandy Silty Clay, trace Gravel

Tested By: SH **Checked By:** JY

Particle Size Distribution Report



	% +75mm	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	6.2	5.2	7.3	11.6	51.3	18.4

Identification	Date Sampled	Date Received	Date Tested
Location: BH11 SS8 Sample Number: MG-35657	Mar 22, 2022	Apr 8, 2022	Apr 13, 2022

Client Neamsby Investment Inc.

Project Six Line Top Bank Investigation

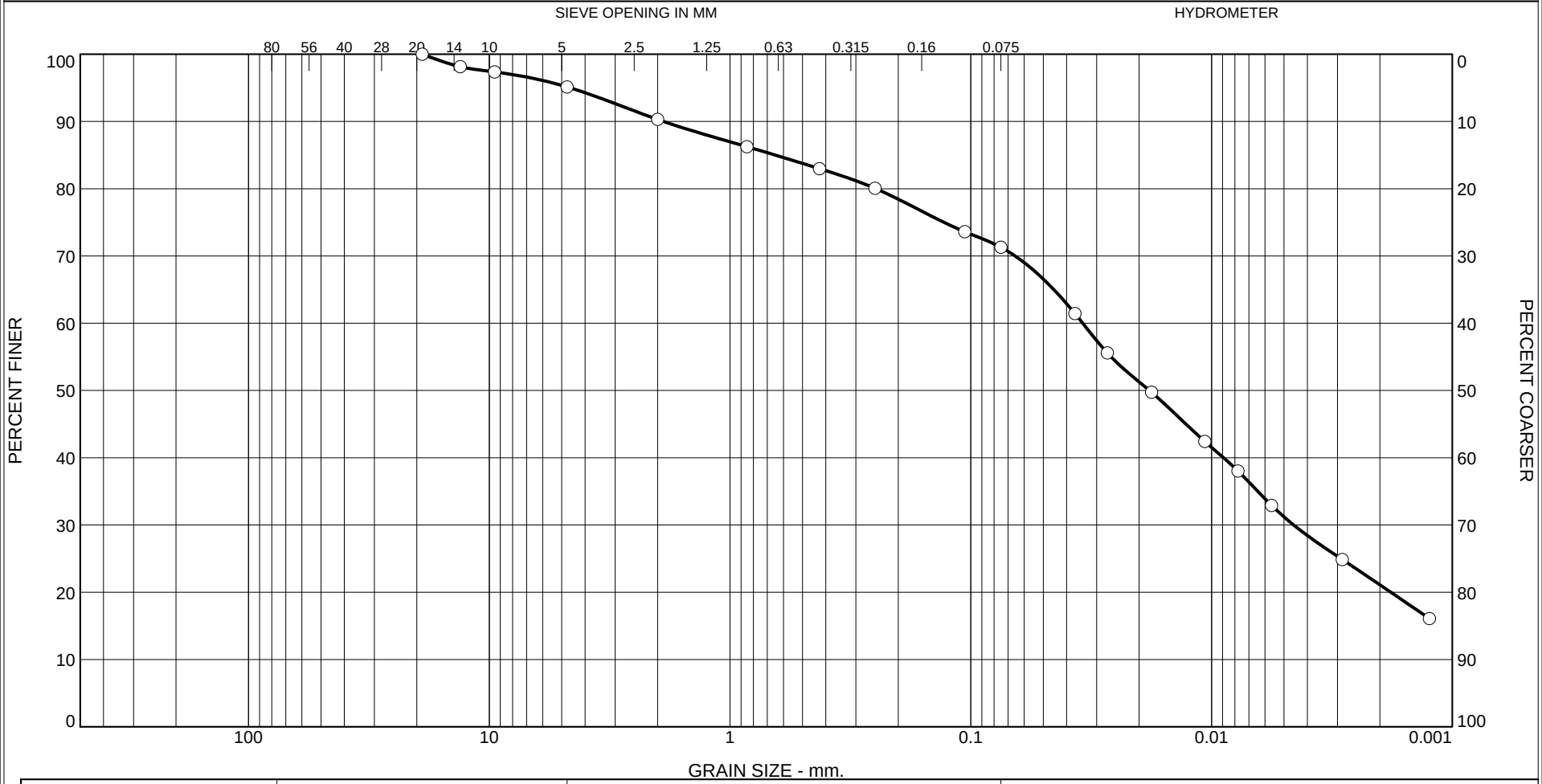
Project No. 30291.233 Figure

AME Materials Engineering

○ Description: Sandy Silt, some Clay, trace Gravel

Tested By: TZ **Checked By:** JY

Particle Size Distribution Report



	% +75mm	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	4.9	4.8	7.3	11.7	50.2	21.1

Identification	Date Sampled	Date Received	Date Tested
Location: BH12 SS9 Sample Number: MG-35654	Mar 22, 2022	Apr 8, 2022	Apr 13, 2022

Client Neamsby Investment Inc.

Project Six Line Top Bank Investigation

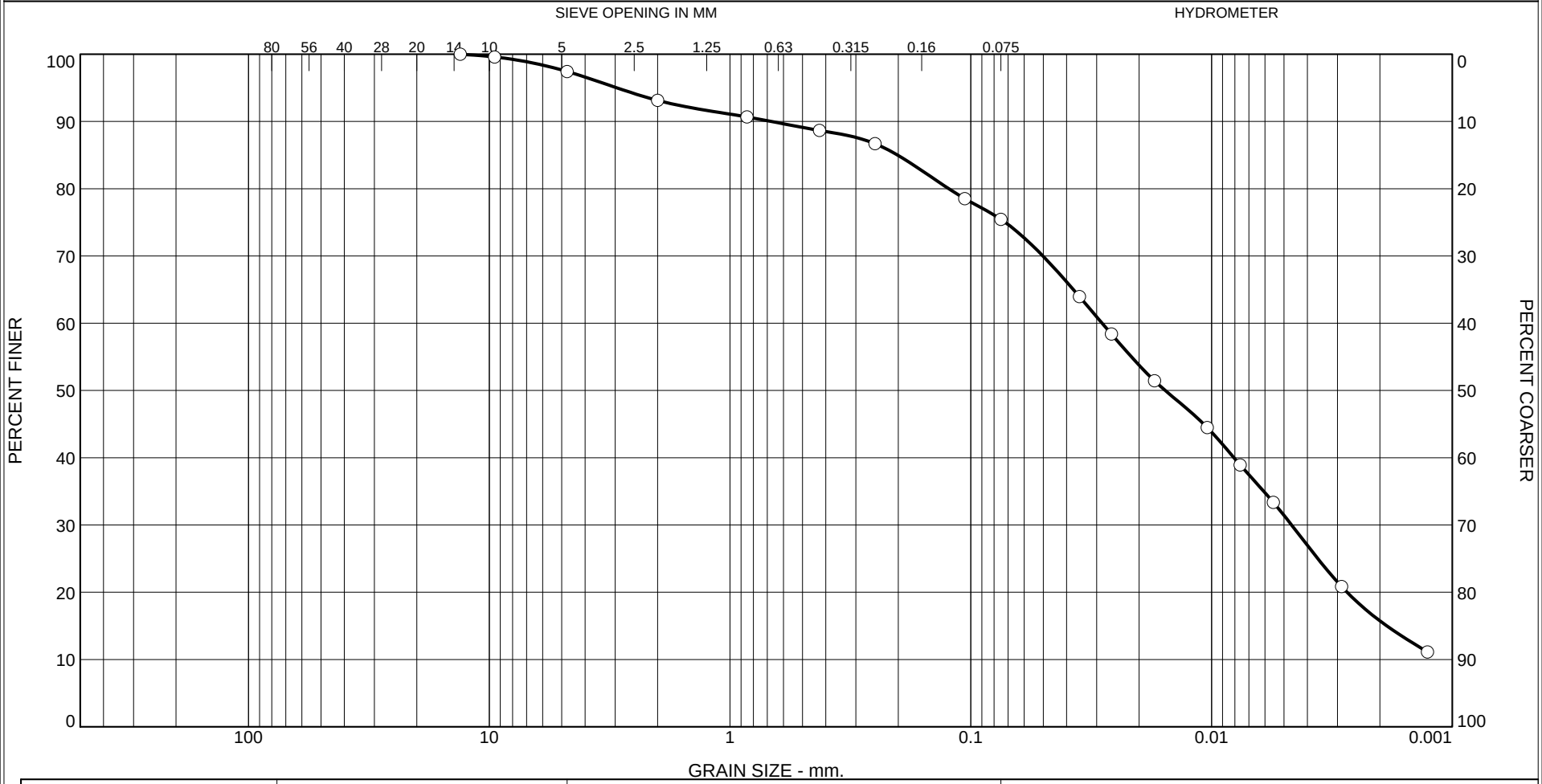
Project No. 30291.233 Figure

AME Materials Engineering

○ Description: Sandy Clayey Silt, trace Gravel

Tested By: TZ **Checked By:** JY

Particle Size Distribution Report



	% +75mm	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	2.6	4.3	4.4	13.3	59.6	15.8

Identification	Date Sampled	Date Received	Date Tested
Location: BH13 SS6 Sample Number: MG-35653	Mar 22, 2022	Apr 6, 2022	Apr 13, 2022

Client Neamsby Investment Inc.

Project Six Line Top Bank Investigation

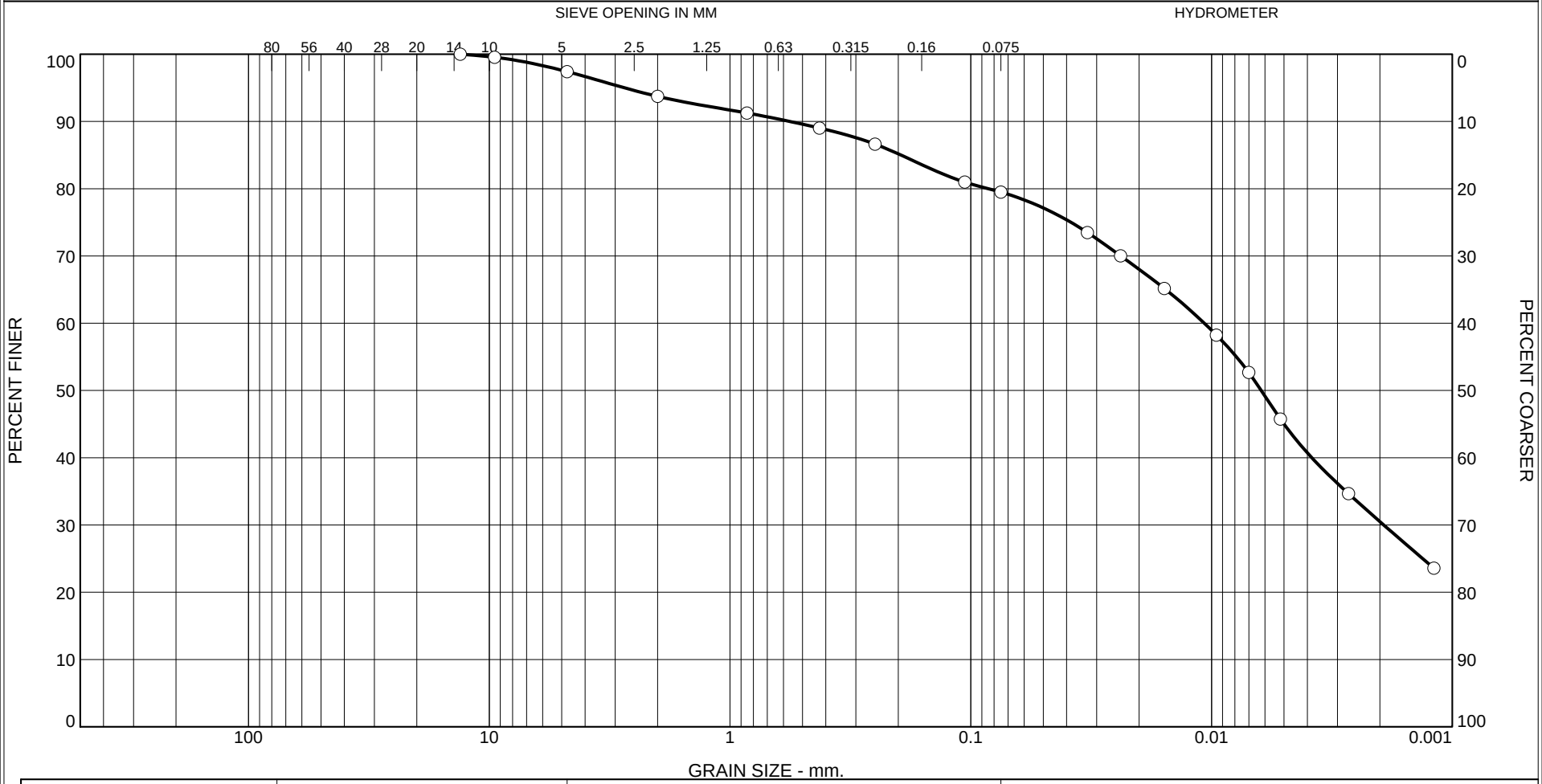
Project No. 30291.233 Figure

AME Materials Engineering

○ Description: Sandy Silt, some Clay, trace Gravel

Tested By: SH **Checked By:** JY

Particle Size Distribution Report



	% +75mm	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	2.6	3.7	4.7	9.5	49.0	30.5

Identification	Date Sampled	Date Received	Date Tested
Location: BH14 SS3 Sample Number: MG-35662	Mar 22, 2022	Apr 8, 2022	Apr 13, 2022

Client Neamsby Investment Inc.

