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GEOTECHNICAL EVALUATION
PROPOSED NEW GRAVITY SEWER ALIGNMENT
TOWN OF LOCKPORT, NEW YORK

Submitted To:

EA Engineering , Science, and Technology Inc.

6712 Brooklawn Parkway
Syracuse, NY 13211

December 11, 2020

W.O. 10528.01

Submitted By:

Tectonic Engineering Consultants, Geologists & Land Surveyors, D.P.C.

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PRACTICAL SOLUTIONS. EXCEPTIONAL SERVICE.

EA Engineering , Science, and Technology Inc.
6712 Brooklawn Parkway
Syracuse, NY 13211

Attention: Ms. Melanie Dina
(Via Email: mdina@eaest.com)

December 11, 2020

RE: W.O. 10528.01
GEOTECHNICAL EVALUATION
PROPOSED NEW GRAVITY SEWER ALIGNMENT
LOCKPORT, NEW YORK

Dear Ms. Dina;

Tectonic Engineering Consultants, Geologists & Land Surveyors, D.P.C. is pleased to submit subsurface investigation and geotechnical engineering evaluation for the proposed new gravity sewer alignment in the Town and City of Lockport, Niagara County, New York. The purpose of this investigation was to identify and evaluate the soil and bedrock conditions along the proposed sewer alignment. This report presents the scope of the investigation, findings, conclusions, and recommendations for design and construction of the proposed sewer main.

We appreciate this opportunity to assist you with this project. If you have any questions, please do not hesitate to contact the undersigned.

Sincerely,

TECTONIC ENGINEERING CONSULTANTS, GEOLOGISTS & LAND SURVEYORS, DPC

STATE OF NEW YORK
CHRISTOPHER BURKE
078832
LICENSED PROFESSIONAL ENGINEER

Christopher Burke, Ph.D., P.E., PMP
Manager of Geotechnical Services

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GEOTECHNICAL EVALUATION
PROPOSED NEW GRAVITY SEWER ALIGNMENT
LOCKPORT, NEW YORK

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1.0 INTRODUCTION

Tectonic Engineering Consultants, Geologists & Land Surveyors D.P.C. (Tectonic) has performed a subsurface investigation and geotechnical engineering evaluation for the proposed new gravity sewer alignment in the Town and City of Lockport, Niagara County, New York. The purpose of this investigation was to identify and evaluate the soil and bedrock conditions along the proposed sewer alignment. This report presents the scope of the investigation, findings, conclusions, and recommendations for design and construction of the proposed sewer main.

2.0 SCOPE OF WORK

The geotechnical engineering services described below were performed for EA Engineering, P.C. and its Affiliate EA Science and Technology, herein referred to as EA.

- Perform a site walk with representatives of EA to observe site conditions.
- Review information about the proposed construction provided by the design team and publicly available information from the USGS, NRCS and others, regarding the soil and bedrock conditions that exist within the vicinity of the site.
- Field inspection of 41 borings by a Tectonic representative. The boring locations were selected by EA and drilled by others under our representatives' observation. Other tasks performed by our representatives included assisting EA in locating alternate borings, logging the subsurface soil, rock and groundwater conditions, and collecting of soil and rock samples for laboratory testing.
- Select soil and rock samples for lab testing by others, review the resulting laboratory test data and incorporate that data into the boring logs, our engineering analyses and this report.
- Geotechnical engineering analysis of the subsurface conditions as related to the design and construction of the proposed new gravity sewer alignment. Note, geotechnical analyses for other aspects of the project (three sewer crossings of railroads, slope stability along an access road) and the resulting designs will be included under separate cover.
- Preparation of this engineering report presenting the results of the subsurface investigation and geotechnical recommendations for the design and construction of the sewer main.

3.0 PROJECT BACKGROUND, AND SITE AND PROJECT DESCRIPTION

Information provided by EA indicates that they have been tasked by the New York State Department of Conservation to remediate three areas within and near Gulf Ravine, in Lockport, New York. As part of the remediation, the existing sewer main (the Gulf Interceptor, shown as the red line in Image A, below), which extends along Gulf Creek and beneath two areas to be remediated (see below), will be replaced.

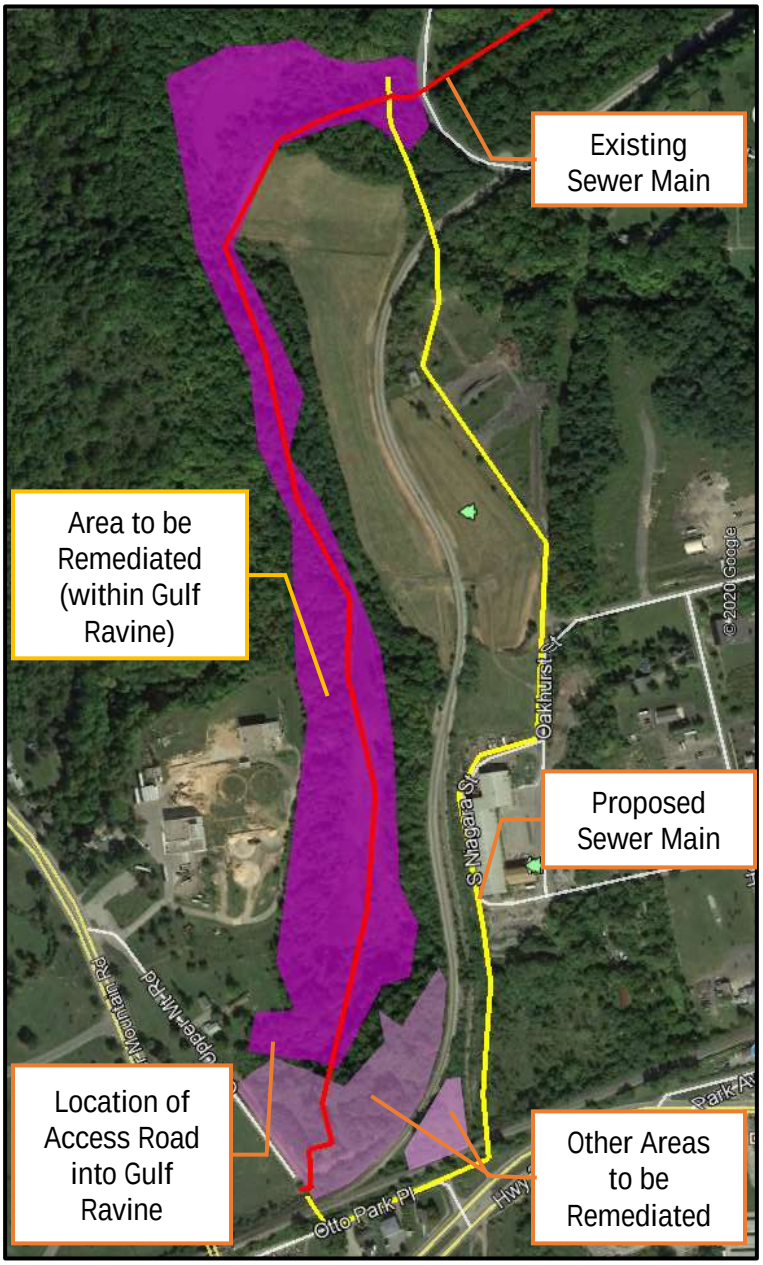


Image A – Aerial View of Project Site

The areas to be remediated include a former ash and waste dumping site at the head of Gulf Ravine, near the termination of Old Upper Mountain Road, Gulf Creek and the sediment within the bottom of Gulf Ravine between Old Upper Mountain Road and Niagara Street, and another small area between the CSX railroad and a spur owned by Somerset Railroad. As can be seen from Image A, the Gulf Interceptor passes beneath two of the areas to be remediated and it is also our understanding that parts of the existing sewer are inaccessible.

As noted above, EA has also been tasked by NYSDEC to design a realignment of the sewer main, as part of the overall remediation project. The proposed new sewer alignment (shown in yellow in Image A, above, and on Figures 1A to 1E) begins at the south end of Old Upper Mountain Road (near latitude {Lat} 43.165˚, longitude {Lon} -78.725˚), extends south to cross beneath the east-to-west CSX railroad and northbound Somerset Railroad spur to Otto Park Place, and then turn eastward along Otto Park Place to near its intersection with West Avenue (NYS Route 31). The new alignment then turns to the north, crosses back under the CSX railroad and continue to the north, behind the Lockport DPW garage, then turns to the east and shortly turns again to the north, where it passes along the west side of Oakhurst Street and a gravel drive that extends northward from it. Near the northern end of the alignment, the sewer will pass beneath another railroad, owned by Somerset Railroad and operated by CSX, and then will connect with the existing sewer Gulf Interceptor before it crosses under Niagara Street crosses Gulf Creek (near Lat 43.176˚, Lon -78.724). Overall, the new sewer alignment is approximately 5,000 feet in length.

It is our understanding that the new sewer main is intended to be a gravity sewer that will need to pass beneath a storm sewer that crosses beneath Otto Park Place and the CSX railroad, to southern end of Gulf Creek. Subsequently, current plans have the sewer flowline depths ranging from as shallow as 7.58 feet (near boring B-39) to as deep as 22.10 feet (between borings B-7 and B-9). Typical flowline depths along most of the alignment are between 12 and 15 feet.

Construction of the new sewer main will require geotechnical engineering evaluation and design for bedding, manholes, excavation support, and for installation of the 30-inch inside diameter sewer main. As noted above, the sewer line will also cross beneath the CSX and Somerset Railroad's tracks in three locations (see Figures 1A and 1E). These railroad crossings will also require design of launch and receiving pits for jack and bore, micro-tunneling, directional drilling, or other horizontal drilling methods to carry the sewer pipe beneath the tracks at the railroad crossings, without disturbing the rails or disrupting traffic. Most of the design work for these crossings will be performed after completion of this report, and therefore, will be documented under separate cover.

In addition to the planned new sewer alignment, this project includes a narrow access road that passes from Old Upper Mountain Road into Gulf Ravine, approximately 600 feet south of the intersection of Upper Mountain Road and Old Upper Mountain Road (see Image A above for a rough indication of the access road's location and see Figure 1C for a topographic plan of the access road area). This access road is currently too narrow to be

safely traversed by the heavy equipment needed to remediate the ash and waste previously placed within the ravine. Because of the steepness of the ravine, widening of the access road will require cutting into the slope above the road, and therefore, also requires an evaluation of the stability of the slopes above and below the access road, and might require design of stabilization methods. This aspect of the project is secondary to the sewer realignment and will largely be discussed under separate cover.

4.0 SUBSURFACE INVESTIGATION

The subsurface investigation was conducted by EA and observed by geotechnical engineers representing Tectonic. The subsurface investigation consisted of drilling a total of 43 test borings, designated as B-1 through B-49 along the planned sewer alignment and near the access road into Gulf Ravine. The boring locations, as well as the approximate sewer alignment, the locations of the three railroad crossings and the access road location are shown on Figures 1A to 1F – the Boring Location Plans. The following items should be noted about the boring numbering:

- Borings B-2, B-3, B-8, B-31, B-34, B-40, B-41, B-42 and B-43 were eliminated from the subsurface investigation for various reasons, including access issues, and selection of the primary planned route, which eliminated several borings along alternate routes.

- Alternate borings (B-4A and B-17A) were drilled immediately adjacent to the original borings, when obstructions were encountered at the original borings (B-4 and B-17). An alternate boring B-16A was also drilled after boring B-16 was terminated by EA to avoid underground infrastructure that was reported to be near the original boring location.

- Borings B-1 to B-39 were drilled to evaluate the subsurface conditions along the propose sewer alignment, with borings B-1 and B-4/4A, B-7 and B-9, and B-30 and B-32 bracketing each of the three railroad crossings, respectively (See Figures 1A and 1B for the crossing and boring locations).

- Borings B-45 to B-49 were drilled to obtain subsurface information about the slope into which the access road into Gulf Ravine has been cut. The general area of the access road and these borings are indicated by clouded areas on Figures 1A and are shown on Figure 1C.

The majority of the borings were performed by Nothnagle Drilling, Inc., who was directly contracted with EA. The subsurface investigation was conducted between July 20, 2020 and September 3, 2020, utilizing either truck-mounted or ATV-mounted CME 55 drill rigs, equipped with automatic hammers. The borings were advanced through soil using 4¼-inch inside diameter hollow stem augers; and through rock using either 2-inch (NQ), or 2.5-inch (HQ), inside diameter double-tube core barrels, equipped with diamond impregnated bits.

Standard Penetration Testing (SPT) and split-spoon sampling were generally performed continuously throughout the depth of soil encountered within the borings. The SPT sampling was performed in general accordance with the requirements of ASTM Standard D1586 *"Standard Test Method for Penetration Test and Split-Barrel Sampling of Soils"*. Field SPT N-values were recorded for each soil sample taken.

Samples of the soil obtained during the investigation were collected and retained in glass jars, while the rock core samples were retained in wooded boxes. EA personnel shipped all soil and rock samples to SJB Services, Inc. for material testing. Upon completion of each boring, it was backfilled with cuttings, and those that were drilled through pavement were topped with cold patch asphalt.

Geotechnical engineers, representing Tectonic, observed the subsurface investigation and prepared logs of the subsurface conditions under the purview of a Professional Engineer licensed in New York State. All soils encountered were classified in accordance with the Unified Soil Classification System (ASTM D2488), and the Modified Burmister Soil Classification System. Copies of the boring logs are included in Appendix I.

In addition to the machine-drilled and sampled borings noted above, a representative of EA traveled to the site and conducted two borings (B-38 and B-39) using a hand auger and a probe. These borings were drilled in an area at the northern end of the sewer alignment that was deemed inaccessible to heavy drilling equipment. Neither penetration testing, nor rock coring, were performed in these two borings. Excerpts of the Daily Inspection Report describing these borings are also included in Appendix I, with the other boring logs.

5.0 LABORATORY TESTING

Laboratory testing was performed by SJB Services, Inc. on soil and rock samples selected to help refine the field identification and aid in establishing the engineering properties of the soils and rocks encountered in the borings. Table 5.0.1, below, lists the various laboratory tests performed upon soil and rock samples collected from this project. The results of the laboratory testing have been incorporated into the descriptions of the subsurface conditions presented below and are included in Appendix II.

Table 5.0.1 - Laboratory Testing			
Test Description	ASTM Standard	Number of Tests	Purpose
Grain Size Distribution	D6913	23	Classification of coarse-grained soils (sands and gravels)
Natural Moisture Content	D2216	13	Measurement of the natural moisture content of a soil sample
Specific Gravity	D854	6	Measure of the overall specific gravity of soil particles in a sample
Atterberg Limits Determination	D4318	6	Measurement of the relative plasticity of fine-grained soils (silts and clays)
Modified Proctor Moisture/Density	D1557	1	Measurement of the moisture-density relationship of a soil
Point Load Strength Index	D5731	30	Measurement of intact rock strength
Direct Shear	D3080	1	Measurement soil shear strength

6.0 SUBSURFACE CONDITIONS

The subsurface conditions encountered at the site generally consist, in turn, of occasional fill, native soils, partially weathered rock (PWR), and bedrock. The following subsections provide generalized descriptions of the encountered soil, rock and groundwater conditions. Detailed descriptions of the subsurface conditions are provided in the boring logs and soil profiles included in Appendix I.

As previously mentioned, automatic hammers were used in the performance of the SPT sampling. The energy standardized N_{60}-value, which is typical of a safety hammer and is the standard for geotechnical analyses, is also used in the following descriptions of the soils. An automatic hammer typically imparts about 1.3 times as much energy to the soil as a safety hammer, and therefore, the field N-values reported in the boring logs are corrected by this factor to obtain the energy-corrected SPT N_{60}-values.

6.1 Fill

Clearly discernable fill was encountered in eleven (11) borings (B-6, B-12, B-14, B-15, B-16, B-16A, B-19, B-20, B-28, B-29 and B-32). Fill is also noted in boring B-30, but this material was placed prior to drilling the borings, to create a level area for the drill rig. Encountered fill depths range from 1-foot to 12 feet, and the fill is typically about 2 to 4 feet deep. The majority of the borings where fill was encountered lie near the DPW garage and Oakhurst Street, and near the northern-most of the three railroad crossings.