Project Six Line Top Bank Investigation

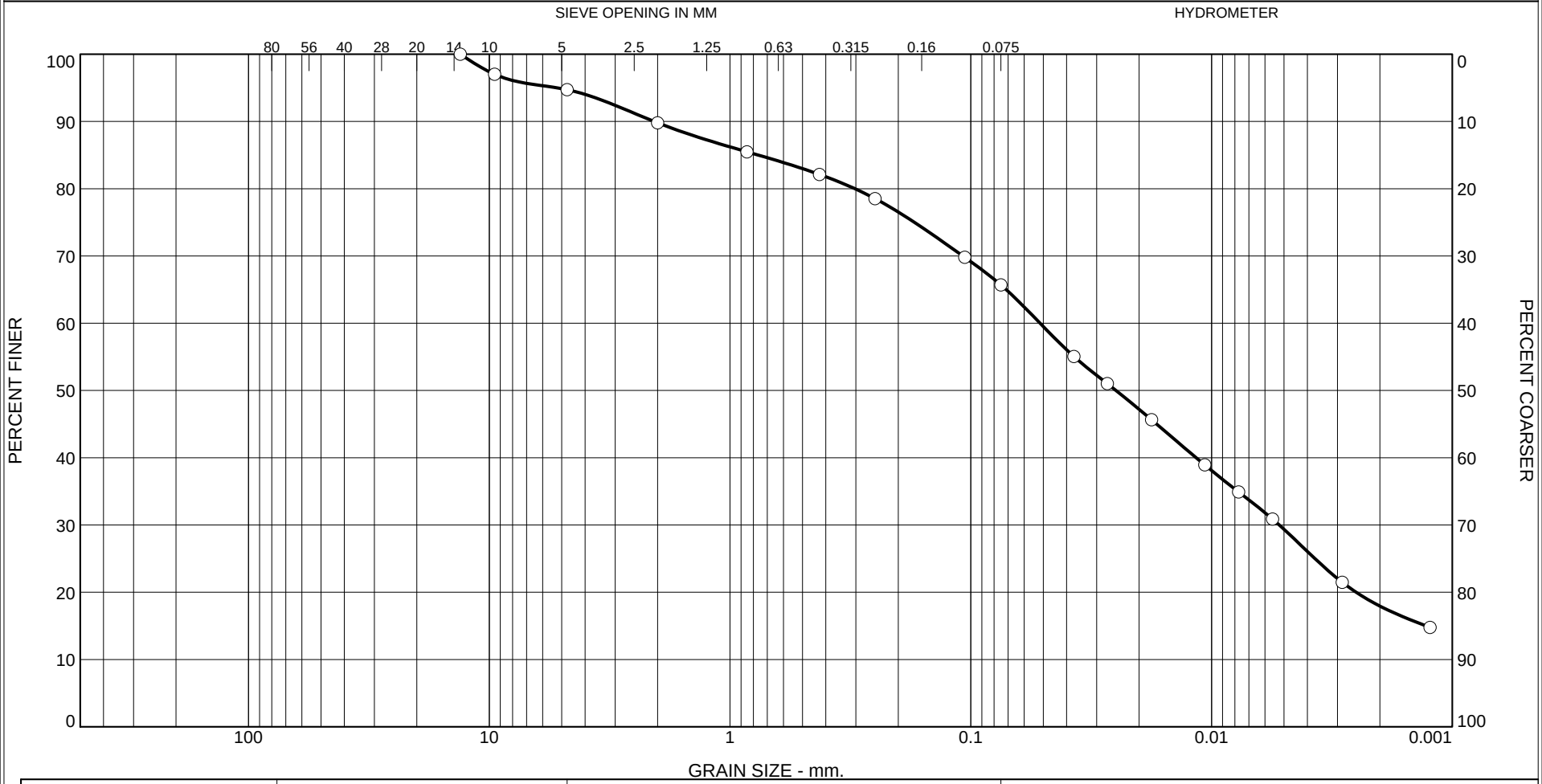
Project No. 30291.233 Figure

AME Materials Engineering

○ Description: Clayey Silt, some Sand, trace Gravel

Tested By: TZ **Checked By:** JY

Particle Size Distribution Report



	% +75mm	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	5.3	4.9	7.7	16.4	47.8	17.9

Identification	Date Sampled	Date Received	Date Tested
Location: BH15 SS7 Sample Number: MG-35661	Mar 22, 2022	Apr 6, 2022	Apr 13, 2022

Client Neamsby Investment Inc.

Project Six Line Top Bank Investigation

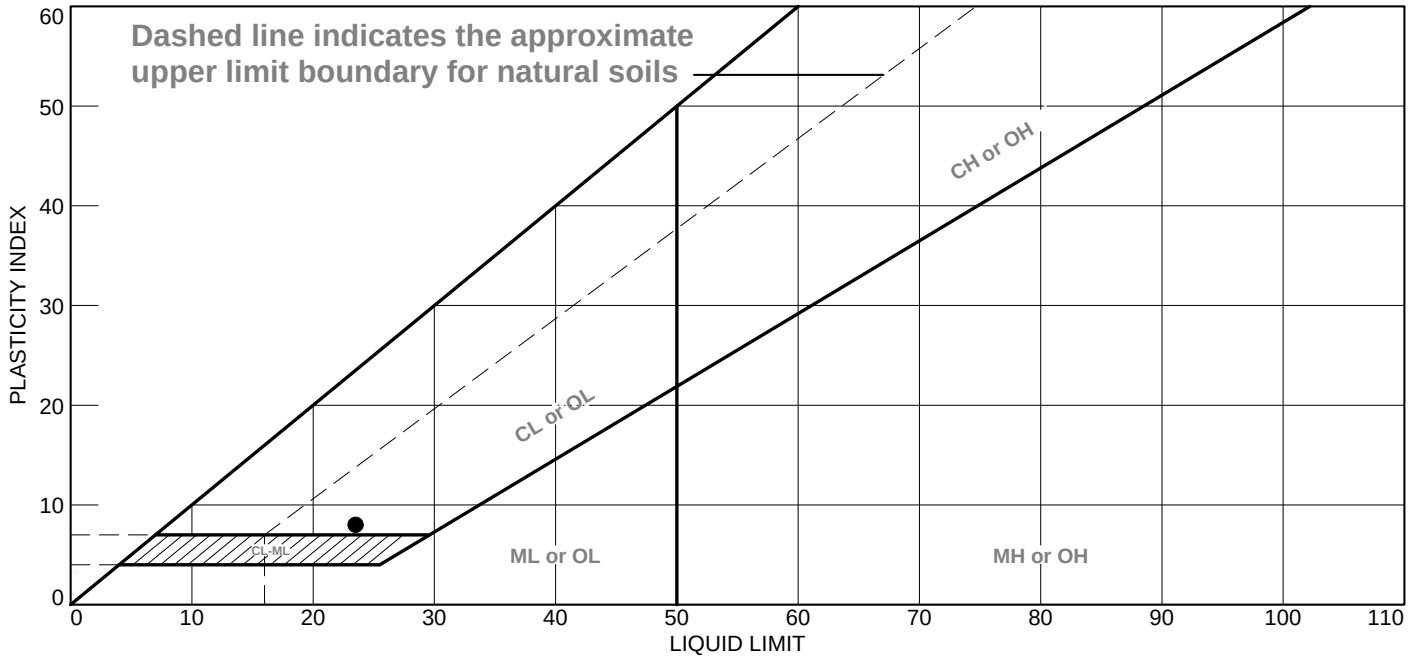
Project No. 30291.233 Figure

AME Materials Engineering

○ Description: Sandy Silt, some Clay, trace Gravel

Tested By: SH **Checked By:** JY

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Clayey Sandy Silt, trace Gravel	23.5	15.5	8.0	79.0	65.2	CL

Project No. 30291.233 **Client:** Neamsby Investment Inc.

Project: Six Line Top Bank Investigation

Location: BH1 SS3
Sample Number: MG-35650

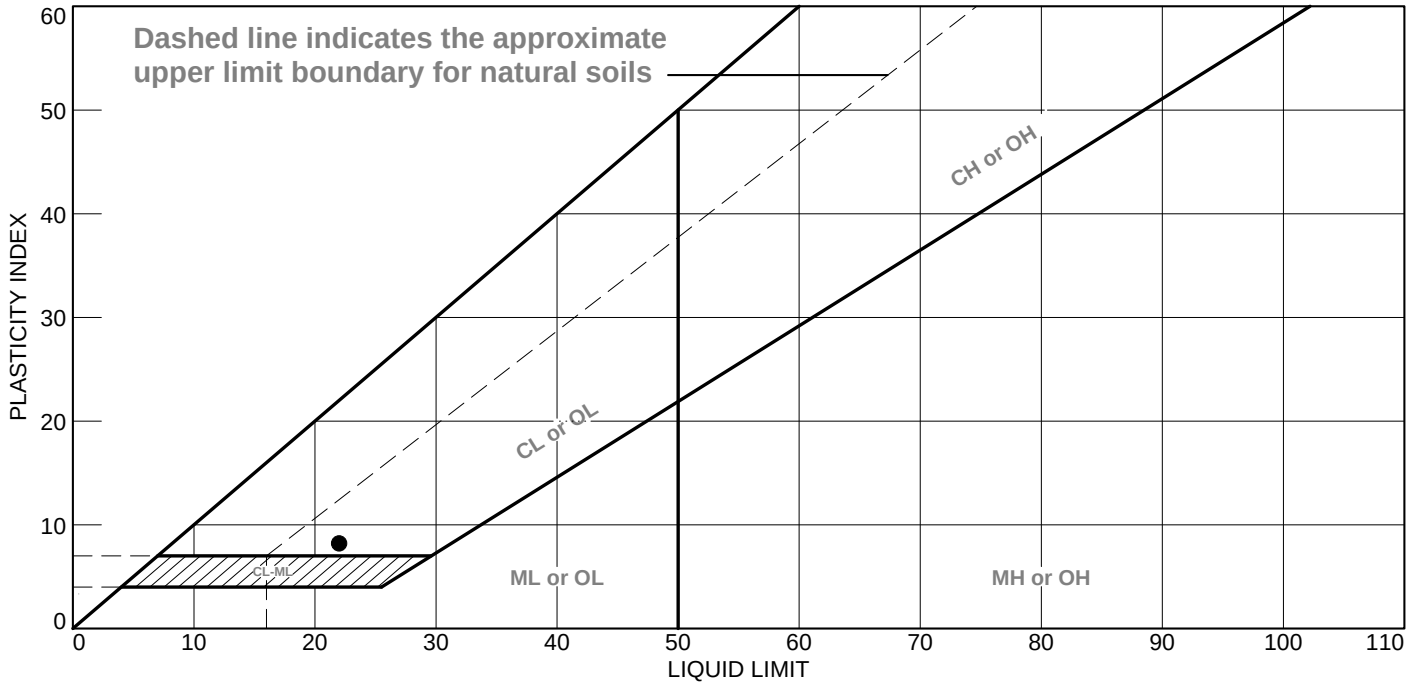
AME Materials Engineering

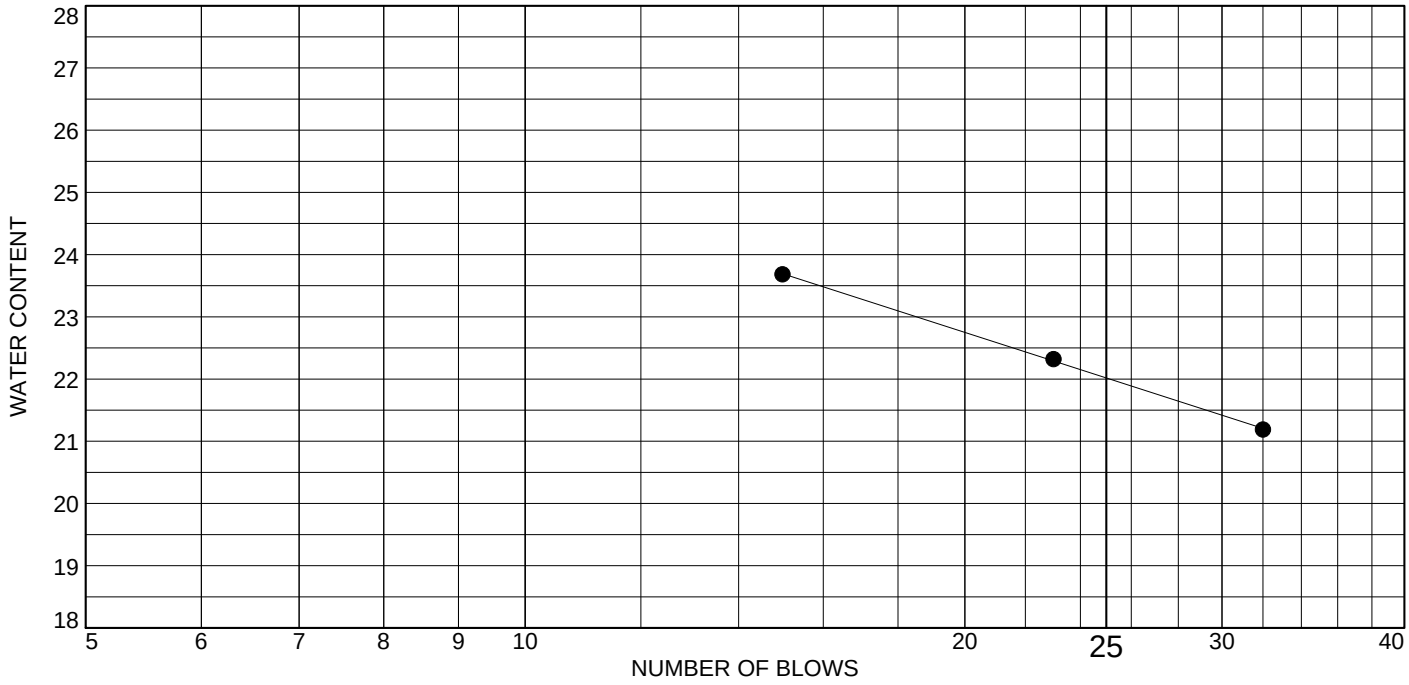
Remarks:

Figure

Tested By: TZ **Checked By:** JY

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Sandy Clayey Silt, trace Gravel	22.0	13.8	8.2	79.0	66.3	CL

Project No. 30291.233 **Client:** Neamsby Investment Inc.

Project: Six Line Top Bank Investigation

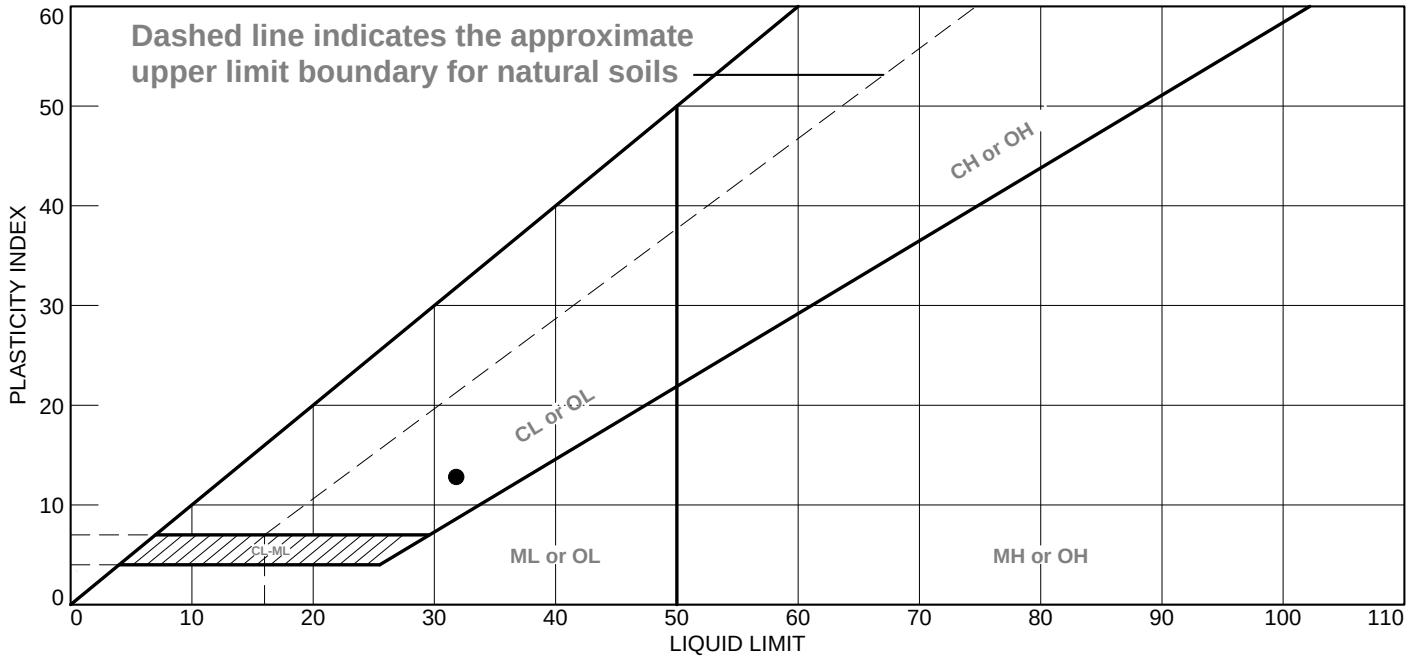
Location: BH5 SS9
Sample Number: MG-35649

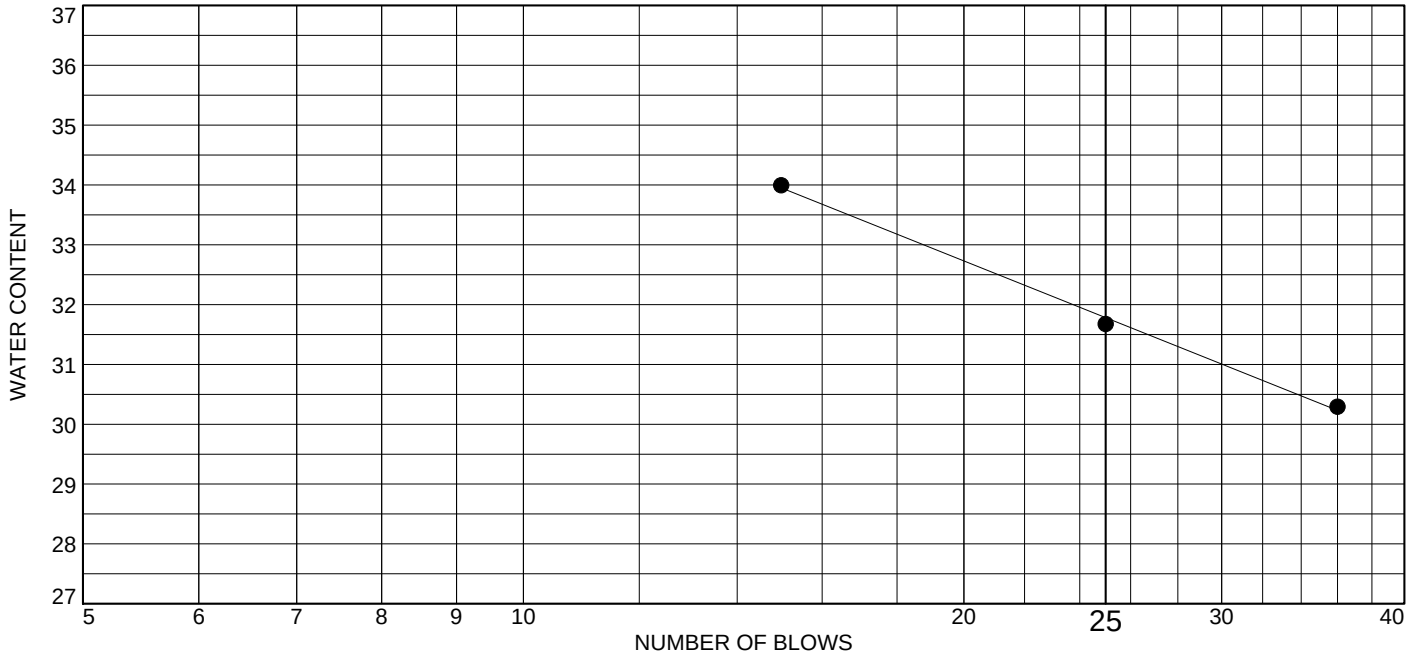
Remarks:

AME Materials Engineering

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Clayey Silt, some Sand, trace Gravel	31.8	19.0	12.8	85.3	76.9	CL

Project No. 30291.233 **Client:** Neamsby Investment Inc.

Project: Six Line Top Bank Investigation

Location: BH6 SS2
Sample Number: MG-35658

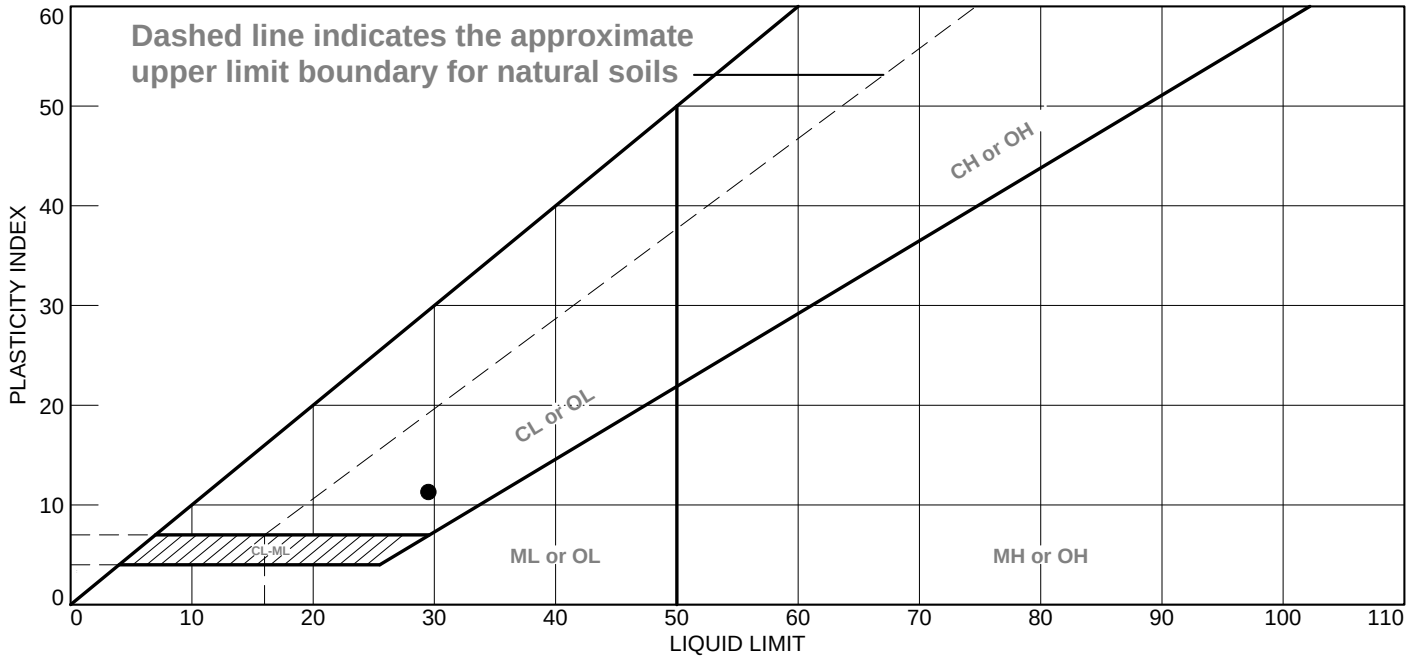
Remarks:

AME Materials Engineering

Figure

Tested By: TZ **Checked By:** JY

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Sandy Silty Clay, trace Gravel	29.5	18.2	11.3	82.5	73.9	CL

Project No. 30291.233 **Client:** Neamsby Investment Inc.