The fill typically ranges from brown-black coarse to fine sand, with 20 to 45 percent coarse to fine gravel, and 10 to 35 percent silt; to multi-colored coarse to fine gravel, with 20 to 35 percent coarse to fine sand, and widely varying percentages of silt, silt & clay, or clay & silt. It should be noted that the terms silt, silt & clay, and clay & silt indicate varying degrees of plasticity within the fine portions of the fill (see the Legend for Soil Descriptions sheet, included in Appendix I, and further information included in the following sub-section). Furthermore, ash, wood, cloth, brick and glass fragments were observed in some of the fill, and the odor of petroleum was noted in two (2) samples of fill (at borings B-12 and B-16). The fill generally appears to be re-worked native soil or a pavement subbase gravel. The fill soils typically have USCS designations of SP, SP-SM, SM, SC, GP, GM, and GC.

Field SPT N-values within the fill range from 1 to 41 blows per foot (bpf) and average 15 bpf. When the energy correction is applied to the field N-values shown on the boring logs, we find that the N_{60}-values within the fill range from 1 to 53 bpf, with an average of 20 bpf. These N_{60}-values indicate that the fill is typically medium dense, but can range from very loose to very dense.

6.2 Native Soils

Review of the Quaternary Map of the Northeastern United States shows that the site is underlain by a thin layer of glacial till, overlying shallow bedrock. Glacial till is a mixed soil, with a very wide range of particle sizes, ranging from clay to boulders, produced by the continental glacier that covered the area up until some 15,000 years ago. Furthermore, the Natural Resource Conservation Service (NRCS) classifies the near-surface soils near the sewer alignment as silty clay (CL), silt (ML) or silty gravel (GM).

Based on our observations of the soil encountered immediately below the fill, or immediately below the ground surface (where fill was not encountered), the soils appear to consist of glacial till or residual soil derived from the weathering of the underlying bedrock. The native soils tend to range from gray-tan coarse to fine gravel, with 20 to 45 percent coarse to fine sand, and 10 to 35 percent silt; to gray-brown silt, with 10 to 20 coarse to fine sand, and less than 10 percent fine gravel. Furthermore, a comparison of Figures 2b through 2f shows that the native soils tend to be coarser near the southern end of the sewer alignment and finer near the northern end. The native soils have USCS designations of GM, GC, SM, SC, ML, CL and CL-ML. The native soils were found to range in depth from less than 1-foot in borings B-4 and B-4A, to about 14 feet, in boring B-29. The depth of the soils, overall, tends

to vary significantly along the sewer alignment, but tends to be shallower near the southern and far-northern ends of the alignment and deeper near the center of the alignment (between borings B-24 and B-32).

Field SPT N-values within the native soils range from 4 to 50 bpf, which correlate to N_{60}-values ranging from 5 to 65 bpf. These N_{60}-values indicate that the native soil range from loose to very dense.

Partially weathered rock (PWR) was encountered in several borings. PWR is defined as soil that maintains the apparent structure of bedrock, but can be drilled through and sampled using standard soil boring and sampling equipment. Another strong characteristic of PWR is that although it can be sampled with a split spoon sampler, split spoon refusal often occurs. Split spoon refusal is defined as less than 6 inches of split spoon penetration after 50 blows of the 140-pound hammer. Both observation of the samples, as well and the field N-values were used to identify PWR at this site.

PWR was typically encountered near the middle of the proposed sewer alignment, between borings B-19 and B-26, and appears to largely consist of decomposed shale bedrock. When sampled, the PWR typically breaks into soil that could be described as tan to brown coarse to fine gravel, with 20 to 45 percent coarse to fine sand, and 20 to 35 percent silt. However, it occasionally can break into clayey silt or silt, with 10 to 45 percent fine gravel and 10 to 20 percent coarse to fine sand. It should also be noted that, when two of samples of the PWR encountered in boring B-23 were tested in the laboratory, they appeared to break down. These samples were described in the field as being predominantly gravel, with less than 35 percent silt, but after a sieve analysis was performed, they were described as predominantly silt, with approximately 25 percent gravel and 14 to 30 percent sand. This suggests that some of the PWR tends to break down with manipulation, and/or exposure to air.

Split spoon refusal occurred in many of the samples of PWR collected from the borings, indicating that the PWR typically acts like a very dense soil. The PWR was encountered as shallow as 4 feet in several borings (see Table 6.3.1, below), extends to a depth of 15 feet in boring B-19, and to the bottom of exploration (at depths between 15.3 and 18 feet) in borings B-23, B-24, and B-26.

6.3 Bedrock

The United States Geologic Survey maps of the area identify three bedrock formations across the site. These formations generally vary from north to south and with increasing elevation. These formations include rocks of the Power Glen Shale of the Medina Group; the DeCew Dolomite and Rochester Shale of the Clinton Group; and the Ilion Shale of the Lockport Group. These formations primarily consist of dolomite (aka dolostone), shale, mudstone and sandstone. It should also be noted that maps of karst regions across the United States show that the southern-most of these groups, the Lockport Group, is karstic. In other words, solution cavities have been found to form within the carbonate rock (dolomite and/or limestone). Bedrock encountered within the borings generally match the rocks described in these formations.

Table 6.3.1, below, lists the depths and elevations where PWR and bedrock were encountered, if encountered.

Table 6.3.1 – PWR and Bedrock Depths and Elevations

Boring Number	Surface Elevation (ft)	PWR Depth (ft)	PWR Elevation (ft)	Bedrock Depth (ft)	Bedrock Elevation (ft)
B-1	588.5	NE[1]	NE	4.5	584.0
B-4A	589.5	NE	NE	1.1	588.4
B-5	592.1	NE	NE	4.5	587.6
B-6	589.6	NE	NE	9	580.6
B-7	589.7	NE	NE	2	587.7
B-9	592.7	NE	NE	1.5	591.2
B-10	592.0	NE	NE	1.5	590.5
B-11	590.0	NE	NE	3	587.0
B-12	589.1	NE	NE	12	577.1
B-13	589.0	NE	NE	9	580.0
B-14	589.0	NE	NE	10	579.0
B-15	587.2	NE	NE	5.2	582.0
B-16A	585.0[2]	4	581.0	6	579.0
B-17	586.5	NE	NE	7	579.5
B-17A	586.5	NE	NE	9	577.5
B-18	590.0	NE	NE	9	581.0
B-19	583.2	NE	NE	15.3	567.9
B-20	583.0	NE	NE	2	581.0
B-21	583.8	3[3]	580.8	2, 6.5[3]	581.8
B-22	583.0	NE	NE	8.5	574.5

Table 6.3.1 – PWR and Bedrock Depths and Elevations					
Boring Number	Surface Elevation (ft)	PWR Depth (ft)	PWR Elevation (ft)	Bedrock Depth (ft)	Bedrock Elevation (ft)
B-23	579.8	2	577.8	NE	NE
B-24	578.0	4	574.0	NE	NE
B-25	590.0	NE	NE	2	588.0
B-26	576.9	8	568.9	NE	NE
B-27	576.3	10	566.3	15.4[4]	550.9
B-28	575.2	8	567.2	15.4[4]	551.8
B-29	573.4	6	567.4	NE	NE
B-30	569.5	20	549.5	24[4]	525.5
B-32	535.0	NE	NE	NE	NE
B-33	525.0	NE	NE	7	518.0
B-35	504.1	NE	NE	4	500.1
B-36	498.0	NE	NE	3.5	494.5
B-37	498.0	NE	NE	3[5]	495.0
B-38	469.0	NE	NE	7[6]	462.0
B-39	475.7	NE	NE	3.33[6]	472.4
B-44	575.5	NE	NE	7	568.5
B-45	567.5	Pending[7]	Pending	Pending	Pending
B-46	588.0	NE	NE	5.5	582.5
B-47	588.0	Pending	Pending	Pending	Pending
B-48	545.6	Pending	Pending	Pending	Pending
B-49	526.0	20	506.0	27	499.0

Notes:

1. NE: Not Encountered
2. Surface elevations for alternate (A) borings have been estimated to be the same as the surveyed elevations for the original borings.
3. Bedrock was initially encountered at 2 feet, but a layer of PWR was encountered between 3 and 6.5 feet. Hard rock was encountered again below this depth range.
4. Estimated from split spoon and/or auger refusal.
5. The rock recovered from between 3 and 6.5 feet is so weathered that it might be considered to be PWR.
6. Inferred from rebar refusal.
7. "Pending" indicates borings that had not been completed by the date that the draft report was prepared.

The bedrock in the southern end of the site primarily consists of gray, decomposed to fresh, highly fractured to massive, coarse to fine grained dolomite. The dolomite has Rock Quality Designations (RQDs), which is defined as the cumulative sum of the lengths of recovered core pieces having a length greater than 4 inches divided by the total cored length, that range from 0 to 100 percent, with an average of 44 percent. These RQDs indicate that the dolomite ranges in quality from very poor to very good, and has a poor quality, on average. This rock appears to be part of the Lockport Group.

Shale bedrock (that could be cored) was encountered immediately beneath the native soils in borings B-14, 17A, B-19 and B-44. Shale was also encountered beneath a thin layer of sandstone in boring B-20, and beneath the dolomite in borings B-21, B-22 and B-46. The shale can be described as gray to gray-black, highly weathered to fresh, highly to slightly fractured, fine grained, and moderately soft to moderately hard. Measured RQDs in the shale range from 0 to 100 percent, with an average of 46 percent. These RQDs indicate that the shale has a quality that ranges from very poor to very good, and on average, has a poor quality. These shales appear to be part of the Clinton Group, but may also be parts of the Lockport and Medina Groups.

Finally, as suggested above, the rock coring occasionally encountered rock that could best be described as mudstone (in boring B-15) and sandstone (in boring B-20, B-33, B-35, B-36 and B-37). Ten (10) core samples of these rocks were encountered, and the mudstone and sandstone can generally be described as highly weathered to fresh, highly to slightly fractured, fine grained (mudstone) or medium to fine grained (sandstone), and very soft to hard. Measured RQDs in the mudstone and sandstone range from 0 to 52 percent, with an average of 25 percent. These RQDs indicate that the mudstone and sandstone have qualities that range from very poor to fair, and on average, are of poor quality. These rocks also appear to be part of the Clinton Group.

As previously noted in Section 5, PLSI tests were performed on intact fragments of the bedrock samples taken from representative borings. Table 6.3.2 provides a summary of the PLSIs, as well as the estimated unconfined compressive strengths of the samples.

Table 6.3.2 – Rock Strength Characteristics of Select Rock Core Samples					
Boring Number	Sample Number	Rock Type	Sample Depth (ft)	Uncorrected PLSI[1, 2] (psi)	Estimated UCS[3, 4] (psi)
B-1	C-1	Dolomite[5]	13	560	11,793
B-4	C-4	Dolomite	15	916	21,339
B-5	C-2	Dolomite	12	339	7,906
B-5	C-3	Dolomite	17	435	10,126
B-6	C-1	Dolomite	9	699	16,274
B-6	C-2	Shale	17.5	939	21,925
B-7	C-2	Dolomite	7	435	10,126
B-7	C-3	Dolomite	12	323	7,548
B-9	C-2	Dolomite	6.5	254	5,929
B-9	C-4	Dolomite	18	708	16,534
B-10	C-3	Dolomite	16	481	11,213
B-11	C-3	Dolomite	14	609	12,819
B-12	C-1	Dolomite	15	706	14,871
B-13	C-3	Dolomite	16	447	10,424
B-14	C-1	Shale	14	477	11,143
B-15	C-1	Mudstone[6]	7	77	1,796
B-15	C-3	Mudstone	17	38	900
B-17A	C-1	Shale	11	373	8,679
B-18	C-2	Dolomite	12	536	11,278
B-25	C-3	Dolomite	14	536	11,278
B-33	C-1	Sandstone[6]	11	609	12,819
B-35	C-1	Sandstone	8	731	15,381
B-36	C-1	Sandstone	8	443	9,232
B-37	C-1	Sandstone	9	414	8,716
B-46	C-2	Dolomite	13	584	12,304
B-46	C-4	Dolomite	23	414	8,716
B-46	C-6	Shale	33	49	1,026
B-46	C-8	Shale	43	73	1,547
B-46	C-10	Shale	53	365	7,690
B-46	C-12	Shale	62	73	1,536

Notes:

1. PLSI: Point Load Strength Index
2. By the nature of PLSI testing in-tact samples must be used to perform the tests. Subsequently weaker rock with fragments smaller than approximately 4 inches in length could not be tested. Subsequently core samples with an RQD of 0 percent and decomposed rock could not be tested. These tests were performed across the diameters of the core samples. Tests performed along the lengths of the samples could have produced different results.

3. UCS: Unconfined Compressive Strength
4. To calculate the UCS, a correction factor (between 1.003 and 1.112) related to the diameter of the core samples and a correlation constant (k) of 21 were applied to the measured PLSIs. Based on a comparison with the result given by the testing laboratory (SJB) it appears that Tectonic has elected to use a different (more conservative) correlation constant than SJB used to report the Uniaxial Compressive Strengths on their laboratory reports.
5. During field inspection, it was unclear whether the predominant rock in the southern portion of the site is dolomite or limestone and acid testing was not performed to differentiate between the two rock types. Subsequently, both limestone and dolomite (or dolostone) are used in the rock types in the laboratory reports. Based on the mapped rock formations, it has been concluded that the rock is most likely dolomite, and subsequently, this term has been used throughout this report and on the typed boring logs.
6. The mudstone encountered in boring B-15 was inaccurately described as siltstone on the field logs and this term was used in the laboratory report. Similarly, the sandstone encountered in borings B-33, B-35, B-36 and B-37 was initially classified as limestone, but after further review, it was concluded that sandstone would better describe the encountered rock in this report and on the typed boring logs.

A review of Table 6.3.2 shows that the mudstone encountered in boring B-15 has the lowest calculated UCS (900 psi), while the weakest shale has a similar UCS (1,026 psi). Conversely, the weakest dolomite is significantly stronger, with a calculated UCS of 5,929 psi. The shale and mudstone have an average UCS of 4,781 psi, while the dolomite has an average UCS of 12,071 psi – indicating that the dolomite is significantly stronger than the shale and mudstone. The sandstone, encountered at the northern end of the sewer alignment, has calculated unconfined compressive strengths that range from 8,716 to 12,819 psi, with an average UCS of 11,537 psi – indicating that the sandstone samples' strengths are comparable to most of the tested dolomite strengths.

Figure 3 – Rock Characteristics Plots has three plots of the RQD, PLSI and the degree of weathering in the rock (represented by a weathering score ranging from 1 {decomposed} to 5 {fresh}) versus depth (to 25 feet). As can be seen from the plots, the characteristics of the bedrock encountered along the proposed sewer alignment is widely scattered. However, the trend lines added to the plots of the various parameters suggest that there is a slight increase in RQD and strength, and a slight decrease in weathering, with the depth into the bedrock. However, we bring your attention to the coefficients of correlation for the trend lines (R^2). These values are quite low and represent the relatively wide scatter of the various points. Subsequently, although we anticipate that the bedrock will become less weathered, stronger and more massive, with depth it should not be necessarily expected at any given location. Please note that these plots do not include the deep shales sampled and tested in boring B-46.

Another item of note is that voids were encountered in borings B-4A, B-5, B-10 and B-11, and could be observed in an exposure of the dolomite near the access road. The largest of these voids was encountered is boring B-4A (2.7 feet in height), while the remainder of the voids are typically less than 1-foot in height. It is expected that these are solution cavities (karst conditions) within the dolomite. This will be further discussed in Section 8, below.

6.4 Groundwater

Free groundwater or saturated soil samples were not encountered in the borings. In fact, the only potentially wet soil was encountered in boring B-38, which was hand-drilled near Gulf Creek. Subsequently, we anticipate that the groundwater at the site will be slightly above the nearby elevation(s) of Gulf Creek, and we anticipate that the groundwater elevation near the southern end of the sewer alignment (and near the access road) will be somewhere around +520 to +530 feet; while at the northern end of the sewer alignment, we anticipate that the groundwater elevation will be between approximately +470 to +480 feet. However, groundwater observation wells were not installed at the site and these estimates are based only upon engineering judgement and a review of the surrounding terrain. Furthermore, groundwater elevations tend to fluctuate with seasons and with variations in rainfall. If the contractor needs accurate groundwater depth estimates, it is recommended that groundwater observation wells be installed.