Project: Six Line Top Bank Investigation

Location: BH10 SS3
Sample Number: MG-35656

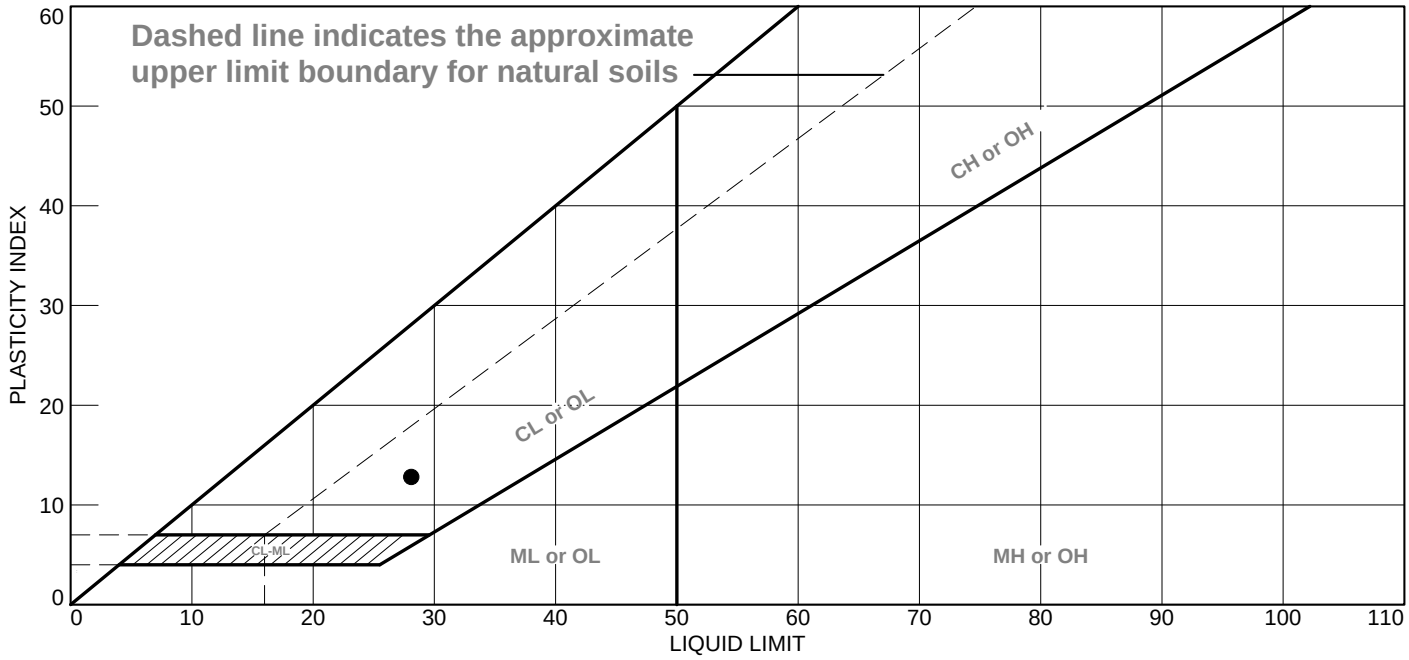
Remarks:

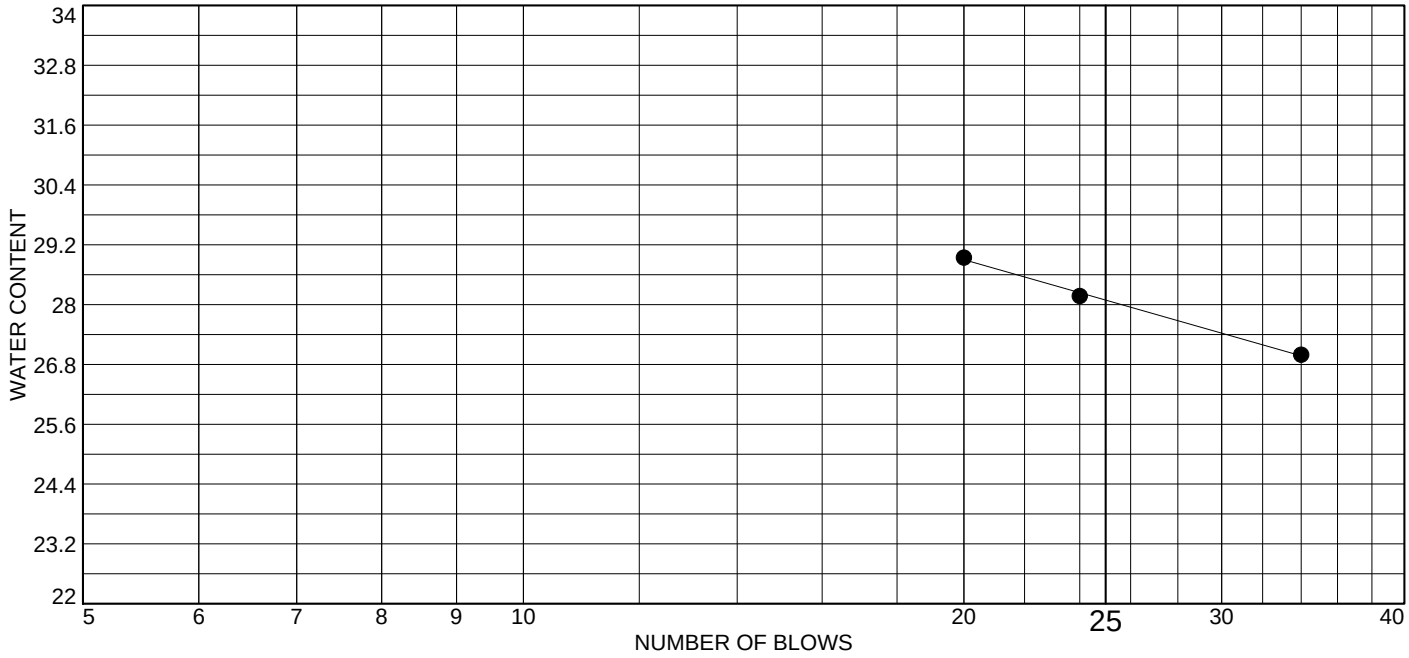
AME Materials Engineering

Figure

Tested By: TZ **Checked By:** JY

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Clayey Silt, some Sand, trace Gravel	28.1	15.3	12.8	90.4	78.5	CL

Project No. 30291.233 **Client:** Neamsby Investment Inc.

Project: Six Line Top Bank Investigation

Location: BH8 SS8
Sample Number: MG-35660

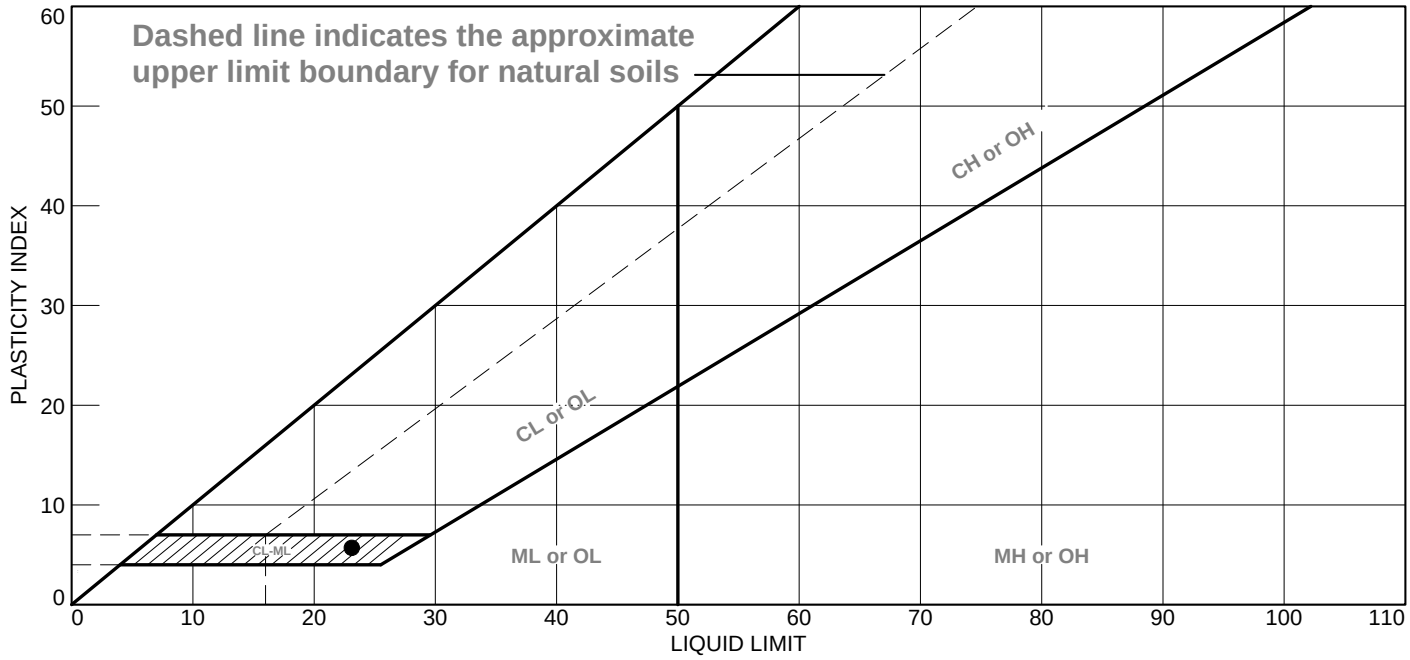
AME Materials Engineering

Remarks:

Figure

Tested By: TZ **Checked By:** JY

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Sandy Silt, some Clay, trace Gravel	23.1	17.4	5.7	88.7	75.4	CL-ML

Project No. 30291.233 **Client:** Neamsby Investment Inc.

Project: Six Line Top Bank Investigation

Location: BH13 SS6
Sample Number: MG-35653

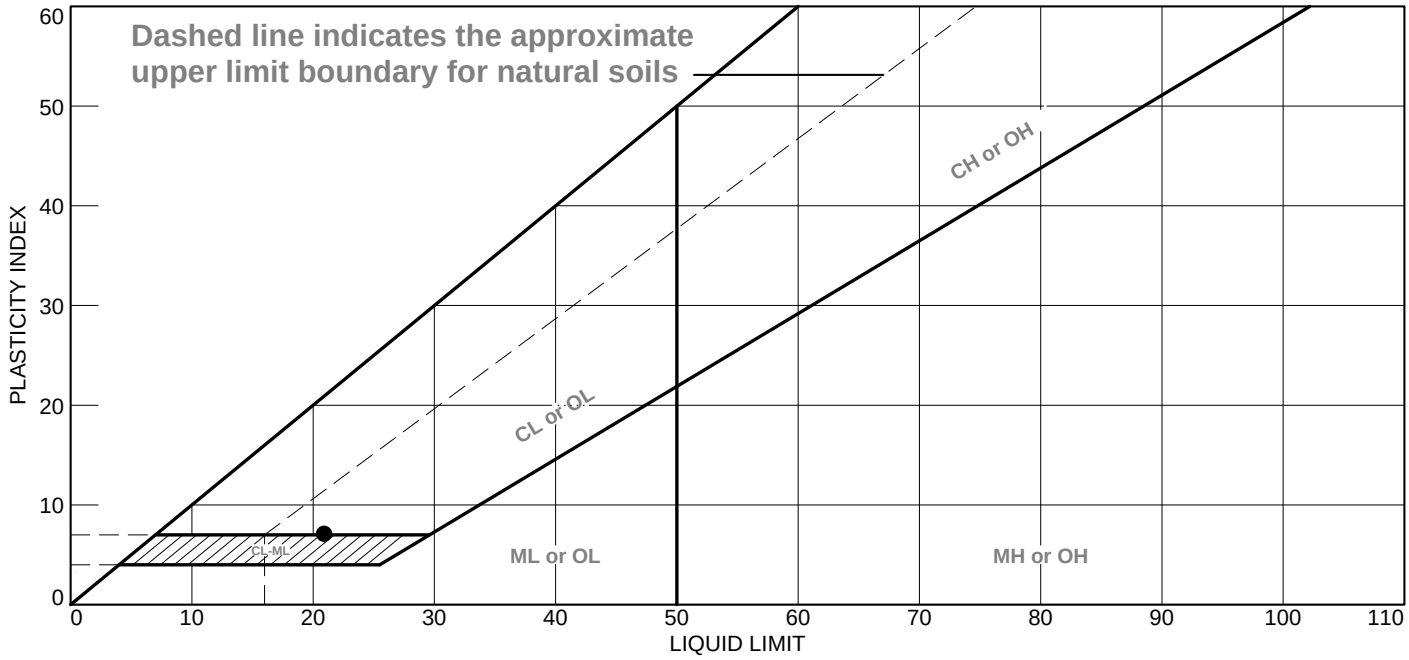
Remarks:

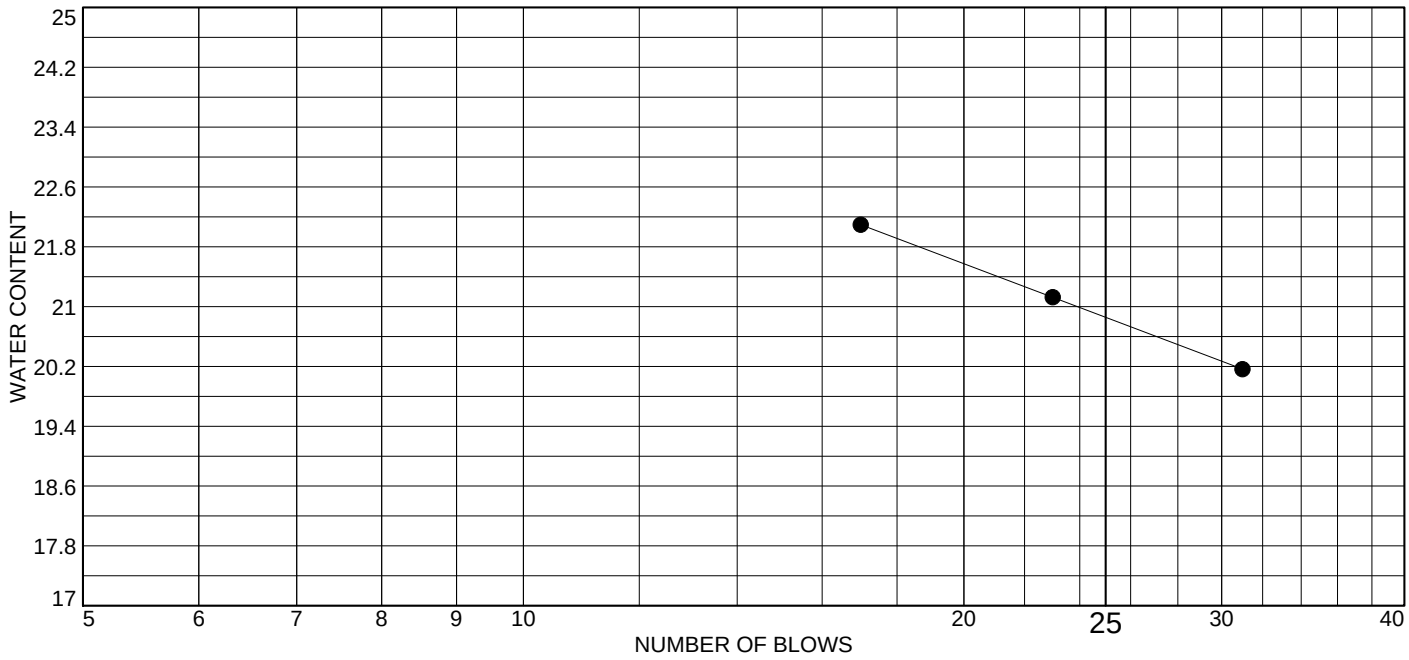
AME Materials Engineering

Figure

Tested By: TZ **Checked By:** JY

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Sandy Silt, some Clay, trace Gravel	20.9	13.8	7.1	82.1	65.7	CL-ML

Project No. 30291.233 **Client:** Neamsby Investment Inc.

Project: Six Line Top Bank Investigation

Location: BH15 SS7
Sample Number: MG-35661

Remarks:

AME Materials Engineering

Figure

Tested By: TZ **Checked By:** JY

AME - Materials Engineering
Borehole / Soil Sample Moisture Content (LS-700)

Sample No.:	MG-35648 to 35662	**Date Sampled:**	22-Mar-22
Job No.:	30291.233	**Date Tested:**	7-Apr-22
Job Name:	Six Line Top of Bank Investigation	**Tested By:**	WB
Source:		**Material Code:**	
Material Type:	BH Soil	**Results To:**	

Borehole No.	Tin No.:	Depth Sample Taken (ft)	Wet Sample + Tare (A)	Dry Sample + Tare (B)	Tare (C)	Mass of Sample (D) (B-C)	% Moisture (A-B)/D x100
BH1		SS1	118.72	102.37	38.43	63.94	25.6
		SS2	261.55	236.57	38.32	198.25	12.6
		SS3	686.60	643.00	224.10	418.90	10.4
		SS4	162.44	149.73	37.95	111.78	11.4
		SS5	203.99	188.49	38.49	150.00	10.3
		SS6	195.25	181.75	38.14	143.61	9.4
		SS7	243.64	226.28	39.30	186.98	9.3
		SS8	237.18	220.36	37.99	182.37	9.2
		SS9	185.54	173.31	38.35	134.96	9.1
BH2		SS1	232.43	192.09	37.87	154.22	26.2
		SS2	254.11	220.20	37.92	182.28	18.6
		SS3	160.62	139.74	38.17	101.57	20.6
		SS4	206.40	185.36	37.72	147.64	14.3
		SS5	220.00	202.13	39.03	163.10	11.0
		SS6	224.70	207.70	38.09	169.61	10.0
		SS7	805.30	752.90	251.10	501.80	10.4
		SS8	208.33	193.90	38.05	155.85	9.3
		SS9	178.60	164.02	38.17	125.85	11.6
BH3		SS1	229.03	187.88	39.17	148.71	27.7
		SS2	717.50	662.90	262.00	400.90	13.6
		SS3	218.25	197.84	38.12	159.72	12.8
		SS4	198.44	180.39	38.53	141.86	12.7
		SS5	262.96	246.15	37.93	208.22	8.1
		SS6	264.66	248.27	39.27	209.00	7.8
		SS7	231.34	216.09	38.53	177.56	8.6
		SS8	213.18	197.92	40.86	157.06	9.7
		SS9	234.84	217.41	40.64	176.77	9.9
		SS10	251.30	229.92	38.10	191.82	11.1

IMTE Used: Scale #: Oven #:

Technician: WB Supervisor: MS

AME - Materials Engineering
Borehole / Soil Sample Moisture Content (LS-700)

Sample No.:	MG-35648 to 35662	**Date Sampled:**	22-Mar-22
Job No.:	30291.233	**Date Tested:**	7-Apr-22
Job Name:	Six Line Top of Bank Investigation	**Tested By:**	WB
Source:		**Material Code:**	
Material Type:	BH Soil	**Results To:**	

Borehole No.	Tin No.:	Depth Sample Taken (ft)	Wet Sample + Tare (A)	Dry Sample + Tare (B)	Tare (C)	Mass of Sample (D) (B-C)	% Moisture (A-B)/D x100
BH4		SS1	170.95	141.30	38.00	103.30	28.7
		SS2	193.05	170.62	38.90	131.72	17.0
		SS3	180.03	162.89	38.60	124.29	13.8
		SS4	173.77	156.69	37.91	118.78	14.4
		SS5	686.30	635.20	263.80	371.40	13.8
		SS6	215.41	200.25	39.21	161.04	9.4
		SS7	219.05	203.38	39.69	163.69	9.6
		SS8	219.08	202.55	43.49	159.06	10.4
		SS9	219.50	201.52	37.96	163.56	11.0
BH5		SS1	191.65	158.36	37.91	120.45	27.6
		SS2	219.70	188.83	38.19	150.64	20.5
		SS3	163.15	145.75	37.94	107.81	16.1
		SS4	203.92	181.10	38.93	142.17	16.1
		SS5	277.09	254.23	37.94	216.29	10.6
		SS6	209.41	180.32	39.16	141.16	20.6
		SS7	211.53	193.30	41.47	151.83	12.0
		SS8	237.33	216.73	38.12	178.61	11.5
		SS9	869.90	801.80	251.50	550.30	12.4
BH6		SS1	298.98	245.77	37.89	207.88	25.6
		SS2	724.60	663.10	271.90	391.20	15.7
		SS3	231.23	210.11	38.00	172.11	12.3
		SS4	198.19	179.51	37.81	141.70	13.2
		SS5	237.58	214.69	37.64	177.05	12.9
		SS6	191.65	169.55	37.95	131.60	16.8
		SS7	216.03	202.03	38.71	163.32	8.6
		SS8	236.24	218.31	37.74	180.57	9.9
		SS9	236.31	218.45	37.73	180.72	9.9
		SS10	236.78	218.80	37.95	180.85	9.9

IMTE Used: Scale #: Oven #:

Technician: WB Supervisor: MS

AME - Materials Engineering
Borehole / Soil Sample Moisture Content (LS-700)

Sample No.:	MG-35648 to 35662	**Date Sampled:**	22-Mar-22
Job No.:	30291.233	**Date Tested:**	7-Apr-22
Job Name:	Six Line Top of Bank Investigation	**Tested By:**	WB
Source:		**Material Code:**	
Material Type:	BH Soil	**Results To:**	

Borehole No.	Tin No.:	Depth Sample Taken (ft)	Wet Sample + Tare (A)	Dry Sample + Tare (B)	Tare (C)	Mass of Sample (D) (B-C)	% Moisture (A-B)/D x100
BH7		SS1	209.34	170.95	38.05	132.90	28.9
		SS2	188.65	164.93	37.95	126.98	18.7
		SS3	273.06	242.79	38.25	204.54	14.8
		SS4	214.98	191.93	39.54	152.39	15.1
		SS5	184.27	163.41	39.59	123.82	16.8
		SS6	254.33	234.72	37.92	196.80	10.0
		SS7	627.30	593.50	252.30	341.20	9.9
		SS8	270.82	249.26	41.33	207.93	10.4
		SS9	138.31	128.32	31.54	96.78	10.3
		SS10	129.56	120.00	31.74	88.26	10.8
BH8		SS1	170.45	143.32	30.14	113.18	24.0
		SS2	157.85	139.91	31.51	108.40	16.5
		SS3	166.10	150.57	31.61	118.96	13.1
		SS4	142.27	129.19	31.31	97.88	13.4
		SS5	144.94	128.78	31.48	97.30	16.6
		SS6	150.66	133.96	31.63	102.33	16.3
		SS7	162.83	150.06	31.75	118.31	10.8
		SS8	699.10	636.00	216.90	419.10	15.1
		SS9	150.96	142.69	31.69	111.00	7.5
		SS10	165.06	155.21	31.75	123.46	8.0
BH9		SS1	239.47	224.46	40.12	184.34	8.1
		SS2	214.89	186.24	37.97	148.27	19.3
		SS3	216.05	184.85	38.02	146.83	21.2
		SS4	243.64	223.26	39.11	184.15	11.1
		SS5	206.38	192.03	38.25	153.78	9.3
		SS6	216.07	193.66	37.86	155.80	14.4
		SS7	219.80	199.80	37.92	161.88	12.4
		SS8	233.56	214.41	38.81	175.60	10.9
		SS9	214.92	187.77	37.99	149.78	18.1
		SS10	805.00	745.60	273.40	472.20	12.6