7.0 SEISMIC SITE COEFFICIENTS AND LIQUEFACTION POTENTIAL

Based on the results of the subsurface investigations and the criteria outlined in the current edition of the New York State Building Code (Code), the subsurface conditions underlying the site should be considered Class C. Seismic designs should use maximum spectral response accelerations at short periods (S_{MS}) equal to 0.275g and at a 1-second period (S_{M1}) equal to 0.110g. Based on the procedures outlined in the Code, the corresponding five-percent damped design spectral response acceleration at short periods (S_{DS}) is equal to 0.183g, and at 1-second (S_{D1}) is equal to 0.073g. Note, these accelerations were determined using ASCE 7-16 and are slightly greater than the AASHTO accelerations, which would be used for structures within roadways.

Liquefaction of soils can be caused by strong vibratory motion due to earthquakes. Both research and historical data indicate that loose, granular soils saturated by a shallow groundwater table are most susceptible to liquefaction. Liquefaction occurs when an earthquake and associated ground shaking of sufficient duration

results in the loss of grain-to-grain contact due to a rapid increase in pore-water pressure, causing the soils to behave as a fluid for short periods.

An analysis was performed using a procedure recommended by Youd et al (2001), to evaluate the liquefaction potential of the soils at the site. This method estimates the stresses likely to be induced by an earthquake and the stresses likely to initiate liquefaction using the SPT blow counts, the effective overburden pressure, and the peak horizontal ground acceleration that would be caused by the design seismic event. Given a site classification of C, a design peak horizontal ground acceleration (phga) of 0.125g (based on a top-of-bedrock phga of 0.096 and a correction factor of 1.3, as specified by the Code), was applied to the model. The earthquake moment magnitude was taken as 5.46, which is the mean value for the site's location, calculated on the USGS Unified Hazard Tool, using the "Dynamic: Conterminous U.S. 2014" model, and a 2 percent probability of exceedance in 50 years (a 2475-year return period).

The factors of safety against liquefaction were computed by the ratio of cyclic shear strength of the soil to the cyclic shear stress induced by the seismic event. The liquefaction analysis indicates that the soils encountered within the borings have a factor of safety against liquefaction greater than the generally accepted minimum of 1, indicating that liquefaction is unlikely. Furthermore, the general lack of groundwater (except near Gulf Creek) further decreases the probability of liquefaction at the site. Subsequently, it is our conclusion that the subsurface soils are unlikely to liquefy during a design earthquake of Magnitude 5.46.

8.0 DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

The following sub-sections discuss the main issues noted within the request for proposal regarding the design and construction of the proposed sewer main and its crossings of the railroads. Each subsection generally begins with a discussion of how the subsurface conditions affect the design and construction of each feature, which is in turn followed by conclusions and recommendations for the design of the sewer pipe, open cut trenches, the railroad crossings and manholes. These subsections are then followed by recommendations for construction monitoring.

8.1 Pipe Design

As previously noted, voids (likely solution cavities) were encountered in the dolomite bedrock near Otto Park Place. It is expected that both horizontal and vertical voids will be encountered during excavation of the proposed sewer trench. It is not anticipated that these voids will pose a significant impediment

to construction of the proposed sewer, given that the encountered voids have been relatively small; however, we do anticipate that some void filling beneath the sewer pipe (and perhaps within the sidewalls of the trench) may be necessary. It is recommended that the specifications call for either lean concrete or flowable fill (Controlled Low Strength Material – CLSM) to be used to fill any encountered voids that exceed 6 inches in width.

With the exception of filling voids with grout or flowable fill, a standard pipe bedding may be used along the entire length of the proposed sewer alignment. Alternatively, as discussed above, flowable fill (CLSM) may be used for pipe bedding (and backfill), provided that appropriate measures are taken to prevent the pipe from floating.

Along the alignment, at the shallowest point between the roadway and top of pipe (near boring B-19), we estimate that the top of the pipe will lie about 10.5 feet below the pavement surface. We estimate that the net increase in vertical stress on the pipe, from a set of tandem 24,000-pound axles, 5 feet apart, will be approximately 360 pounds per square foot.

8.2 Open Cut Trench

The primary geotechnical issues associated with the proposed gravity sewer construction are the shallow bedrock and variations in the bedrock consistency and depth. It is anticipated that some of the PWR and bedrock can be ripped with a heavy ripper attached to a large excavator. However, we anticipate that much of the dolomite encountered in the southern half of the site, and some of the sandstone encountered near the northern end of the sewer alignment, will likely require pre-drilling, before it can be ripped, or will require the use of a hoe-ram for excavation.

To evaluate whether the rock might be ripped, we used the NRCS *National Engineering Handbook, Chapter 4 – Engineering Classification of Rock Materials*, 2005, and *Chapter 52 - Field Procedures Guide* for the *Headcut Erodibility Index*, 1997. These chapters relate how easily rock can be ripped to the headcut erodibility index (k_h) for open spillway channels at dams, and by estimating k_h using parameters such as fracture spacing and orientation, weathering, and RQD. This index is then used to separate the rock conditions into three classes (I, II and III), where Class I rock is very hard to rip and "*requires drilling and explosives or impact procedures for excavation*", Class II rock is hard to rip and "*requires ripping techniques for excavation*", while Class III rock is easy to rip and "*can be excavated*

as common material by earthmoving or ripping equipment." The NRCS also provides estimates of the flywheel horsepower required to rip each class of rock, if it can be ripped.

Based on the boring data and the above-procedure, we have estimated the relative classes of rock that are expected to be encountered during excavation of the trench for the new sewer alignment. The following bulleted conclusions have been made:

- Between Stations 0+00 and 19+00, most of the trench excavation will be through soil or PWR, which can be excavated with normal heavy excavation equipment.
- The PWR, where encountered, can generally be considered to be Class III rock.
- Between Stations 19+00 and 50+00, most of the trench excavation will be in rock and the majority of rock cores performed within the portion of the sewer alignment encountered dolomite.
- Between 80 and 95 percent of the dolomite can be considered Class I rock, and the remainder would be considered Class II rock.
- In the northern end of the pipeline, where the rock is predominantly shale or mudstone, about 25 to 65 percent of the rock is Class I, about 35 to 60 percent of the rock is Class II, and less than 10 percent is Class III rock.

Most of the hardest rock (dolomite and sandstone) exists in the portions of the sewer alignment that crosses, or parallels the railroads, or passes beneath Otto Park Place, and therefore, it is not expected that blasting will be a viable option for excavating those portions of the sewer trench. In these areas, it is anticipated that the contractor will need to use hammering, possibly with pre-drilling, to excavate the trench. However, there are portions of the sewer alignment that pass through open fields and it might be possible to allow blasting in these areas. All standard blasting control measures, mats, vibration monitoring, et cetera should be implemented, if the contractor wishes to employ blasting to excavate any portions of the trench.

Given that a large portion of the proposed sewer trench will be excavated in relatively hard (NRCS Class I and II) rock, we anticipate that rock removal will constitute a significant portion of the open trench excavation costs. Therefore, it would be prudent to minimize the quantity of rock removal for this project. To that end, one option may be to bed and backfill the sewer pipe using flowable fill within the sections that will be excavated in competent rock. It should be noted however, that the use of flowable fill as bedding and backfill might require that the pipe be anchored or ballasted against floating

while the flowable fill is placed and cures. Alternatively, the bedding and backfill could be placed in stages to prevent the pipe from floating.

The recommendation for using flowable fill might be justified, when the combined costs of rock removal and backfilling using soil backfill or flowable fill are compared. Tectonic has generally found that typical bids for rock removal tend to fall between approximately $125/cubic yard (cy) and $150/cy. To consider the pricing for the backfill materials, we consulted their bid price histories provided by the New York State Department of Transportation (NYSDOT). NYSDOT reports recent bid prices of $90/cy to $148/cy for sand backfill (Item No. 203.25) in Regions 4 and 6 (near the site), with a weighted average in Region 4 of $60/cy between January, 2018 and December, 2019. Likewise, NYSDOT lists bid pricing for CSLM in Regions 4, 5 and 6 that range from $144/cy to $467/cy, in their weighted average item price report for 1/1/18 to 12/31/19. However, most of the bids were for small quantities (about 10 to 33 cy) and only one bid price ($232/cy) was for a large quantity of CLSM (699 cy). Other references suggest a typical bid price for placement of flowable fill between approximately $150/cy to $200/cy. A more-detailed cost analyses comparing CSLM with standard sand bedding would need to be performed by the contractor to evaluate if any cost saving could be realized.

Excavations into the native soils and PWR should be feasible with conventional heavy-duty construction equipment; however, excavation into hard rock is expected to require the use of a hoe-ram, pre-drilling, and possibly blasting.

It is anticipated that the contractor may use the soil and PWR excavated from the sewer trench as backfill (both above the pipe and around manholes). However, Laboratory testing of the native soils show that their fines contents range from approximately 11 to 86 percent, with an average of about 45 percent. Furthermore, the fine portions of the soils that were lab tested tend to be clayey, with plasticity indices between 5 and 23 percent. Finally, gradation analyses performed on two samples collected from boring B-23 suggest that the shale PWR will become finer, the more it is worked. These lab test results indicate that the majority of the soils at the site may also be susceptible to disturbance, especially when wet. Subsequently, the contractor should take care to minimize exposure of the excavated materials to weather and minimize working the material as much as practicable. Hard rock excavated from the sewer trench could be processed into gravel backfill or into concrete (flowable fill) aggregate.

The main geotechnical issues with the proposed construction of the proposed sewer alignment is the general need for rock removal. We recommend that the sewer pipe be installed in open excavations along roadways and though undeveloped portions of the alignment. However, we recommend that the contractor line drill the hard rock along the sides of the excavations that will fall within 10 feet of roadways, to prevent excessive excavation widths. Furthermore, the contractor should consider predrilling and the use of a hoe ram and/or heavy ripping hook to break and excavate the hard bedrock. Blasting may be used to excavate the sewer trench in open areas.

Temporary excavation slopes and shoring should conform to the latest OSHA standards, including slopes permitted for the specified depths of excavation and soil conditions encountered. Design of all excavation slopes greater than 4 feet in depth and design of sheeting, shoring, and bracing should be performed by a New York State licensed Professional Engineer. Furthermore, it should be specified that those designs be submitted to the Engineer of Record for final review and approval.

Soil depths range from approximately 1 to 17 feet along the proposed sewer alignment. It is anticipated that standard sloped excavations can be used in open, undeveloped areas and trench boxes may be used to support soils in confined areas, such as along Otto Park Place and near the DPW garage. Most of the fill and natural soils on the site should be considered OSHA Type C soils; however, the partially weathered rock may be considered Type A soil. The contractor should plan to either cut the soil overburden back to a stable excavation slope, or be prepared to shore the soil, such as with a trench box.

It is anticipated that some of the trench excavation in hard rock (Sound Rock per OSHA) can be vertical; however, the measured RQDs vary greatly and fracture sets that are both near-horizontal and near-vertical were observed, both with widely varying spacing. This suggests that small blocks of rock might fall from the sides of the excavations. Subsequently, if the contractor intends to use vertical excavations within the bedrock, it is recommended that the specifications require the contractor to employ a qualified geological engineer or geotechnical engineer who is experienced in rock evaluation slope stability. In addition, the contractor should include provisions for scaling any loose rock that could fall into the trench and pose a safety hazard to personnel working within the trench. Otherwise, the contractor should consider the hard bedrock to be Type A soil, or use precautions to protect personnel, such as using a trench box.

The contractor should be prepared to perform temporary dewatering in the sewer trench excavations near Gulf Creek. Dewatering should be performed to allow work to be performed in the dry. Any dewatering should be performed in a manner that will prevent loosening or migration of the subgrade soils and that will prevent pollution of Gulf Creek. Furthermore, the specifications should require all water removed by dewatering to pass through a temporary settlement basin and that the discharge be compliant with all current NYSDEC Stormwater Pollution Prevention procedures.

The fill used to backfill the sewer trench, and the launch and receiving pits for the railroad crossings, should generally consist of clean imported or on on-site sand, gravel, crushed stone, crushed gravel, or a mixture of these, and should contain no organic matter, cobbles or boulders. The specifications should require that the backfill have a USCS designation of GW, GP, GM, GC, SW, SP, SM or SC, with a maximum particle size of 4 inches and a maximum plasticity index of 15 percent. Within undeveloped areas, the excavated on-site soils (regardless of where they were excavated from) may be used to completely backfill the trench, regardless of whether it meets the USCS designations or plasticity index limitation presented above, provided that it can be compacted in accordance with the requirements given below.

The specifications should require at least one set of laboratory tests (ASTM D6913, D4318 and D698) be performed on all excavated soil that is to be used as backfill, for every 500 linear feet of excavated sewer trench. Additionally, the specifications should require that all processed material that will be used as trench backfill and/or pipe bedding be similarly lab tested, at a frequency of not less than one set of tests per 1,000 cubic yards of imported or processed material. Finally, the specifications should require that all submitted materials be approved by the geotechnical engineer prior to their use.

It is recommended that the specifications require that granular structural fill be used within three (3) feet of pavement subgrade elevations and manholes. Structural fill should meet the requirements for Select Granular Fill (Item No. 733-1101), as specified in the New York State Department of Transportation (NYSDOT) Standard Specifications, and as recommended below.

Sieve Size	Percent Finer by Weight
4-inch	100
No. 40	0 - 70
No. 200	0 - 15

A few of the soil samples that were laboratory tested meet this requirement, while most have fines contents that are well in excess of 15 percent.

Pipe (and manhole) bedding material should be a granular soil consisting of crushed stone, crushed air-cooled blast furnace slag, or gravel, free of soft, non-durable particles, organic material, and thin or elongated particles having a gradation in accordance with NYSDOT Table 733-23B Bedding Material Gradation, as shown below:

Sieve Size	Percent Finer by Weight
1½-inch	100
1-inch	90 - 100
½-inch	25-60
¼-inch	0 - 10
No. 40	0 - 2

All pipe bedding material, and backfill placed within the rights-of-way of the roadways and the railroads, should be compacted to at least 95 percent of the maximum dry density at near optimum moisture contents, as determined by ASTM Standard D698 "Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft^3 (600 kN-m/m^3))", as specified by the NYSDOT. Trench backfill, placed above the pipe, outside of the rights-of-way, should be compacted to at least 90 of the maximum dry density at near-optimum moisture contents, as determined by ASTM Standard D698. Compaction of pipe bedding and trench backfill should be verified by compaction testing performed at least once per lift, per 100 linear feet of trench.

The lift thickness for the fill soils will vary depending on the type of compaction equipment used. Fills should generally be placed in uniform horizontal lifts not exceeding 12 inches in loose thickness; however, the loose lift thickness should be reduced to 6 inches, or less, in confined areas, depending on the compaction equipment used. Each lift should be compacted with sufficient passes of compaction equipment necessary to achieve the recommended degree of compaction.

As discussed above, flowable fill may be used as an alternative for pipe bedding and trench backfill material. It may also be used as backfill around manholes, provided that the buoyance of the manhole is adequately addressed and controlled. If flowable fill is used, it should comply with the specifications provided for Controlled Low Strength Material (CLSM) given in Sections 204 and 733-01 (for Flowable Fill) of the current New York State Department of Transportation's Standard Specifications. Note, the

specifications should also require the contractor to provide verification of line and grade of the pipe after fill has been placed to the spring-line, if flowable fill is used as bedding and/or backfill, as a precaution against the pipe floating within the flowable fill.

Subbase gravel, to be used for pavement subbase reconstruction, should be placed to match the thickness of subbase gravel removed during excavation and should meet the requirements for Type 2 Aggregate Subbase, as specified in in the NYSDOT Standard Specifications (Section 733-04) and as follows:

Sieve Size	Percent Finer by Weight
1-inch	100
¼-inch	25 – 60
No. 40	5 – 40
No. 200	0 – 10

Asphalt pavement should match the types and thicknesses of the pavement removed during excavation of trenches, and advancing and receiving pits.