IMTE Used: Scale #: Oven #:

Technician: WB Supervisor: MS

AME - Materials Engineering
Borehole / Soil Sample Moisture Content (LS-700)

Sample No.:	MG-35648 to 35662	**Date Sampled:**	22-Mar-22
Job No.:	30291.233	**Date Tested:**	7-Apr-22
Job Name:	Six Line Top of Bank Investigation	**Tested By:**	WB
Source:		**Material Code:**	
Material Type:	BH Soil	**Results To:**	

Borehole No.	Tin No.:	Depth Sample Taken (ft)	Wet Sample + Tare (A)	Dry Sample + Tare (B)	Tare (C)	Mass of Sample (D) (B-C)	% Moisture (A-B)/D x100
BH10		SS1	202.21	172.13	38.63	133.50	22.5
		SS2	237.86	208.25	38.46	169.79	17.4
		SS3	745.70	681.70	223.70	458.00	14.0
		SS4	227.07	204.78	38.64	166.14	13.4
		SS5	223.35	197.78	37.96	159.82	16.0
		SS6	233.10	216.43	39.58	176.85	9.4
		SS7	200.17	186.91	38.26	148.65	8.9
		SS8	195.07	178.23	39.11	139.12	12.1
		SS9	248.85	231.81	37.96	193.85	8.8
BH11		SS1	158.11	133.87	38.13	95.74	25.3
		SS2	222.00	198.64	39.09	159.55	14.6
		SS3	220.14	200.52	37.67	162.85	12.0
		SS4	196.72	179.68	39.03	140.65	12.1
		SS5	232.96	213.75	37.76	175.99	10.9
		SS6	217.88	203.57	37.81	165.76	8.6
		SS7	207.91	193.45	37.84	155.61	9.3
		SS8	721.50	681.40	253.00	428.40	9.4
		SS9	209.86	195.23	38.28	156.95	9.3
BH12		SS1	242.70	206.12	37.95	168.17	21.8
		SS2	236.99	211.88	37.94	173.94	14.4
		SS3	226.22	205.77	37.83	167.94	12.2
		SS4	203.83	184.16	38.50	145.66	13.5
		SS5	185.64	166.60	38.68	127.92	14.9
		SS6	259.86	236.22	39.10	197.12	12.0
		SS7	257.67	239.37	38.75	200.62	9.1
		SS8	206.63	188.50	38.13	150.37	12.1
		SS9	875.70	814.10	252.80	561.30	11.0

IMTE Used: Scale #: Oven #:

Technician: WB Supervisor: MS

AME - Materials Engineering
Borehole / Soil Sample Moisture Content (LS-700)

Sample No.:	MG-35648 to 35662	**Date Sampled:**	22-Mar-22
Job No.:	30291.233	**Date Tested:**	7-Apr-22
Job Name:	Six Line Top of Bank Investigation	**Tested By:**	WB
Source:		**Material Code:**	
Material Type:	BH Soil	**Results To:**	

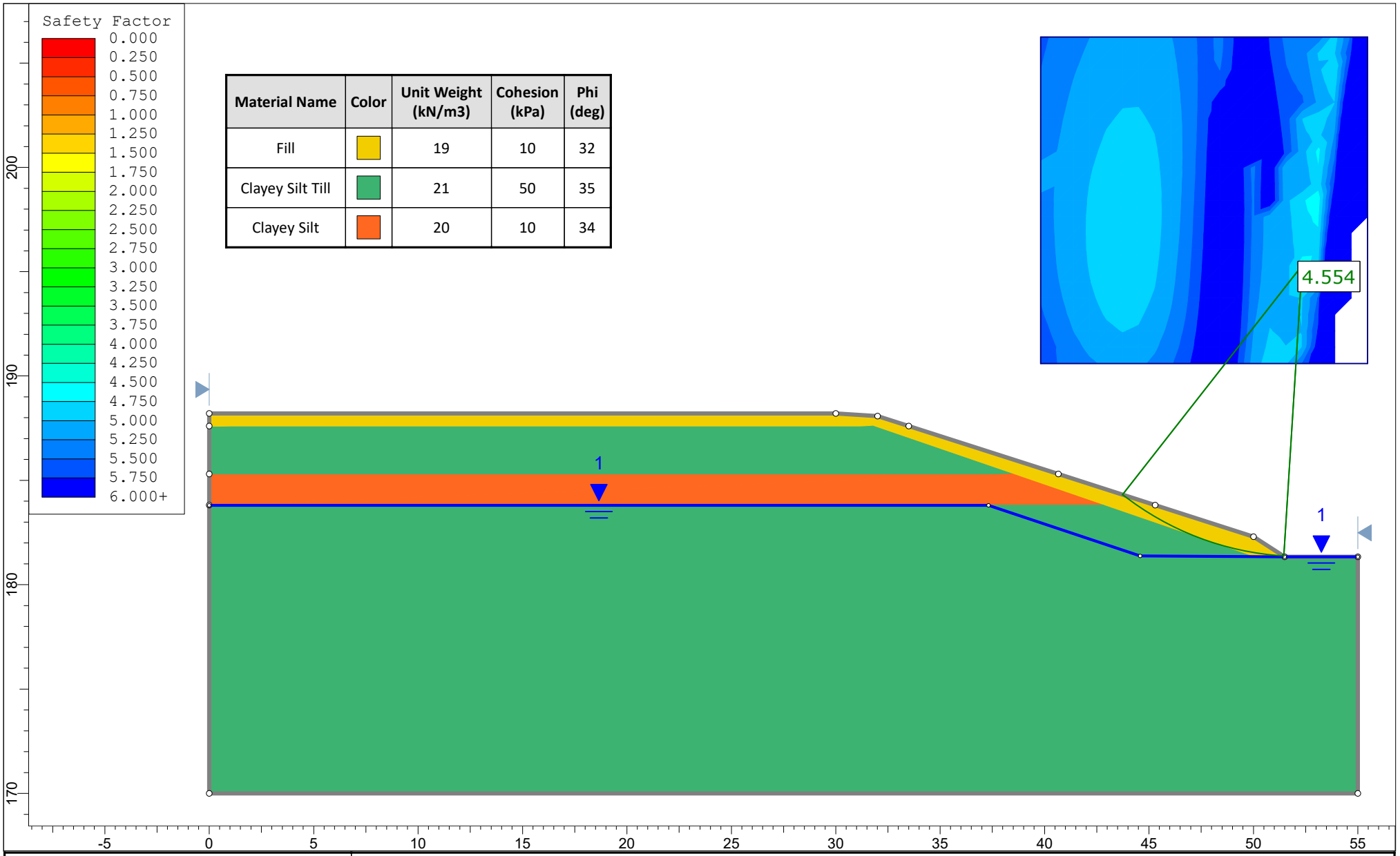
Borehole No.	Tin No.:	Depth Sample Taken (ft)	Wet Sample + Tare (A)	Dry Sample + Tare (B)	Tare (C)	Mass of Sample (D) (B-C)	% Moisture (A-B)/D x100
BH13		SS1	247.61	201.25	38.03	163.22	28.4
		SS2	187.57	168.35	38.34	130.01	14.8
		SS3	211.60	190.85	38.08	152.77	13.6
		SS4	185.53	167.23	37.95	129.28	14.2
		SS5	208.59	187.10	41.29	145.81	14.7
		SS6	766.40	685.70	249.50	436.20	18.5
		SS7	191.33	176.17	37.98	138.19	11.0
		SS8	214.50	196.98	37.82	159.16	11.0
		SS9	225.19	203.95	38.26	165.69	12.8
		SS10	186.01	168.56	39.32	129.24	13.5
BH14		SS1	142.83	121.99	31.53	90.46	23.0
		SS2	183.05	160.68	39.41	121.27	18.4
		SS3	762.80	692.70	271.40	421.30	16.6
		SS4	129.89	115.52	31.65	83.87	17.1
		SS5	129.36	116.14	30.58	85.56	15.5
		SS6	165.76	154.58	38.35	116.23	9.6
		SS7	205.86	191.30	37.61	153.69	9.5
		SS8	170.50	158.86	38.26	120.60	9.7
		SS9	143.88	133.21	39.09	94.12	11.3
BH15		SS1	159.84	134.01	30.55	103.46	25.0
		SS2	138.47	119.10	30.83	88.27	21.9
		SS3	131.87	111.53	31.55	79.98	25.4
		SS4	146.81	132.71	31.67	101.04	14.0
		SS5	163.00	147.75	31.44	116.31	13.1
		SS6	156.53	144.16	31.51	112.65	11.0
		SS7	794.40	750.00	264.60	485.40	9.1
		SS8	133.29	123.27	30.16	93.11	10.8
		SS9	136.01	126.68	31.48	95.20	9.8
		SS10	161.60	149.65	31.41	118.24	10.1

IMTE Used: Scale #: Oven #:

Technician: WB Supervisor: MS

APPENDIX D

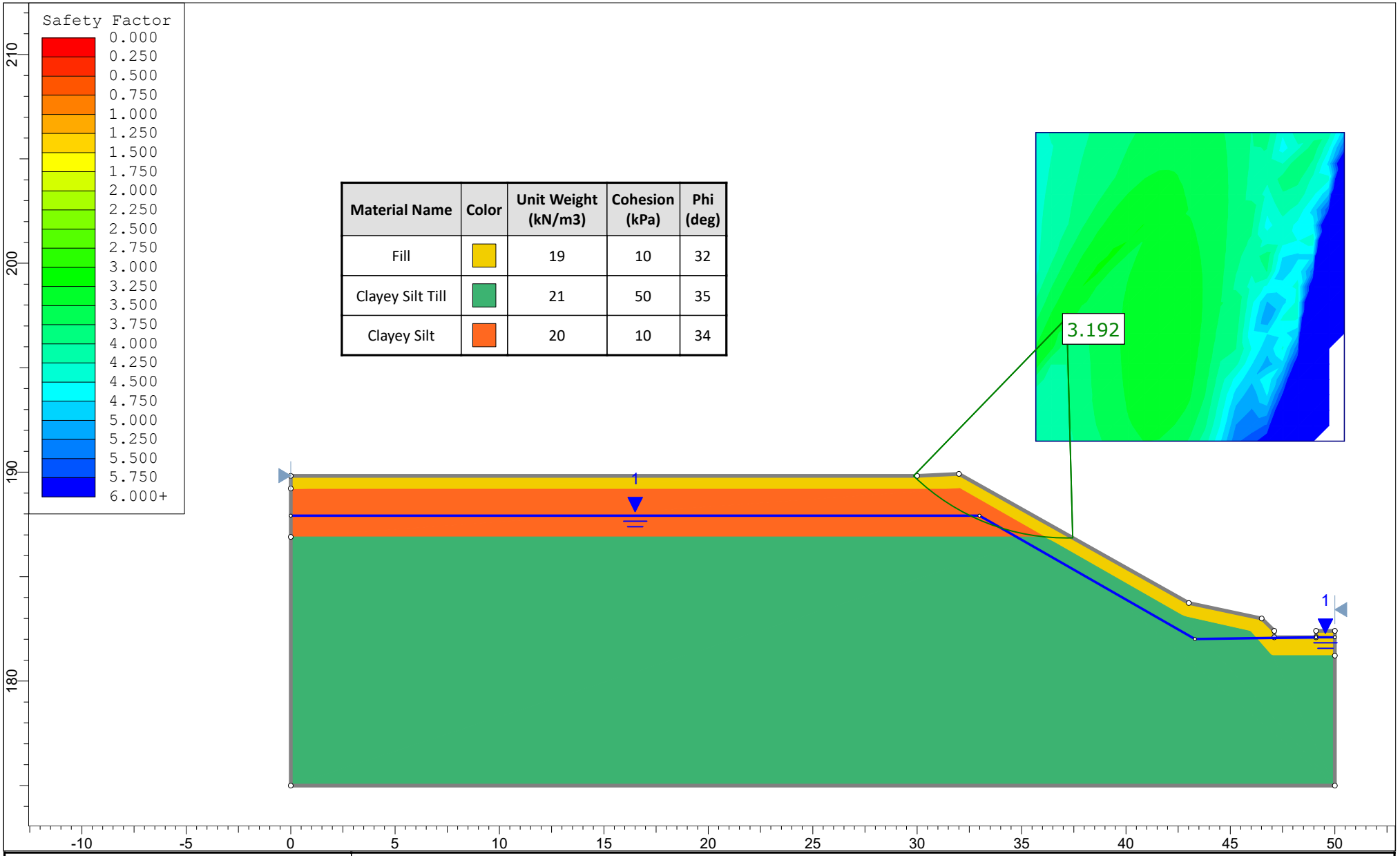
Slope Stability Analysis: Figure Nos: D1 to D5