8.3 Railroad Crossings

Extending the sewer beneath the railroads will require the use of equipment that is capable of advancing casing through both soils and bedrock. Subsequently, and as noted above, we anticipate that it would be difficult (at the northern railroad crossing) or impossible (at the two southern railroad crossing) to jack casing, and therefore, we recommend tunneling with a micro-tunnel boring machine, or horizontal directional drilling. The following paragraphs discuss these options.

Borings B-1, B-4A, B-7 and B-9 all encountered bedrock well-above the planned sewer flow line. This suggests that the sewer pipe will be within the dolomite bedrock where it crosses the CSX railroad near the eastern and western ends of Otto Park Place. The northern crossing of the railroad is, conversely, expected to be mostly in soil or partially weathered rock (see borings B-29, B-30 and B-32). Note, this is assuming that the railroad does not require the pipe to lie at least 25 feet below the rails, as stated in the document *CSXT Interim Guidelines for Horizontal Directional Drilling (HDD).* An approximate profile of the ground surface and pipe alignment at the northern railroad crossing is presented in Figure 4 - Approx. Northern Railroad Crossing Profile. It currently appears that the pipe will be about 14.5 feet below the rails, as currently planned. If the pipe must be at least 25 feet below the rails, then the flowline at the northern crossing will have to be lowered and it is currently unclear

whether the pipe will remain in soil or will be within bedrock. Even if the pipe does not have to be lowered, the subsurface conditions encountered in boring B-33 suggests that some sandstone could be encountered, as well. There, the sandstone was encountered at an elevation +518 feet and the proposed flowline elevation is approximately +515 feet.

It is currently expected that the railroads will not allow closure of the tracks for open trench excavation, and therefore, we anticipate that horizontal directional drilling (HDD) or small-diameter tunneling, using a micro-tunnel boring machine (micro-TBM), will be the best options for advancing the sewer beneath the railroad embankments. However, each of these options have their benefits and limitations. For example, a cursory search found several directional drilling companies, but no micro-TBM companies, within New York. However, larger companies located outside of New York do routinely bid on, and perform, work within the state. Conversely, the receiving pit and staging areas for HDD must be significantly larger than those for a micro-TBM. This is largely because the size of an HDD rig needed to drill, and install, a 30-inch inside-diameter pipe is quite large, plus the pipe is generally pulled through the drilled hole in one continuous length from the receiving pit. Chapter 12 of the *Handbook of Polyethylene Pipe, Second Edition* indicates that for large diameter bores, the launch area might need to be approximately 150 feet long by 100 feet wide and the receiving area (the pipe side) might need to be a similar size. This might be too large for one or both of the southern railroad crossings. With a micro-TBM, the launch pit only needs to be large enough to hold the TBM and the first length of casing, plus a jacking frame. We estimate that this could be a little as 15 to 20 feet wide by 25 to 50 feet long. Furthermore, because the micro-TBM installs the casing as it drills the tunnel, the receiving pit only needs to be large enough to disconnect and remove the TBM, and connect the pipe to a manhole or another section of pipe. It is anticipated that the use of a micro-TBM will fit the site constraints near the end of Old Upper Mountain Road, and at both ends of Otto Park Place, better than HDD equipment. Conversely, we anticipate that the open space near the northern railroad crossing will be sufficient for either drilling method.

Another issue that could restrict the use of HDD is that Chapter 12 – *Horizontal Directional Drilling*, from the *Handbook of Polyethylene Pipe*, recommends that the launching and receiving pits for HDD be approximately at the same elevation and, if not, that there be no more than 50 feet in elevation difference between them. We anticipate that there might be as much as 50 feet of elevation difference between the two pits at the northern railroad crossing, depending upon the exact locations of the pits.

Finally, both methods are capable of drilling through soil or rock; however, there is the added capability to change the cutting heads on a micro-TBM as it is being advanced. This allows the driller to adjust the cutting heads to meet changing subsurface conditions, if necessary. This might allow for some savings in the costs of drilling the crossings. Finally, most publications recommend that the diameter of the bore for HDD be approximately 1.25 to 1.5 times the outside diameter of the pipe. This could put the top of the bore within the 25-foot limit, set by CSX, at the railroad crossing between Old Upper Mountain Road and Otto Park Place.

Based on our review of the two leading alternatives for installing the sewer pipe beneath the railroads at the three crossings, it is our opinion that the best alternative would be to employ a micro-TBM. It is recommended that one of the following options be followed:

1. Elicit recommendations from experienced contractors who have recently worked with both large diameter HDD and micro-TBMs, or
2. Provide specifications and constraints for both methods and allow the bidding contractors to select the method that they feel is best suited for this project.

The previously discussed voids encountered in borings drilled in the southern end of the sewer alignment might be another issue that could dictate which method will be best for installing the sewer beneath the railroads. If encountered, a large solution cavity (void) in the rock could cause a loss of drilling fluid (mud), leading to the drilling equipment (HDD drill or reaming heads, micro-TBM, casing or the pipe itself) to become stuck in the hole. Subsequently, we recommend that the project specifications require the drilling subcontractor to provide documentation of the following items for approval by the engineers:

1. A list of at least three past projects where they have drilled through similar karstic bedrock conditions.
2. A method for measuring and recording mud loss.
3. A procedure for addressing or preventing mud loss.

Launch and receiving pits for the HDD or micro-TBM should be adequately sloped back to allow for side slope stability, wherever possible. However, side slopes might not be possible at the pits along Otto Park Place, and possibly at the end of Old Upper Mountain Road. Here, it is expected that shoring will be necessary within the soil and might be required within the bedrock. Because of the shallow, hard rock, it is not expected that shoring like sheet pile, or soldier piles and lagging will be possible.

Rock bolts, shotcrete, plating, or temporary excavation support boxes are recommended to stabilize the bedrock. The contractor will need to consider these issues when designing temporary shoring.

8.4 Manholes and Other Structures

The following are design recommendation for temporary and permanent structures associated with the installation of the sewer main. Foundations (or thrust blocks) may be designed using a net allowable bearing pressure of 2 tons per square foot (tsf) in soil, or up to 8 tsf in PWR or hard rock.

Below-grade walls and manholes should be designed in accordance with the following criteria:

Table 8.4.1 – Lateral Earth Pressure Parameters		
Soil Parameter [1]	On Site Soils	Structural Fill
Angle of Internal Friction	30˚	34˚
Active Earth Pressure Coefficient (Ka) [2]	0.33	0.28
At-Rest Earth Pressure Coefficient (Ko) [3]	0.50	0.44
Passive Earth Pressure Coefficient (Kp) [4]	3.00	3.54
Coefficient of Base Friction [5, 6]	0.30	0.35
Unit Weight of Soil (pounds per cubic foot)	125	135

Notes

1) The coefficients provided assume a level backfill and vertical foundation walls. The coefficients should be re-evaluated for other conditions.

2) Use for free standing walls, where movement of up to 0.0025 X height of wall is both possible and tolerable. Otherwise, use at-rest coefficient.

3) Use for walls or structures (manholes) restrained against lateral movement.

4) Reduce the passive pressure above a depth of 5 feet below exterior grade (local frost depth) by half, to account for frost disturbance.

5) Coefficient of base friction applies to mass concrete placed directly against undisturbed native soils or structural fill. The coefficients of base friction given above include a factor of safety of 1.5.

6) A coefficient of base friction of 0.40 may be used for structures bearing directly upon excavated bedrock, or upon a bedding layer of crushed stone.

Additional loading due to temporary and permanent surcharges should be added to the lateral loading exerted by the retained soil. Loads due to supported structures or traffic should be applied in appropriate combinations with the lateral loads.

Crushed stone, placed as an alternate bedding material for manholes, should be NYSDOT Size Designation 2 Stone, per Table 703-4 of the standard Specifications, or ASTM C33 Number 57 stone, in accordance with the table below.

	Percent Finer by Weight	
	Size Designation 2	ASTM C 33 No. 57
Sieve Size	Stone	Stone
1 ½-inch	100	100
1-inch	90 - 100	95 - 100
½-inch	0 - 15	25 - 60
No. 4		0 - 10
No. 8		0 - 5

8.5 Construction Monitoring

An engineer familiar with the existing subsurface conditions and having the appropriate laboratory and field-testing support should observe that all earthwork is performed in accordance with the specifications, and the design criteria provided in this report.

It is recommended that the following work should be performed under the observation of the geotechnical engineer:

- Dewatering, if necessary
- Vibration monitoring of nearby structures during rock excavation
- Pre-blast survey of nearby structures, prior to blasting (if performed)
- Manhole subgrade preparation
- Infilling of solution cavities (voids) within the sewer trench
- Placement and compaction of trench bedding and backfill
- Placement of flowable fill backfill
- Horizontal directional drilling or micro-tunneling beneath railroad rights-of-way
- Placement and compaction of backfill within launch and receiving pits
- Pavement restoration

Materials proposed for use as backfill and bedding should be tested and approved prior to delivery or use on-site. All fill materials should be tested as they are being placed to verify that the required compaction is being achieved.

Some notes on compaction testing: The use of a nuclear moisture-density gauge within a trench can be significantly affected by the trench sidewalls. In particular, dense materials (such as rock) in the sidewalls of the trench, or the steel in a trench box, will reflect neutrons back to the gauge and cause erroneously high-density readings. Subsequently, the specifications should require that any nuclear moisture-density gauges used in compaction testing within the trenches be calibrated within the trench, in accordance with the manufacturer's recommendations. Additionally, nearby materials that have high organic contents (such as plastic pipe) have high concentrations of hydrogen, which the gauge measures to determine the in-place moisture content of the soil. These materials can produce erroneously high moisture content results. Subsequently, we recommend that the specifications require that compaction tests performed using a nuclear moisture-density gauge be verified by the sand-cone method (ASTM D1556), once per 100 linear feet of pipe trench backfilled, or at least once per day. The verification (sand-cone) test should be performed at the same location as a nuclear density test and at a minimum depth of 4 feet below the ground surface.

Finally, compaction testing beside the pipe will be very difficult, at best, regardless of the test method used. Subsequently, it is recommended that the compaction specification allow for a performance specification to be used to verify the compaction of material placed between the trench bottom and 1-foot above the pipe. The contract documents should allow the contractor to prepare a test strip and, with the contractor's engineer and/or the geotechnical engineer of record, develop a performance specification for compaction of each type of fill to be placed near the pipe. The performance specification should include, but not be limited to, lift thickness and number of passes for each piece of compaction equipment to be used adjacent to the pipe. The specifications should also require that the contractor's engineer submit the proposed performance specification to the geotechnical engineer of record for approval.

9.0 LIMITATIONS

Our professional services have been performed using that degree of care and skill ordinarily exercised under similar circumstances by reputable geotechnical engineers and geologists practicing in this or similar situations. The interpretation of the field data is based on good judgment and experience. However, no matter how qualified the geotechnical engineer or detailed the investigation, subsurface conditions cannot always be predicted beyond the points of actual sampling and testing. No other warranty, expressed or implied, is made as to the professional advice included in this report.

The recommendations contained in this report are intended for design purposes only. Contractors and others involved in the construction of this project are advised to make an independent assessment of the soil and groundwater conditions for the purpose of establishing quantities, schedules and construction techniques.

This report has been prepared for the exclusive use of EA Engineering, P.C. and its Affiliate EA Science and Technology for the specific application to the proposed new sewer alignment in the Town of Lockport, Niagara County, New York. In the event that any changes in the design or location of the proposed structure are planned, Tectonic Engineering Consultants, Geologists & Land Surveyors, D.P.C. (Tectonic) shall not consider the conclusions and recommendations contained in this report valid unless reviewed and verified in writing. It is further recommended that Tectonic be retained to provide construction monitoring and inspection services to ensure proper implementation of the recommendations contained herein, which would otherwise limit our professional liability.

MAS/CBB/MCC File: G:\Newburgh\Geotechnical\10500\10528.01 Old Upper Mountain Road\Report\10528.01 OUMR sewer geoinv - Draft R1.docx

FIGURES

MATCH LINE SEE FIGURE 1B

MATCH LINE SEE FIGURE 1B

B-16

B-16A

B-17, B-17A

SOUTH NIAGARA STREET

B-15

B-14

B-13

B-12

B-10

B-9

B-7

B-6

B-5

B-25

B-4, B-4A

B-1

B-18

B-11A

RAILROAD CROSSING

RAILROAD CROSSING

SEE FIGURE 1C FOR THE BORING LOCATIONS NEAR THE ACCESS ROAD INTO GULF RAVINE

FIGURE 1B

FIGURE 1C

FIGURE 1A

KEY PLAN – NTS

SITE

LEGEND

B-1	APPROXIMATE BORING LOCATION
B-45 (TBD)	BORING TO BE DRILLED
	APPROXIMATE PROPOSED SEWER ALIGNMENT

NOTES

1. PLAN BASED ON A SURVEY BY POPLI DESIGN GROUP, DATED SEPTEMBER 2020.
2. BORINGS WERE SURVEYED BY POPLI DESIGN GROUP.

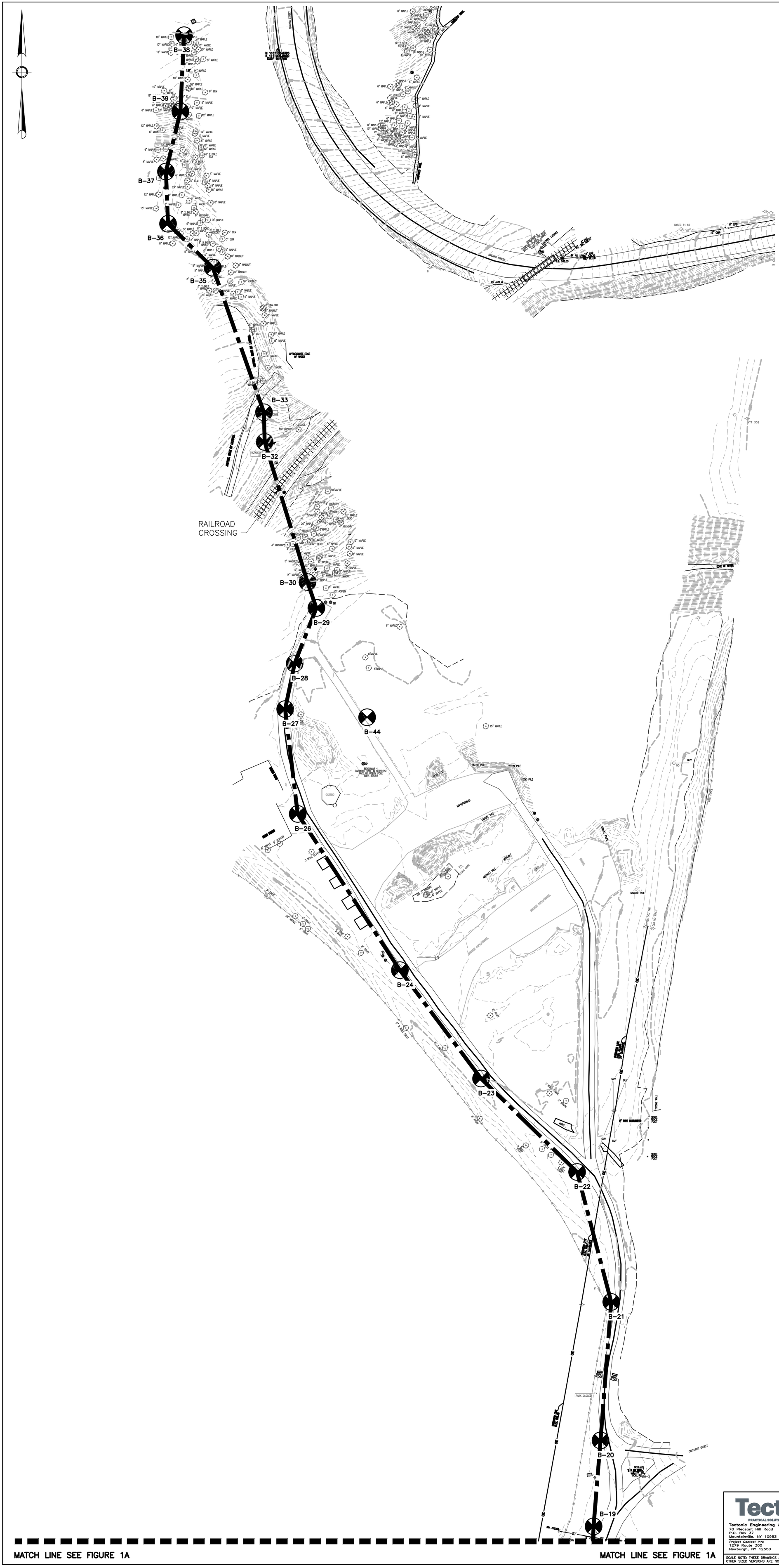
Tectonic
PRACTICAL SOLUTIONS. EXCEPTIONAL SERVICE.
Tectonic Engineering & Surveying Consultants P.C.
70 Pleasant Hill Road
P.O. Box 37
Mountainville, NY 10953
Phone: (845) 534-5959
(800) 829-6531
www.tectonicengineering.com
Project Contact Info
1279 Route 300
Newburgh, NY 12550
Phone: (845) 567-6656

SCALE NOTE: THESE DRAWINGS ARE FORMATTED FOR 24"X36". OTHER SIZED VERSIONS ARE NOT PRINTED TO THE SCALE SHOWN.