Material Name	Color	Unit Weight (kN/m3)	Cohesion (kPa)	Phi (deg)
Fill		19	10	32
Clayey Silt Till		21	50	35
Clayey Silt		20	10	34

AME Materials Engineering

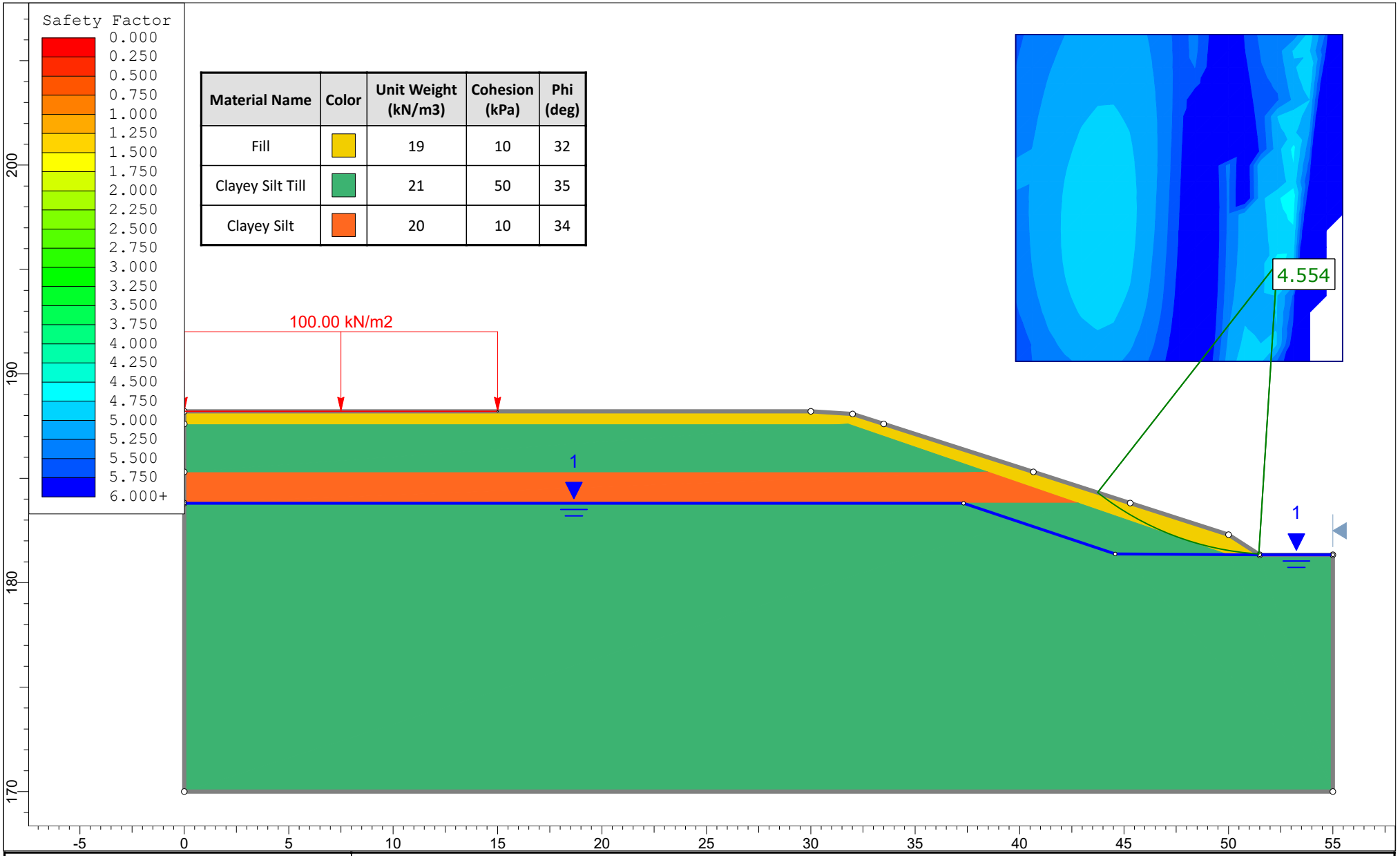
Project:	Top of the Bank Stability - 6451 Sixth Line Milton, ON		
Analysis Description	Long Term (Drained) Slope Stability - Cross Section A-A, BH22-13		
Project Number 30291.233	*Scale* 1:250	*Company*	
Date May 2022		*File Name*	30291.233 - BH22-13.slim Figure D-1



Material Name	Color	Unit Weight (kN/m3)	Cohesion (kPa)	Phi (deg)
Fill		19	10	32
Clayey Silt Till		21	50	35
Clayey Silt		20	10	34

AME Materials Engineering

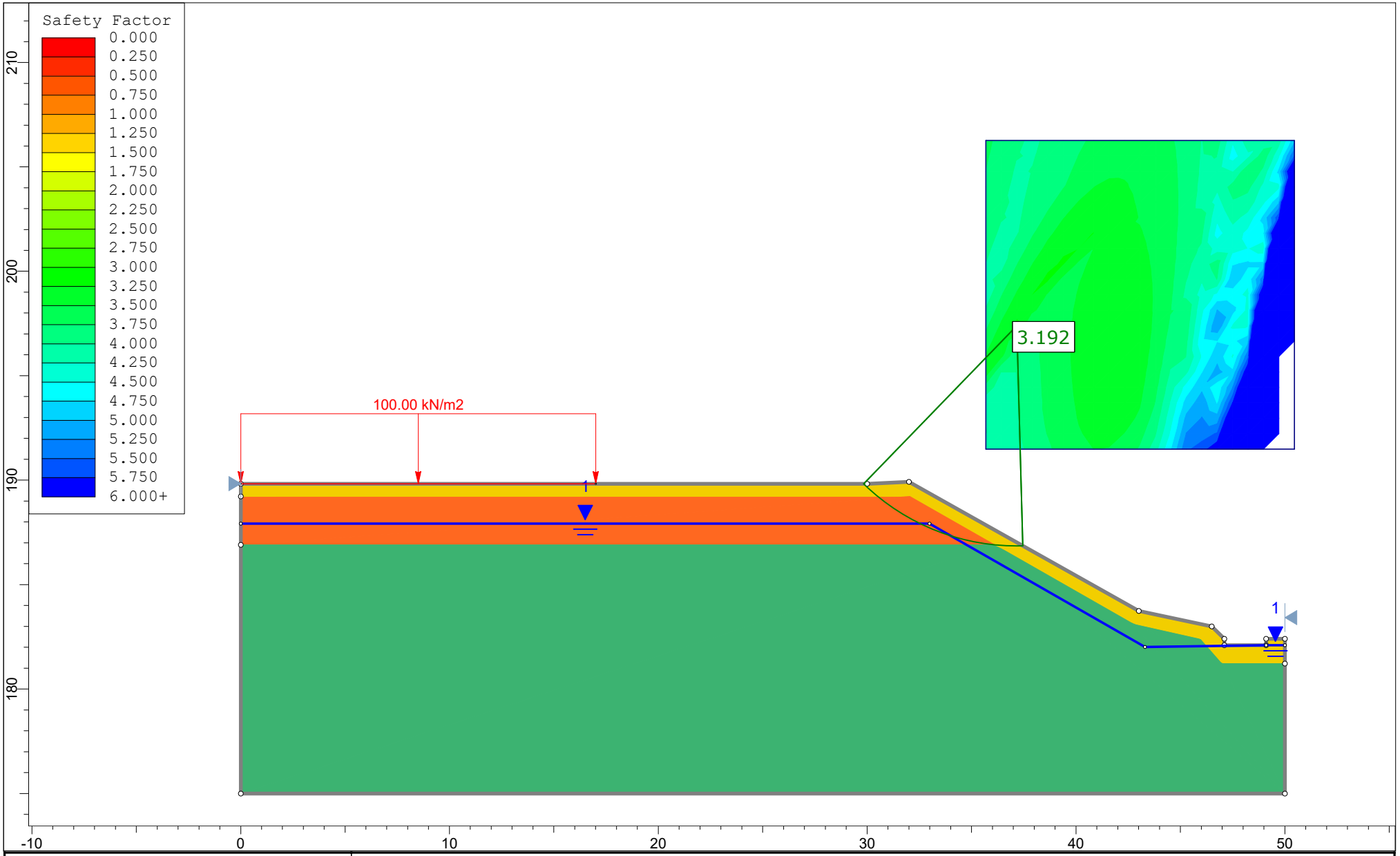
Project:	Top of the Bank Stability - 6451 Sixth Line Milton, ON		
Analysis Description	Long Term (Drained) Slope Stability - Cross Section B-B, BH22-03		
Project Number 30291.233	*Scale* 1:250	*Company*	
Date May 2022		*File Name*	30291.233 - BH22-03.slim Figure D-2



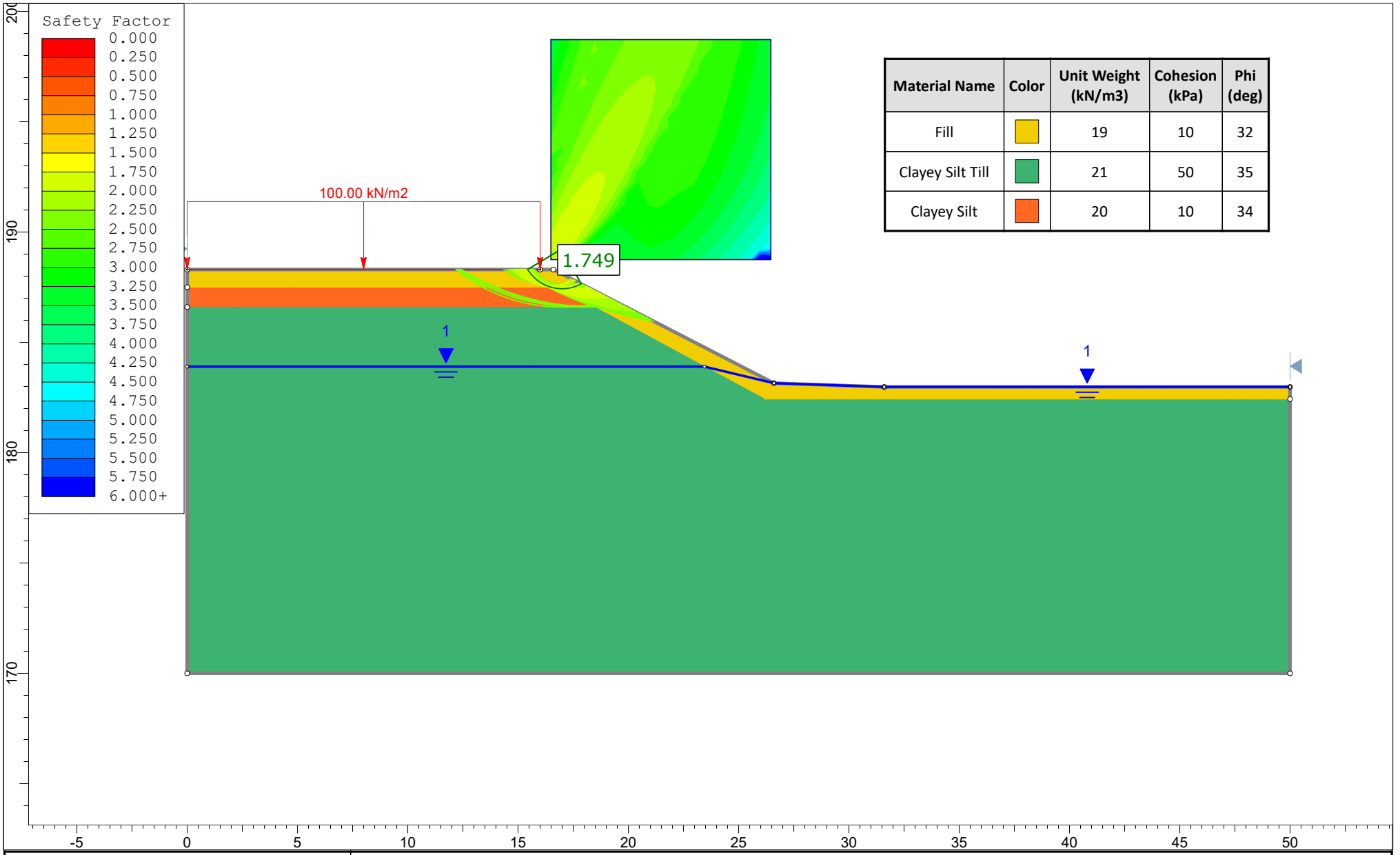
Material Name	Color	Unit Weight (kN/m3)	Cohesion (kPa)	Phi (deg)
Fill		19	10	32
Clayey Silt Till		21	50	35
Clayey Silt		20	10	34