BORING LOCATION PLAN

NYSDEC OLD UPPER MOUNTAIN ROAD
TOWN OF LOCKPORT
NIAGRA COUNTY, NEW YORK

Date	Work Order	Drawing No.	Rev
10/27/2020	10528.01	FIGURE 1A	0
Scale 1:60			



LEGEND

B-1	APPROXIMATE BORING LOCATION
B-45 (TBD)	BORING TO BE DRILLED
	APPROXIMATE PROPOSED SEWER ALIGNMENT

NOTES

1. PLAN BASED ON A SURVEY BY POPLI DESIGN GROUP, DATED SEPTEMBER 2020.
2. BORINGS WERE SURVEYED BY POPLI DESIGN GROUP.

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SCALE NOTE: THESE DRAWINGS ARE FORMATTED FOR 24"X36". OTHER SIZED VERSIONS ARE NOT PRINTED TO THE SCALE SHOWN.

BORING LOCATION PLAN

NYSDEC OLD UPPER MOUNTAIN ROAD
TOWN OF LOCKPORT
NIAGRA COUNTY, NEW YORK

Date	Work Order	Drawing No.	Rev
10/27/2020	10528.01	FIGURE 1B	0

Scale 1:60

LEGEND

B-1 APPROXIMATE BORING LOCATION

NOTES

1. PLAN BASED ON A SURVEY BY POPLI DESIGN GROUP, DATED 2/28/2020.
2. BORINGS WERE SURVEYED BY POPLI DESIGN GROUP.

Tectonic
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SCALE NOTE: THESE DRAWINGS ARE FORMATTED FOR 24"X36". OTHER SIZED VERSIONS ARE NOT PRINTED TO THE SCALE SHOWN.

BORING LOCATION PLAN

NYSDEC OLD UPPER MOUNTAIN ROAD
TOWN OF LOCKPORT
NIAGRA COUNTY, NEW YORK

Date	Work Order	Drawing No.	Rev
12/11/2020	10528.01	FIGURE 1C	1

Scale 1:50

Figure 2A - Atterberg Limits

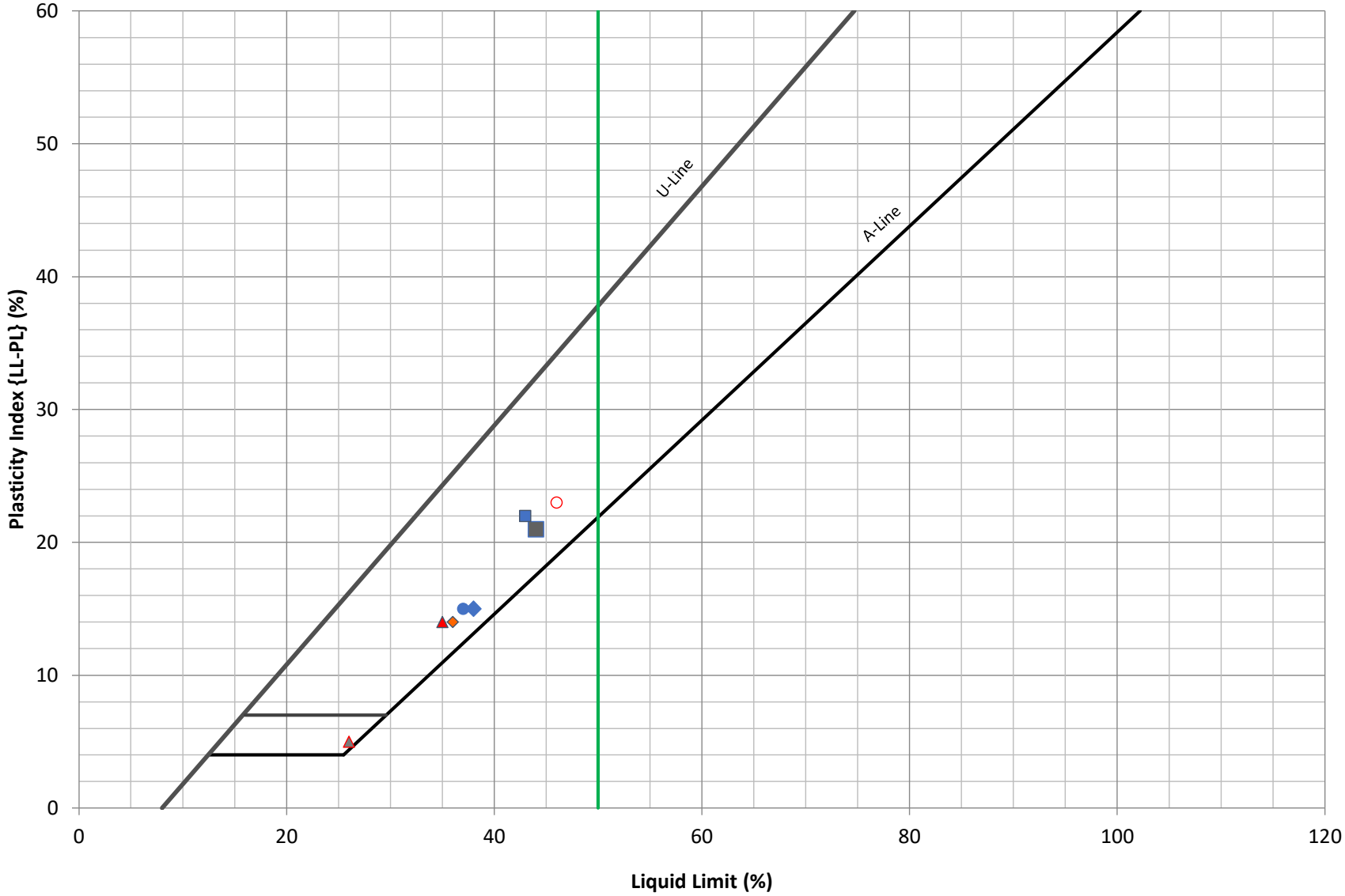


Figure 2B - Grain Size Distribution Chart

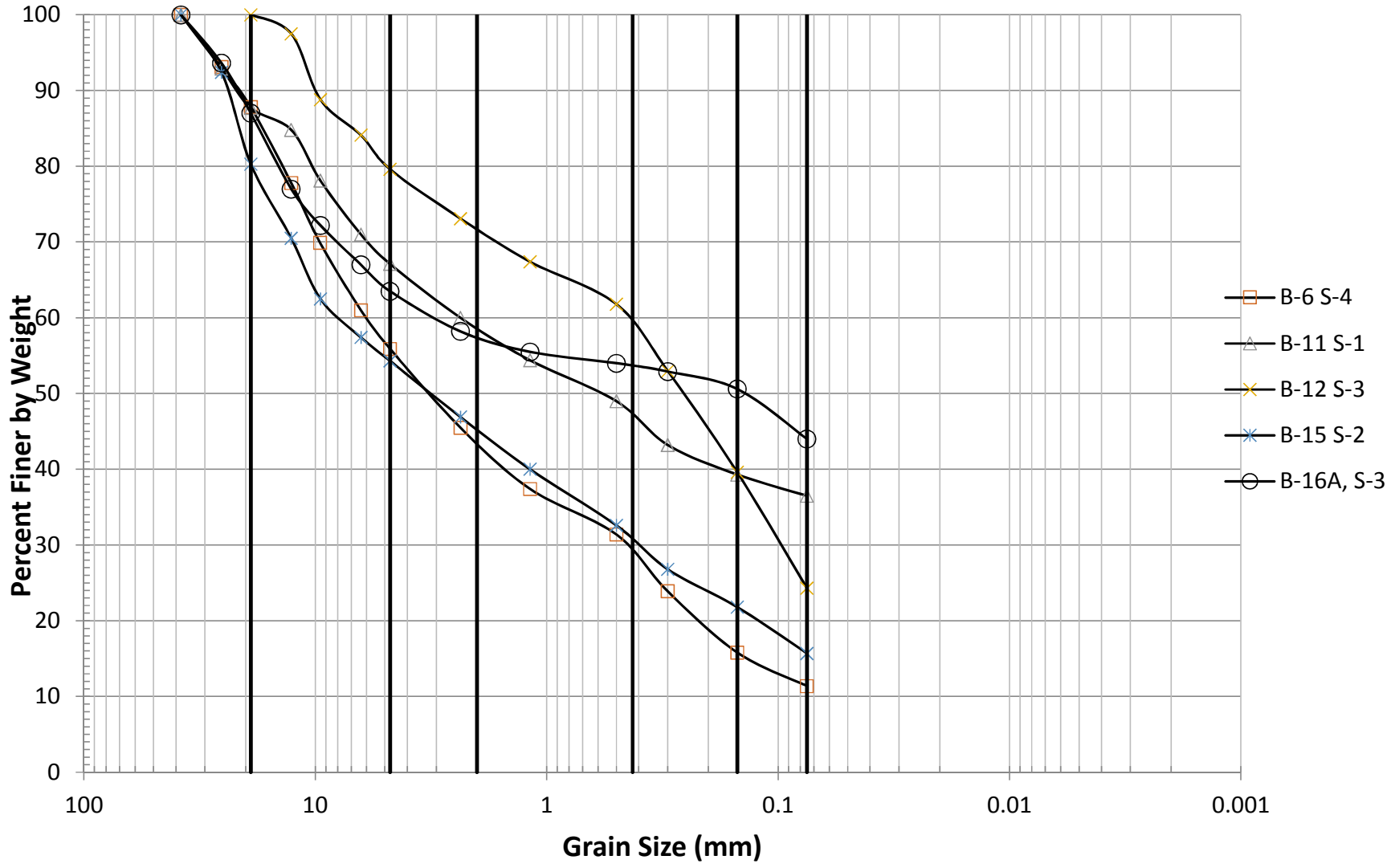


Figure 2C - Grain Size Distribution Chart

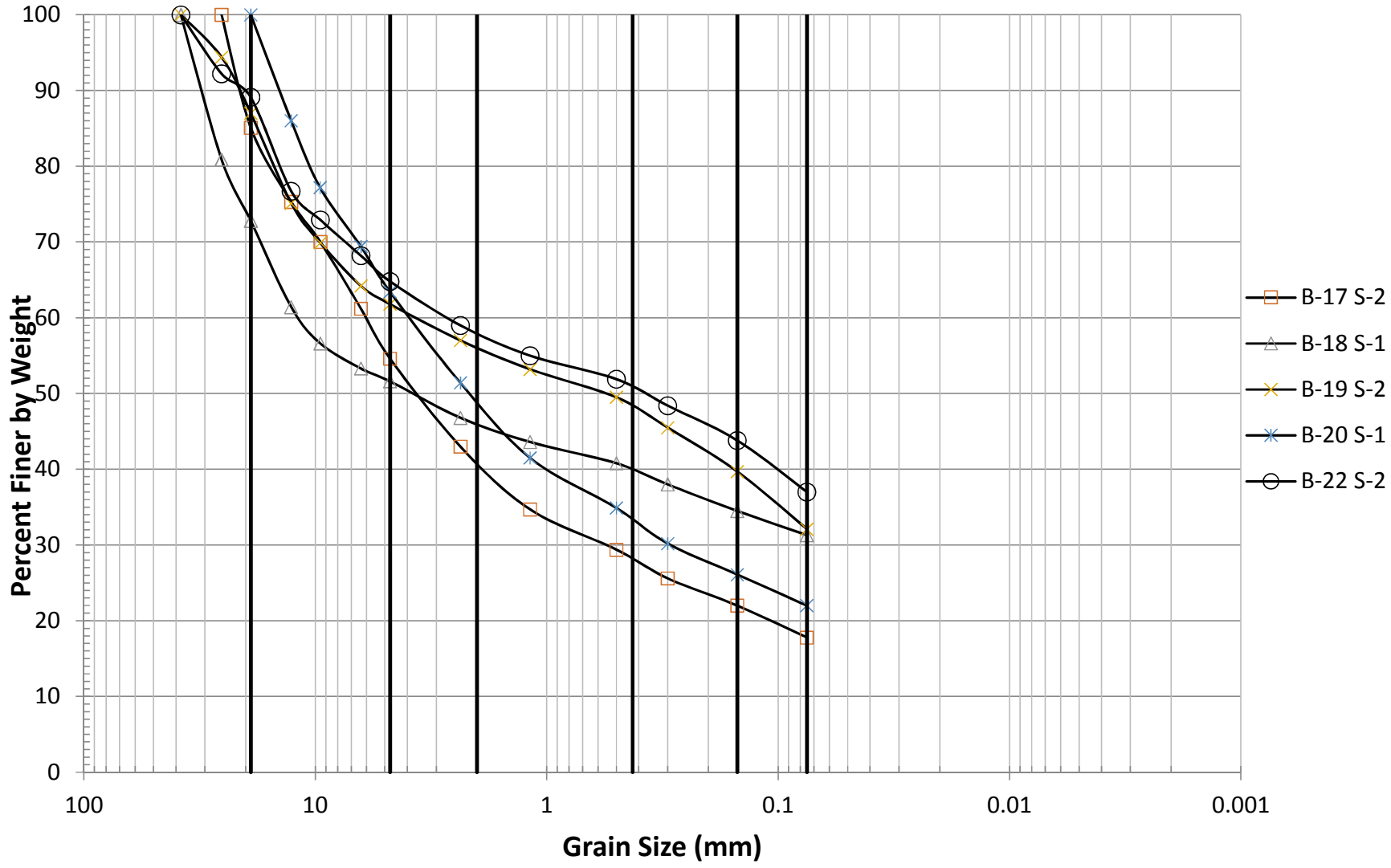


Figure 2D - Grain Size Distribution Chart

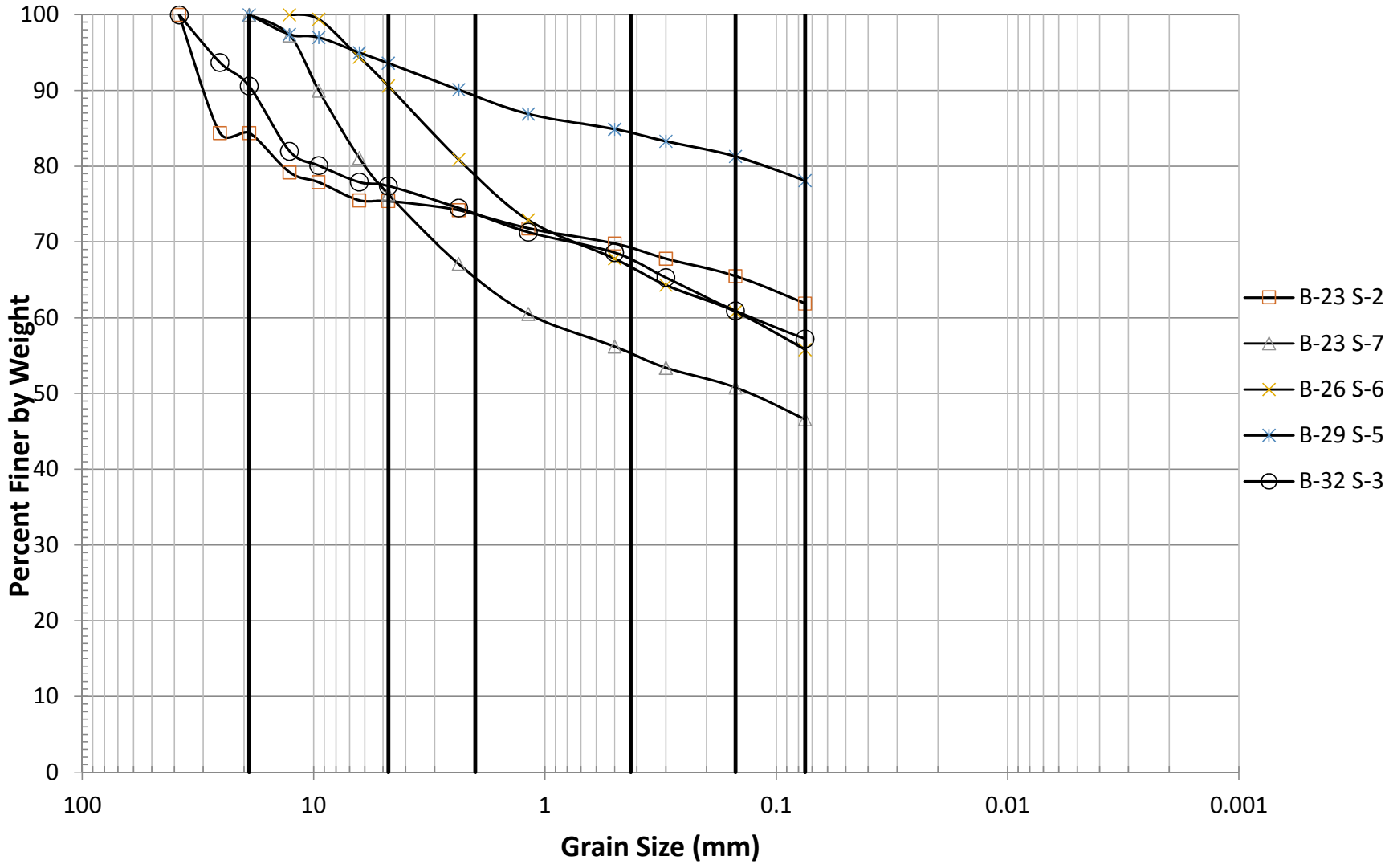


Figure 2E - Grain Size Distribution Chart

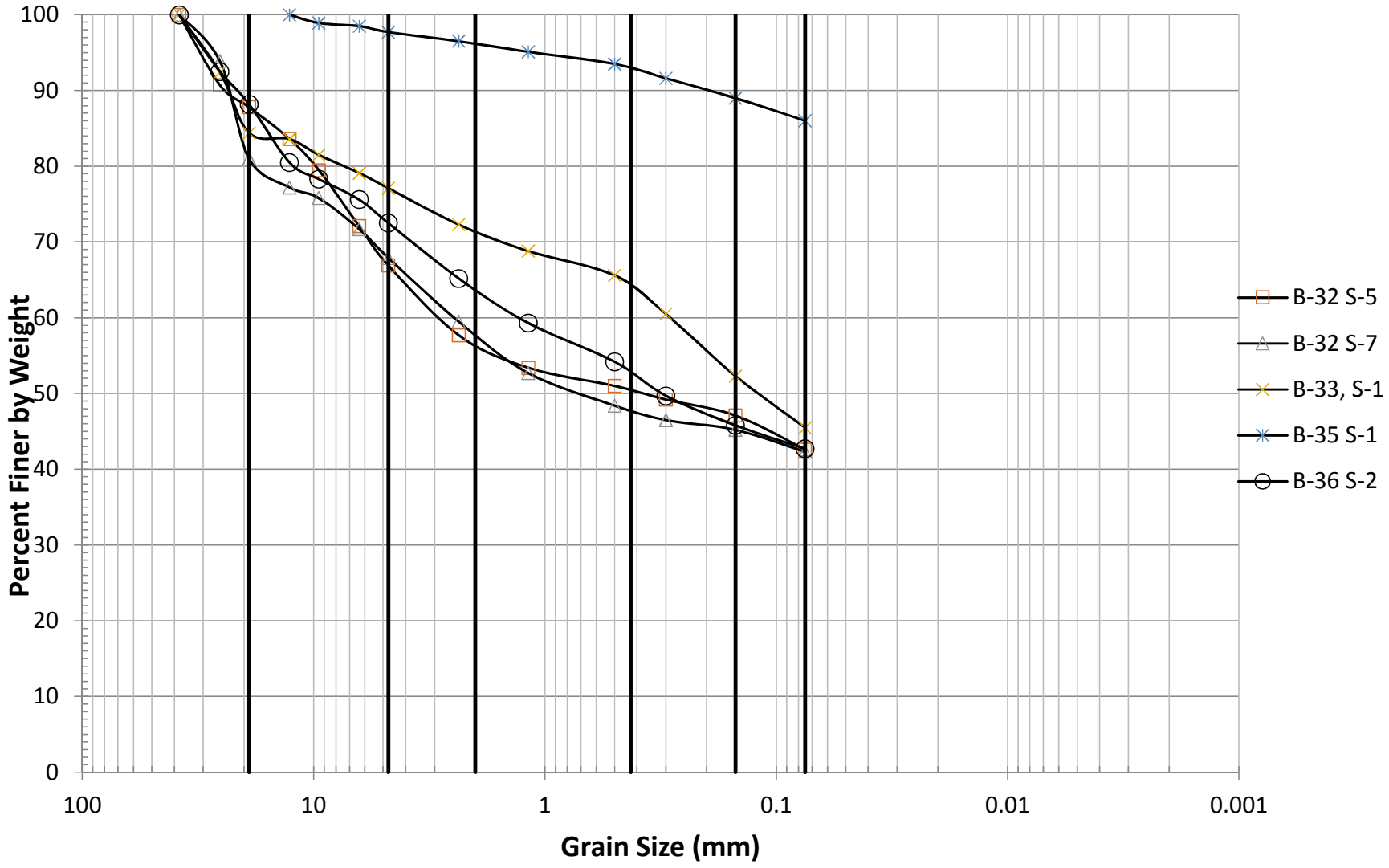


Figure 2F - Grain Size Distribution Chart

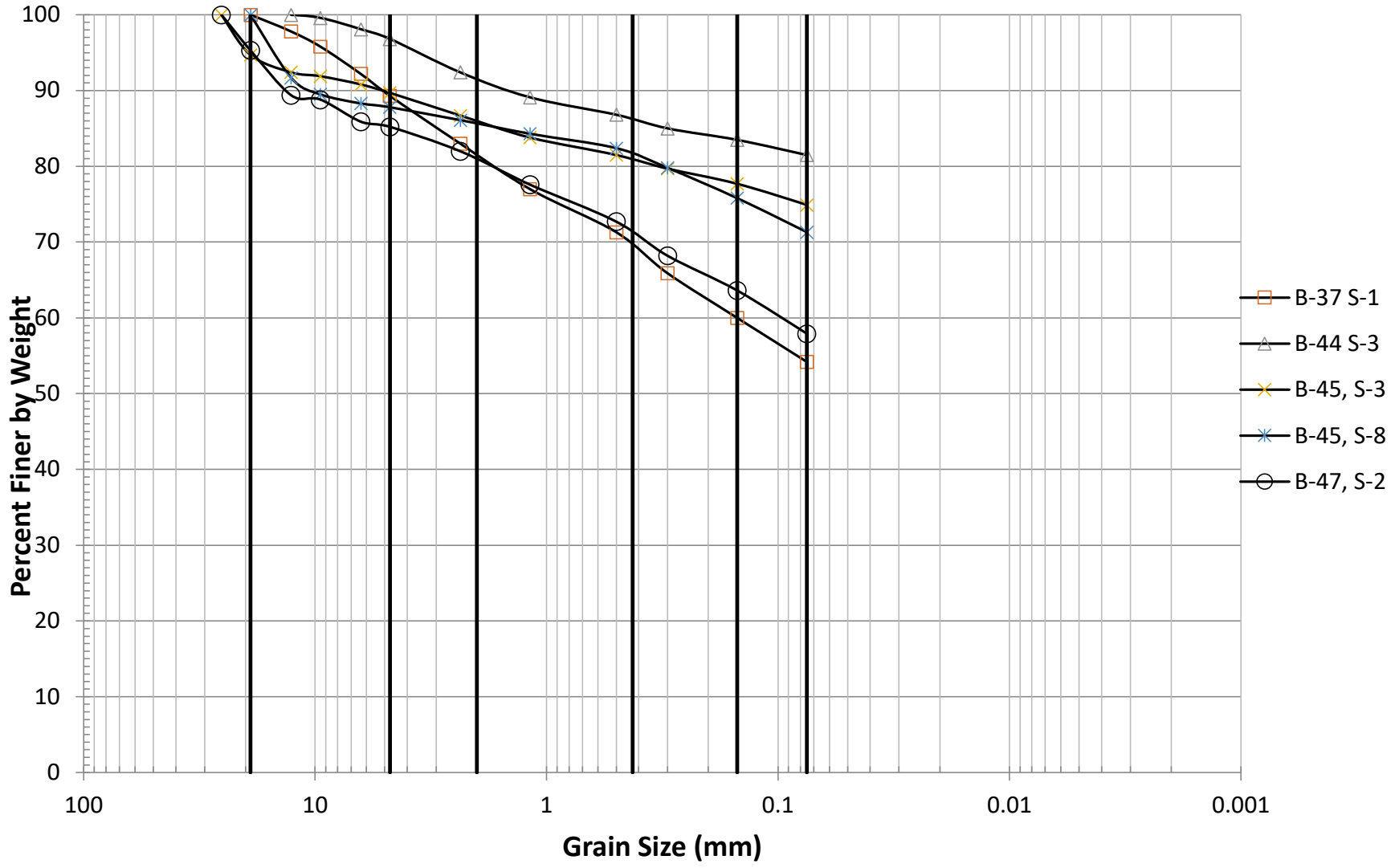


Figure 2G - Grain Size Distribution Chart

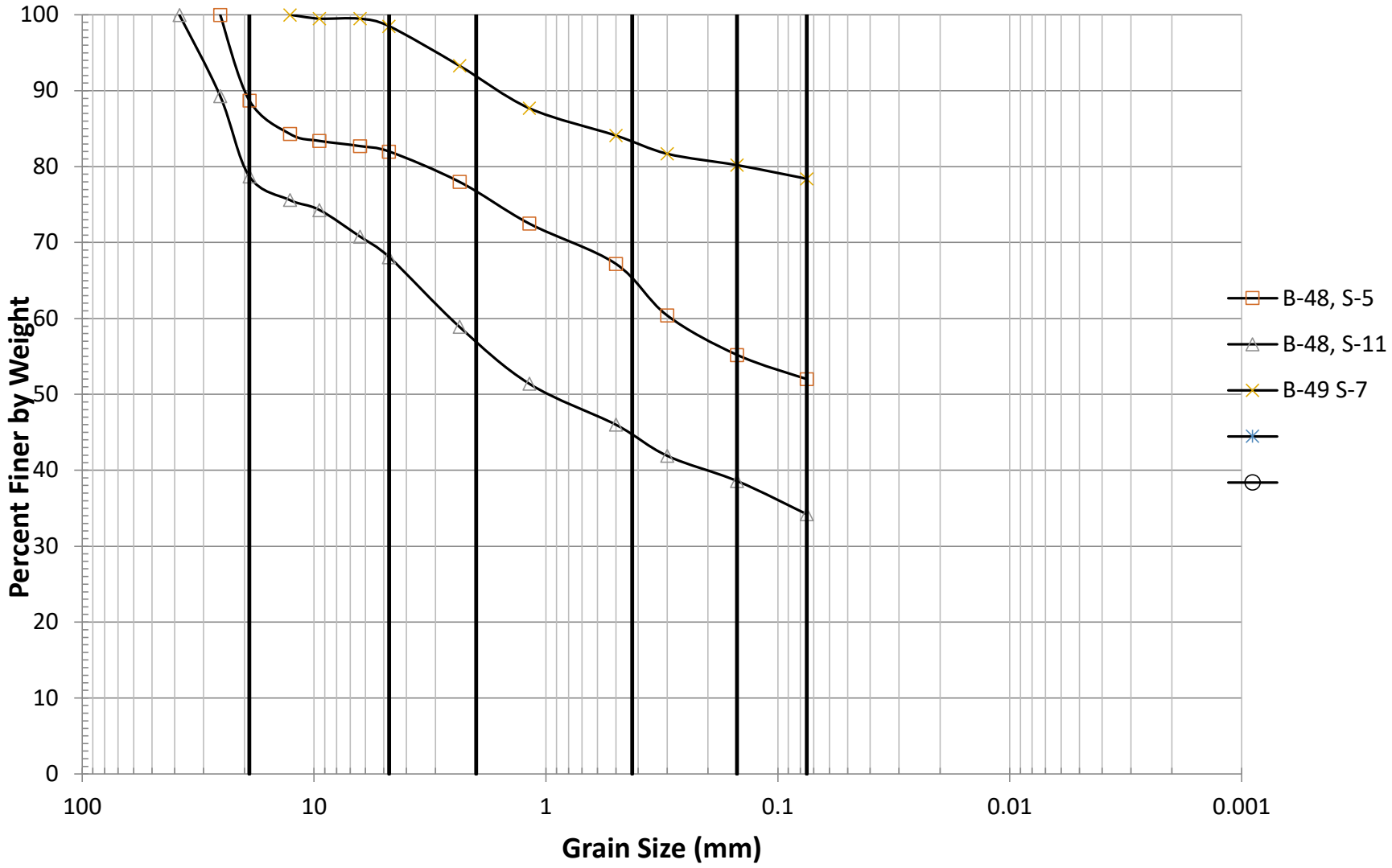
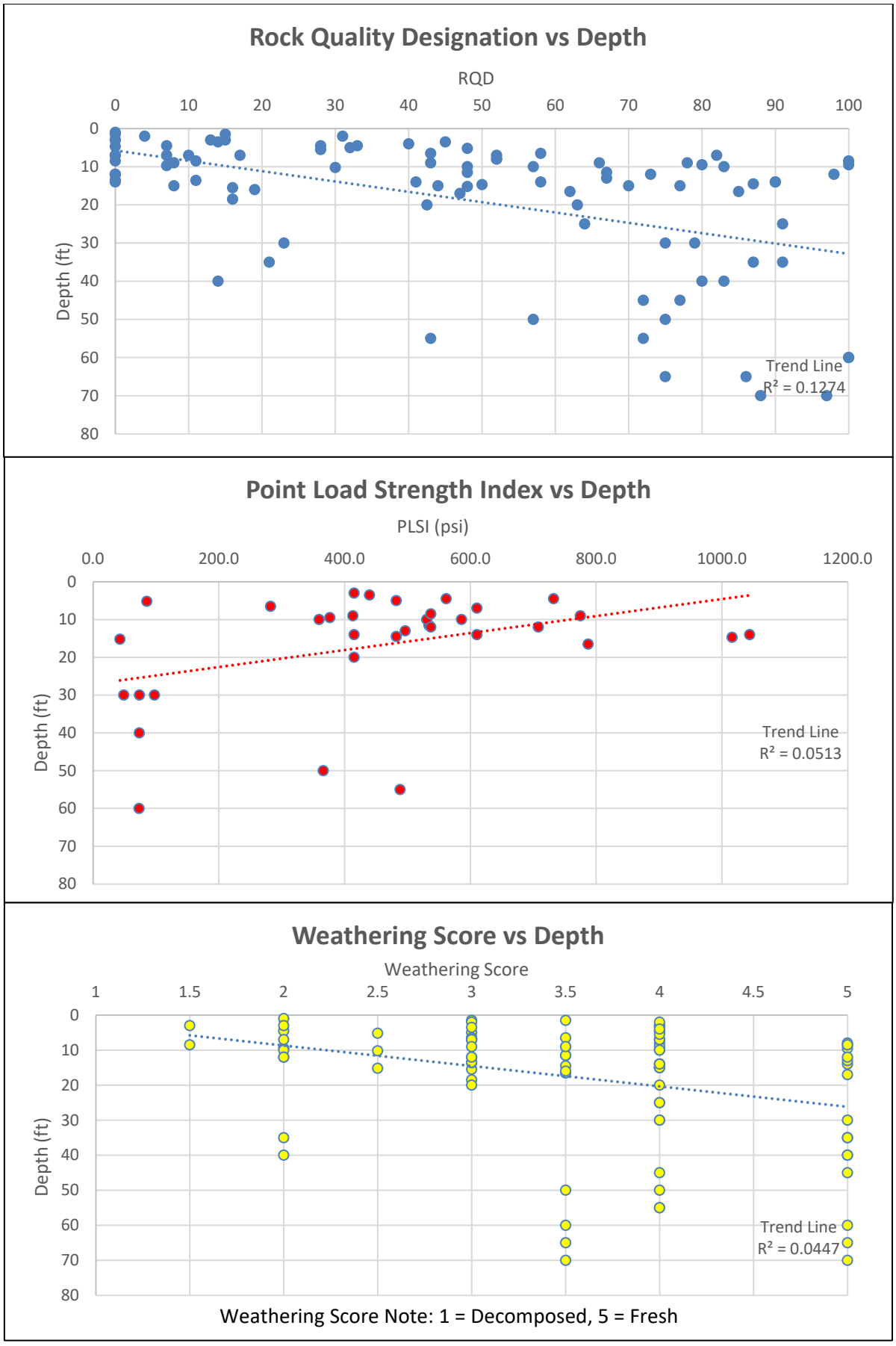
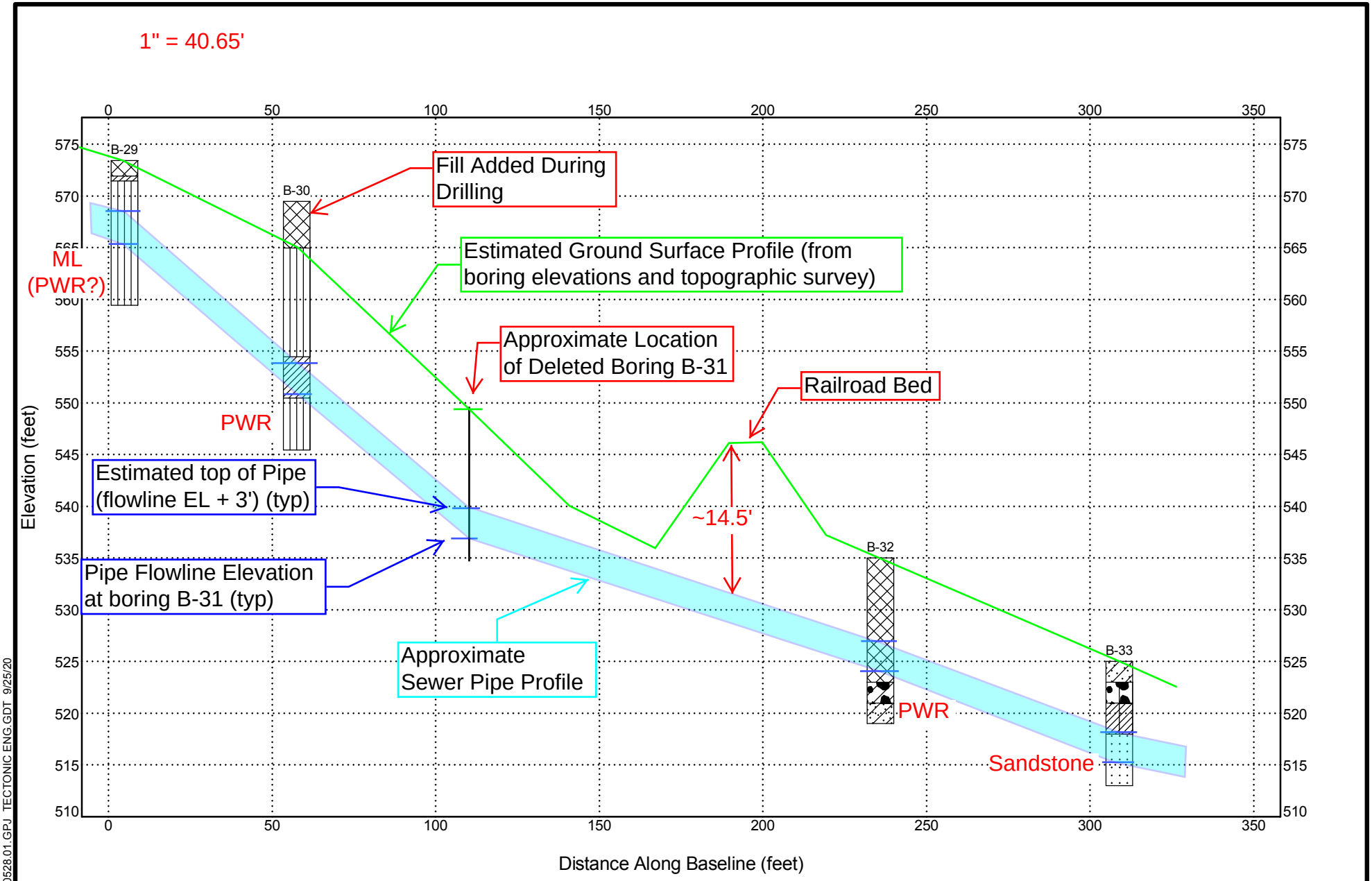