AME Materials Engineering

Project:	Top of the Bank Stability - 6451 Sixth Line Milton, ON		
Analysis Description	Long Term (Drained) Slope Stability - Cross Section B-B (loaded), BH22-13		
Project Number 30291.233	*Scale* 1:250	*Company*	
Date May 2022		*File Name*	30291.233 - BH22-13-2.slim Figure D-3



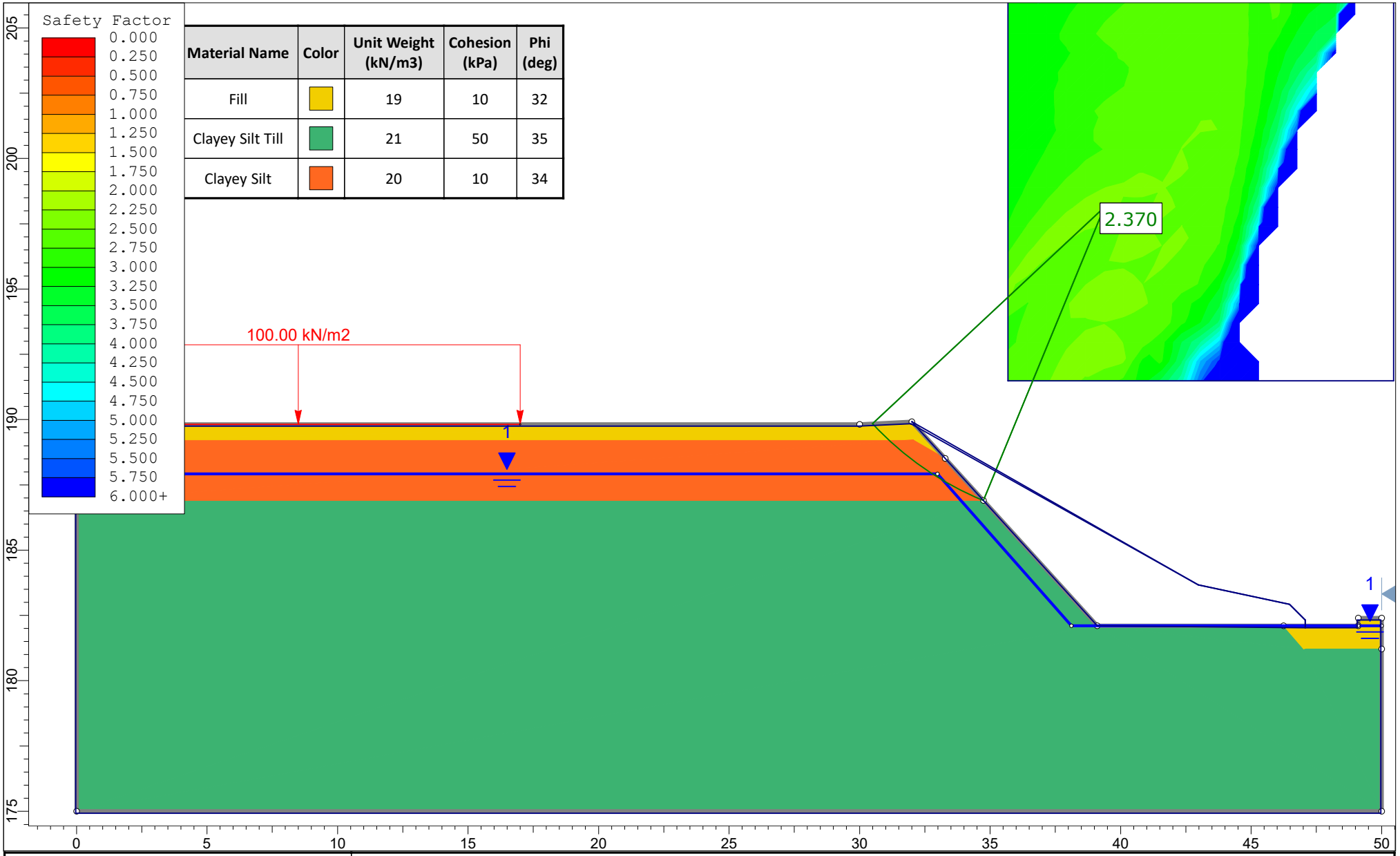
AME Materials Engineering	Project: Top of the Bank Stability - 6451 Sixth Line Milton, ON		
	Analysis Description: Long Term (Drained) Slope Stability - Cross Section B-B (loaded), BH22-03		
	Project Number: 30291.233	Scale: 1:250	Company:
	Date: May 2022		File Name: 30291.233 - BH22-03-2.slim Figure D-4



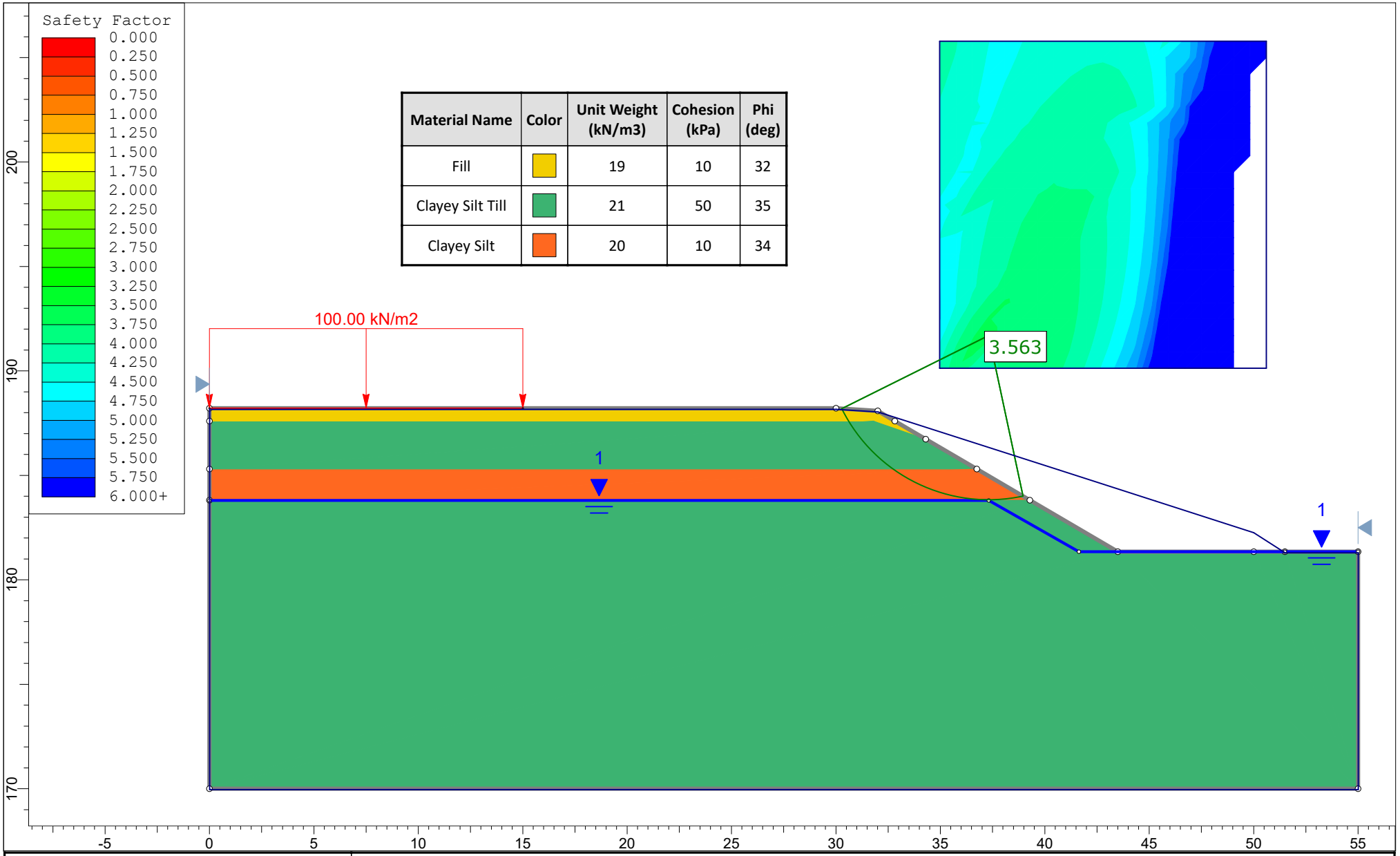
Material Name	Color	Unit Weight (kN/m3)	Cohesion (kPa)	Phi (deg)
Fill		19	10	32
Clayey Silt Till		21	50	35
Clayey Silt		20	10	34

AME Materials Engineering

Project:	Top of the Bank Stability - 6451 Sixth Line Milton, ON		
Analysis Description	Long Term (Drained) Slope Stability - Cross Section C-C (loaded), BH22-14 (Heritage Building)		
Project Number 30291.233	*Scale* 1:236	*Company*	
Date May 2022		*File Name*	30291.233 - BH22-14.slim Figure D-5



AME Materials Engineering	Project:	Top of the Bank Stability - 6451 Sixth Line Milton, ON	
	Analysis Description	Long Term (Drained) Stable Slope - Cross Section B-B (loaded), BH22-03	
	Project Number 30291.233	Scale 1:200	Company
	Date May 2022	File Name	30291.233 - BH22-03-Rev01.slim Figure D-6



Material Name	Color	Unit Weight (kN/m3)	Cohesion (kPa)	Phi (deg)
Fill		19	10	32
Clayey Silt Till		21	50	35
Clayey Silt		20	10	34

AME Materials Engineering

Project:	Top of the Bank Stability - 6451 Sixth Line Milton, ON		
Analysis Description	Long Term (Drained) Stable Slope - Cross Section A-A (loaded), BH22-13		
Project Number 30291.233	*Scale* 1:250	*Company*	
Date May 2022		*File Name*	30291.233 - BH22-13 - Rev01.slim Figure D-7

APPENDIX E

Site Photos : Figure Nos : E1 to E4

Figure E1: Top of Bank at the location of Heritage building

Figure E2: Top of the Bank at the location of BH22-03

Figure E3: Top of Bank at the location of BH22-13

Figure E4: Evidence of falling trees on the slope