Figure 3 - Rock Characteristics Plots





STRATIGRAPHY & GW 10528.01.GPJ TECTONIC.ENG.GDT 9/25/20

Tectonic

280 Little Britian Road
Newburgh, NY 12550
Telephone: (845) 563-9081 Fax: (845) 563-9085

Figure 4 - Approx. Northern Railroad Crossing Profile

Project No: **10528.01** Date: **9/25/20**

Project: **Old Upper Mountain Road**

Location: **Lockport, NY**

APPENDIX I

Tectonic

PROJECT No. **10528.01**
PROJECT: **Old Upper Mountain Road**
LOCATION: **Lockport, NY**

BORING No. B-1

SHEET No. 1 of 1

CLIENT: **EA Engineering , Science, and Technology Inc.**
CONTRACTOR: **Nothnagle Drilling, Inc**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **4 1/4"** | **0** TO **4.5'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | **2"** | **4.5** TO **14.5'**
CME 55LC Track Mounted Drill Rig with Automatic Hammer

GROUND WATER | DATE | TIME | DEPTH

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: **---** TO **---**
WEATHER: **Clear** TEMP: **80° F**
DEPTH TO ROCK: **4.5'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Liam McGrath**
DRILLER: **Bryan Swartz**
SURFACE ELEVATION: **588.5**
DATUM: **See Remarks**
DATE START: **8/6/20**
DATE FINISH: **8/6/20**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % × | WATER CONTENT % ⊗ | LIQUID LIMIT % △ 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	77	7 37 40 49	S-1	18		M	GP	2" Topsoil like material Bwn-gy c-f GRAVEL, and c-f Sand, trace Silt		77
2	52+	52/5	S-2	5		M	GP	Gy-tn c-f GRAVEL, and c-f Sand, trace Silt (Spoon refusal)		
3										
4	50+	40 50/1	S-3	4		M	GP	Gy-wh c-f GRAVEL, and c-f Sand, trace Silt (Spoon refusal)		
5	3									583.5
6	3									
7	3		C-1	46/60	47			Gy-tn, slightly weathered, moderately-highly fractured, c-f grained, moderately hard, DOLOMITE, fractures 0 - 45 degrees from horizontal		
8	3									
9	3									
10	3									578.5
11	4									
12	3		C-2	60/60	100			Gy-tn, fresh, slightly-massive fracturing, c-f grained hard, DOLOMITE, fractures 10 degrees from horizontal		
13	3									
14	4									
15								End of Boring at 14.5'		573.5
16										
17										
18										
19										
20										568.5
21										
22										
23										
24										
25										563.5

REMARKS: Boring Coordinates: 43.164987, -78.725121

BORING LOG 10528.01.GPJ TECTONIC ENG.GDT 9/25/20

Tectonic

PROJECT No. **10528.01**

PROJECT: **Old Upper Mountain Road**

LOCATION: **Lockport, NY**

BORING No. B-4

SHEET No. 1 of 1

CLIENT: **EA Engineering , Science, and Technology Inc.**

CONTRACTOR: **Nothnagle Drilling, Inc**

METHOD OF ADVANCING BORING | DIA. | DEPTH

POWER AUGER: | | TO

ROT. DRILL: | | TO

CASING: | | TO

DIAMOND CORE: | | TO

CME 55LC Track Mounted Drill Rig with Automatic Hammer

GROUND WATER	DATE	TIME	DEPTH

MON. WELL ☐ YES ☒ NO

SCREEN DEPTH: --- TO ---

WEATHER: **Clear** TEMP: **79° F**

DEPTH TO ROCK: ---

*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Scott Cohen**

DRILLER: **Bryan Swartz**

SURFACE ELEVATION: **589.5**

DATUM: **See Remarks**

DATE START: **7/20/20**

DATE FINISH: **7/20/20**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5

PLASTIC LIMIT % × | WATER CONTENT % ⊗ | LIQUID LIMIT % △ 10 20 30 40 50

STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	100+	15 100/3	S-1					3" Topsoil like material 4" Asphalt Reinforced concrete encountered approximately 8 inches below grade Moved to B-4A		100
5										584.5
10										579.5
15										574.5
20										569.5
25								End of Boring at 0.8'		564.5

REMARKS: Boring Coordinates 43.1645005, -78.724108 2' from edge of road

BORING LOG 10528.01.GPJ TECTONIC ENG.GDT 9/25/20

Tectonic

PROJECT No. **10528.01**
PROJECT: **Old Upper Mountain Road**
LOCATION: **Lockport, NY**

BORING No. B-4A

SHEET No. 1 of 1

CLIENT: **EA Engineering , Science, and Technology Inc.**
CONTRACTOR: **Nothnagle Drilling, Inc**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **4 1/4"** | **0** TO **0.7'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | **2.5"** | **0.7** TO **17.7'**
CME 55LC Track Mounted Drill Rig with Automatic Hammer

GROUND WATER | DATE | TIME | DEPTH
MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: **---** TO **---**
WEATHER: **Clear** TEMP: **69° F**
DEPTH TO ROCK: **1.1'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Scott Cohen**
DRILLER: **Bryan Swartz**
SURFACE ELEVATION: **589.5**
DATUM: **See Remarks**
DATE START: **7/28/20**
DATE FINISH: **7/28/20**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % × | WATER CONTENT % ⊗ | LIQUID LIMIT % △ 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	SAMPLES: RECOV. LENGTH (IN.)	SAMPLES: RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	100+ / 4.5	15 / 100/3	S-1	7				3" Topsoil like material 6" Asphalt, refusal encountered at 0.7' on reinforced concrete		589.5
2	5.25							0.7 to 1.1' Concrete roadway 1.1 to 2.0 - Weathered DOLOMITE fragments 2.0 to 4.7 Void		
3	4.5		C-1	16/48	0					
4	4.5									
5	1.25									584.5
6	1							Gy, slightly weathered, highly fractured, medium hard, f grained, DOLOMITE, voids encountered 4.8' - 5.6', 8.5' - 9.5'		
7	1.5		C-2	18/60	0					
8	2.25									
9	2.25									
10	1.25									579.5
11	1.25									
12	2.25		C-3	18/60	7			Gy, moderately weathered, moderately to highly fractured, medium hard, f grained DOLOMITE, void encountered 10.0' - 10.8'.		
13	2.75									
14	3.5									
15	4.5									574.5
16	5.75		C-4	28/36	50			Gy, slightly weathered, slightly to moderately fractured, hard, f grained, DOLOMITE, no voids observed in core		
17	5.5									
18								End of Boring at 17.7'		
19										
20										569.5
21										
22										
23										
24										
25										564.5

REMARKS: Boring Coordinates 43.1645005, -78.724108, 2' from road
Boring started 7/20, resumed 7/28

BORING LOG 10528.01.GPJ TECTONIC ENG.GDT 9/25/20

Tectonic

PROJECT No. **10528.01**
PROJECT: **Old Upper Mountain Road**
LOCATION: **Lockport, NY**

BORING No. B-5

SHEET No. 1 of 1

CLIENT: **EA Engineering , Science, and Technology Inc.**
CONTRACTOR: **Nothnagle Drilling, Inc**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **4 1/4"** | **0** TO **4.5'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | **2"** | **4.5** TO **19.5'**
CME 55LC Track Mounted Drill Rig with Automatic Hammer

GROUND WATER | DATE | TIME | DEPTH

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: --- TO ---
WEATHER: **Clear** TEMP: **80° F**
DEPTH TO ROCK: **4.5'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Scott Cohen**
DRILLER: **Bryan Swartz**
SURFACE ELEVATION: **592.1**
DATUM: **See Remarks**
DATE START: **7/20/20**
DATE FINISH: **7/20/20**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % × | WATER CONTENT % ⊗ | LIQUID LIMIT % △ 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	36	8 15 21	S-1	6		M	SM	Hand dug 6" 6" Topsoil like material Bwn-or c-f SAND, some c-f Gravel, some Silt		
2	60+	60/4	S-2	2		M	GP	Gy c-f GRAVEL, some c-f Sand		
3	50+	38 50/5	S-3	8		M	GP	Gy-bwn c-f GRAVEL, some m-f Sand, trace Silt		
4	129+	68 60 69/3	S-4	12		M	GP	Gy c-f GRAVEL, and m-f Sand, trace Silt		129
5	6									587.1
6	6									
7	4		C-1	46/60	7			Gy, moderately soft, highly weathered, highly fractured, fine grained DOLOMITE, fractures at 0 - 30 degrees. Void encountered between 7 - 8' bgs		
8	4									
9	4									
10	3									582.1
11	2									
12	3		C-2	54/60	80			Gy, moderately hard, slightly weathered, slightly to moderately fractured, medium to fine grained, DOLOMITE, fractures 15 - 45 degrees		
13	2									
14	3									
15	4.25									577.1
16	4									
17	4.75		C-3	55/60	87			Gy, hard, slightly fractured, slightly to moderately weathered, m-f grained DOLOMITE 30 - 45 degrees fractures (2" Void at 15.0')		
18	4									
19	4									
20								End of Boring at 19.5'		572.1
21										
22										
23										
24										
25										567.1

REMARKS: Boring Coordinates 43.1649537, -78.7236188, 1' from edge of road

BORING LOG 10528.01.GPJ TECTONIC ENG.GDT 9/25/20

Tectonic

BORING No. B-6

PROJECT No. **10528.01**
PROJECT: **Old Upper Mountain Road**
LOCATION: **Lockport, NY**
SHEET No. 1 of 1

CLIENT: **EA Engineering , Science, and Technology Inc.**
CONTRACTOR: **Nothnagle Drilling, Inc**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **4 1/4"** | **0** TO **9'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | **2.5"** | **9** TO **18'**
CME 55LC Track Mounted Drill Rig with Automatic Hammer

GROUND WATER | DATE | TIME | DEPTH
MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: **---** TO **---**
WEATHER: **Overcast** TEMP: **80° F**
DEPTH TO ROCK: **9'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Scott Cohen**
DRILLER: **Bryan Swartz**
SURFACE ELEVATION: **589.6**
DATUM: **See Remarks**
DATE START: **7/26/20**
DATE FINISH: **7/26/20**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1								4" Asphalt, 8" Subbase gravel Hand excavated		
2	14	7 6 8 2	S-1	12		M	SP-SM	Bwn c-f SAND, some c-f Gravel, little Silt (FILL)		
3										
4	8	3 4 4 38	S-2	9		M	SP-SM	Same (FILL)		
5										584.6
6	12	1 11 1 WOH	S-3	3		M	GM	Gy c-f GRAVEL, some Silt		
7										
8	12	14 5 7 25	S-4	10		M	SP-SM	Bwn c-f SAND, and c-f Gravel, little Silt		
9								Auger refusal @ 9.0'		
10	3									579.6
11	2.5									
12	3.25		C-1	48/60	78			Gy, slightly to moderately weathered, slightly fractured, medium hard, f grained DOLOMITE		
13	2.5									
14	3									
15	2.75							14 - 16.5' Gy, slightly weathered, slightly fractured, m-f grained, hard DOLOMITE		574.6
16	4.5		C-2	47/48	90					
17	5							16.5' - 18' Gy, slightly weathered, slightly to moderately fractured, f grained, medium hard, SHALE		
18	3.25									
19								End of Boring at 18'		
20										569.6
21										
22										
23										
24										
25										564.6

REMARKS: Boring Coordinates 43.1650319, -78.7230596, offset 7' north due to OHP

BORING LOG 10528.01.GPJ TECTONIC ENG.GDT 9/25/20

Tectonic

PROJECT No. **10528.01**
PROJECT: **Old Upper Mountain Road**
LOCATION: **Lockport, NY**

BORING No. B-7

SHEET No. 1 of 1

CLIENT: **EA Engineering , Science, and Technology Inc.**
CONTRACTOR: **Nothnagle Drilling, Inc**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **4 1/4"** | **0** TO **1'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | **2.5"** | **1** TO **19'**
CME 55LC Track Mounted Drill Rig with Automatic Hammer

GROUND WATER | DATE | TIME | DEPTH
MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: --- TO ---
WEATHER: **Overcast** TEMP: **81° F**
DEPTH TO ROCK: **2'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Scott Cohen**
DRILLER: **Bryan Swartz**
SURFACE ELEVATION: **589.7**
DATUM: **See Remarks**
DATE START: **7/27/20**
DATE FINISH: **7/27/20**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % ✕ ⊗ △ 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	50+	8 / 50/1	S-1	2		M		3" Topsoil like material 2" Asphalt, Refusal on concrete subbase @ 0.6'. Steel obstruction encountered at 0.9'		
2	3.25							Attempted to offset boring 5' north, encountered refusal at 0.8'. Coring @ 1'		
3	3.5		C-1	28/48	0			12" Concrete 1 - 2'		
4	3.5							2' - 5' Gy, highly fractured, highly weathered, f grained medium hard DOLOMITE		
5	4									584.7
6	3.75									
7	4									
8	4		C-2	32/60	32			Lgt gy, moderately weathered, moderately to highly fractured, f grained, hard, DOLOMITE		
9	4									
10	4									579.7
11	4									
12	4									
13	4.25		C-3	58/60	83			Lgt gy, highly weathered, slightly fractured, f grained, hard DOLOMITE, visible fossil, rock is weathered, along vertical plane		
14	4.5									
15	4									574.7
16	4.5									
17	5		C-4	38/48	77			Gy, slightly weathered, massive to slightly fractured f grained, hard DOLOMITE		
18	4.5									
19	4									
20								End of Boring at 19'		569.7
21										
22										
23										
24										
25										564.7

REMARKS: Boring Coordinates 43.1652063, -78.7226254. 30' north of road

BORING LOG 10528.01.GPJ TECTONIC ENG.GDT 9/25/20

Tectonic

PROJECT No. **10528.01**
PROJECT: **Old Upper Mountain Road**
LOCATION: **Lockport, NY**

BORING No. B-9

SHEET No. 1 of 1

CLIENT: **EA Engineering , Science, and Technology Inc.**
CONTRACTOR: **Nothnagle Drilling, Inc**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **4 1/4"** | **0** TO **1.5'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | **2.5"** | **1.5** TO **20.5'**
CME 55LC Track Mounted Drill Rig with Automatic Hammer

GROUND WATER | DATE | TIME | DEPTH

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: **---** TO **---**
WEATHER: **Clear** TEMP: **70° F**
DEPTH TO ROCK: **1.5'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Scott Cohen**
DRILLER: **Bryan Swartz**
SURFACE ELEVATION: **592.7**
DATUM: **See Remarks**
DATE START: **7/29/20**
DATE FINISH: **7/29/20**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % × | WATER CONTENT % ⊗ | LIQUID LIMIT % △ 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	65+	3 15 50/3	S-1	4		M	GM	6" Topsoil like material Gy c-f GRAVEL, some Silt, trace f Sand Auger refusal at 1.5'		65
2	3.5									
3	4									
4	4		C-1	60/60	15			Gy, slightly to moderately weathered, moderately to highly fractured, medium hard, m-f grained DOLOMITE		
5	3.7									587.7
6	4									
7	4									
8	3.75									
9	4		C-2	60/60	43			Gy, slightly to moderately weathered, moderately to highly fractured, hard, f grained, DOLOMITE		
10	2.75									582.7
11	3.5									
12	4									
13	3									
14	2.75		C-3	60/60	67			Gy, slightly to moderately weathered, slightly to highly fractured, hard, f grained, DOLOMITE		
15	3.5									577.7
16	4									
17	3									
18	4.25									
19	4.5		C-4	48/48	85			Gy, slightly weathered, massive to moderately fractured, hard, f grained, DOLOMITE		
20	3.5									572.7
21								End of Boring at 20.5'		
22										
23										
24										
25										567.7

REMARKS: Boring Coordinates 43.1656186, -78.7223843

BORING LOG 10528.01.GPJ TECTONIC ENG.GDT 9/25/20

Tectonic

PROJECT No. **10528.01**
PROJECT: **Old Upper Mountain Road**
LOCATION: **Lockport, NY**

BORING No. B-10

SHEET No. 1 of 1

CLIENT: **EA Engineering , Science, and Technology Inc.**
CONTRACTOR: **Nothnagle Drilling, Inc**

METHOD OF ADVANCING BORING	DIA.	DEPTH
POWER AUGER:	**4 1/4"**	**0** TO **1.5'**
ROT. DRILL:		TO
CASING:		TO
DIAMOND CORE:	**2.5"**	**1.5** TO **20'**

GROUND WATER	DATE	TIME	DEPTH

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: **---** TO **---**
WEATHER: **Clear** TEMP: **78° F**
DEPTH TO ROCK: **1.5'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Scott Cohen**
DRILLER: **Bryan Swartz**
SURFACE ELEVATION: **592.0**
DATUM: **See Remarks**
DATE START: **7/29/20**
DATE FINISH: **7/30/20**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % × — WATER CONTENT % ⊗ — LIQUID LIMIT % △ 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV.: LENGTH (IN.)	RECOV.: RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	63+	11 13 50/5	S-1	3		M	GM	3" Topsoil like material Gy c-f GRAVEL, and Silt, trace f Sand (DOLOMITE fragments)		63
2	3									
3	3									
4	3.25		C-1	45/60	0			Gy, moderately weathered, highly fractured, medium hard f grained, DOLOMITE, void encountered 4.0'-5.0'.		
5	3									587.0
6	3.25									
7	3.5									
8	3.25									
9	3		C-2	60/60	58			Gy, moderately weathered, moderately to highly fractured, hard, f grained DOLOMITE		
10	3									582.0
11	3									
12	2.5									
13	3									
14	3		C-3	60/60	48			Gy, slightly to moderately weathered, slightly to highly fractured, hard f grained DOLOMITE		
15	3.25									577.0
16	3.25									
17	3.25									
18	3									
19	3.25		C-4	48/48	62			Gy, slightly to moderately weathered, slightly to highly fractured, hard f grained DOLOMITE		
20	3									572.0
21								End of Boring at 20.5'		
22										
23										
24										
25										567.0

REMARKS: Boring Coordinates: 43.1661050, -78.7223260

BORING LOG 10528.01.GPJ TECTONIC ENG.GDT 9/25/20

Tectonic

PROJECT No. **10528.01**
PROJECT: **Old Upper Mountain Road**
LOCATION: **Lockport, NY**

BORING No. B-11

SHEET No. 1 of 1

CLIENT: **EA Engineering , Science, and Technology Inc.**
CONTRACTOR: **Nothnagle Drilling, Inc**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **4 1/4"** | **0** TO **3'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | **2"** | **3** TO **16'**
CME 55LC Track Mounted Drill Rig with Automatic Hammer

GROUND WATER | DATE | TIME | DEPTH
| | | |

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: **---** TO **---**
WEATHER: **Overcast** TEMP: **80° F**
DEPTH TO ROCK: **3'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Liam McGrath**
DRILLER: **Bryan Swartz**
SURFACE ELEVATION: **590.0**
DATUM: **See Remarks**
DATE START: **9/3/20**
DATE FINISH: **9/3/20**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % ×—⊗—△ 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLE NUMBER	RECOV. LENGTH (IN.)	RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	13	3 7 6 8	S-1	12		M	GM	3" Topsoil like material Bwn SILT, some c-f Gravel, some c-f Sand, trace organics (roots)		
2	50+	50/4	S-2	4		M	GP-GM	Bwn-gy c-f GRAVEL, and c-f Sand, trace Silt		
3										
4	2									
5	1									585.0
6	.25		C-1	43/60	13			Gy, slightly weathered, moderately-highly fractured, m-f grained hard, DOLOMITE, fractures 0 - 50 degrees from horizontal		
7	1									
8	1									
9	1									
10	1									580.0
11	2		C-2	48/60	52			Gy, fresh, moderately fractured, m-f grained, hard, DOLOMITE, fractures 0 - 30 degrees from horizontal		
12	2									
13	2									
14	2									
15	2		C-3	24/36	58			Same		575.0
16	5							Void encountered 15' - 16'		
17								End of Boring at 16'		
18										
19										
20										570.0
21										
22										
23										
24										
25										565.0

REMARKS: Boring Coordinates 43.163903, -78.724483

BORING LOG 10528.01.GPJ TECTONIC ENG.GDT 9/25/20

Tectonic

PROJECT No. **10528.01**
PROJECT: **Old Upper Mountain Road**
LOCATION: **Lockport, NY**

BORING No. B-12

SHEET No. 1 of 1

CLIENT: **EA Engineering , Science, and Technology Inc.**
CONTRACTOR: **Nothnagle Drilling, Inc**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **4 1/4"** | **0** TO **12'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | **2"** | **12** TO **22'**
Brainard Kilman Truck Mounted Drill Rig with Automatic Hammer

GROUND WATER | DATE | TIME | DEPTH

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: **---** TO **---**
WEATHER: **Rain** TEMP: **70° F**
DEPTH TO ROCK: **12'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Scott Cohen**
DRILLER: **Kevin Busch**
SURFACE ELEVATION: **589.1**
DATUM: **See Remarks**
DATE START: **7/22/20**
DATE FINISH: **7/22/20**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % ✕ ⊗ △ 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	21	9 10 11 11	S-1	4		M	GP	Gravel surface Bwn-gy c-f GRAVEL, and c-f Sand, trace Silt (FILL)		
3	8	5 5 3 3	S-2	2		M	GP	Same (FILL)		
5	2	2 1 1 2	S-3	8		M		Blk-bwn Ash, topsoil like material, roots (FILL) (c-f SAND, some Silt, some c-f Gravel)		584.1
7	2	1 1 1 1	S-4	1		M		Same (FILL)		
9	3	2 1 2 4	S-5	0				No Recovery		579.1
11	65+	3 15 50/1	S-6	8		W	GM	Gy-bwn c-f GRAVEL, some Silt, little c-f Sand, wood, cloth fragments, strong petroleum odor (FILL)		65
13	2									
14	2									
15	2									574.1
16	2									
17	2.5		C-1	115/120	73			Gy-blk slightly to moderately fractured, moderately weathered, m-f grained, moderately hard DOLOMITE, fractures 15 - 45 degrees		
18	2									
19	2.5									
20	2									569.1
21	1.5									
22	2									
23								End of Boring at 22'		
24										
25										564.1

REMARKS: Boring Coordinates 43.1670445, -78.7225556 Approximately 30' west of

BORING LOG 10528.01.GPJ TECTONIC ENG.GDT 9/25/20

Tectonic

PROJECT No. **10528.01**
PROJECT: **Old Upper Mountain Road**
LOCATION: **Lockport, NY**

BORING No. B-13

SHEET No. 1 of 1

CLIENT: **EA Engineering , Science, and Technology Inc.**
CONTRACTOR: **Nothnagle Drilling, Inc**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **4 1/4"** | **0** TO **3'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | **2.5"** | **3** TO **18'**
CME 55LC Track Mounted Drill Rig with Automatic Hammer

GROUND WATER | DATE | TIME | DEPTH
MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: **---** TO **---**
WEATHER: **Overcast** TEMP: **75° F**
DEPTH TO ROCK: **9'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Liam McGrath**
DRILLER: **Bryan Swartz**
SURFACE ELEVATION: **589.0**
DATUM: **See Remarks**
DATE START: **8/4/20**
DATE FINISH: **8/4/20**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	50+	11 50/3	S-1	6		M	GP	2' Topsoil like material Bwn-gy c-f GRAVEL, and c-f Sand, trace Silt, trace Organics		
2										
3										
4	3									
5	2		C-1	52/60	15			Gy-tn Slightly weathered, moderately-highly fractured, c-f grained, moderately hard, DOLOMITE, fractures 0 and 90 degrees from horizontal (plant fossil and shells apparent in rock core) (vertical fracturing)		584.0
6	2									
7	3									
8	3									
9	3									
10	3									
11	4		C-2	60/60	52			Dk gy-tn slightly weathered, moderately-highly fractured, c-f grained, moderately hard, DOLOMITE, fractures 0 and 30 degrees from horizontal		579.0
12	3									
13	3									
14	3									
15	4									
16	4		C-3	60/60	67			Gy, fresh, moderately-highly fractured, m-f grained, hard DOLOMITE/SHALE transition fractures 45 degrees horizontal		574.0
17	4									
18	4									
19								End of Boring at 18'		
20										569.0
21										
22										
23										
24										
25										564.0

REMARKS: Boring Coordinates: 43.167624, -78.722720

BORING LOG 10528.01.GPJ TECTONIC ENG.GDT 9/25/20

Tectonic

PROJECT No. **10528.01**
PROJECT: **Old Upper Mountain Road**
LOCATION: **Lockport, NY**

BORING No. B-14

SHEET No. 1 of 1

CLIENT: **EA Engineering , Science, and Technology Inc.**
CONTRACTOR: **Nothnagle Drilling, Inc**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **4 1/4"** | **0** TO **10'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | **2.5"** | **10** TO **18'**
CME 55LC Track Mounted Drill Rig with Automatic Hammer

GROUND WATER | DATE | TIME | DEPTH
MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: **---** TO **---**
WEATHER: **Overcast** TEMP: **75° F**
DEPTH TO ROCK: **10'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Liam McGrath**
DRILLER: **Bryan Swartz**
SURFACE ELEVATION: **589.0**
DATUM: **See Remarks**
DATE START: **8/4/20**
DATE FINISH: **8/4/20**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % ✕ ⊗ △ 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	8	8 5 3	S-1	12		M	SP	Drilled through 2" Asphalt & 4" Subbase Bwn-or-blk c-f SAND, and c-f Gravel, trace Silt (brick & glass fragments) (FILL)		
3	3	2 1 2 8	S-2	8		M	GP	Bwn-or-blk c-f GRAVEL, and c-f Sand, trace Silt (brick & glass fragments) (FILL)		
5	1	WOH 0 1 1	S-3	6		M	SM	Bwn-blk-or c-f SAND, and c-f Gravel, little Silt (brick & glass fragments) (FILL)		584.0
7	41	30 34 7 6	S-4	4		M	SM	Same (FILL)		
9	54+	3 4 50/4	S-5	5		M	GM	Rd-bwn-tn c-f GRAVEL, and c-f Sand, little Silt (FILL)		579.0
11	3									
12	3									
13	3		C-1	50/60	57			Gy, slightly weathered, moderately-highly fractured, f grained, hard, SHALE, fractures 0 - 45 degrees from horizontal		
14	4									
15	3									574.0
16	3									
17	3		C-2	25/36	44			Same		
18	5									
19								End of Boring at 18'		
20										569.0
25										564.0

REMARKS: Boring Coordinates: 43,168239, -78.722810

BORING LOG 10528.01.GPJ TECTONIC ENG.GDT 9/25/20

Tectonic

PROJECT No. **10528.01**
PROJECT: **Old Upper Mountain Road**
LOCATION: **Lockport, NY**

BORING No. B-15

SHEET No. 1 of 1

CLIENT: **EA Engineering , Science, and Technology Inc.**
CONTRACTOR: **Nothnagle Drilling, Inc**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **4 1/4"** | **0** TO **5.2'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | **2.5"** | **5.2** TO **19.2'**
CME 55LC Track Mounted Drill Rig with Automatic Hammer

GROUND WATER | DATE | TIME | DEPTH

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: **---** TO **---**
WEATHER: **Clear** TEMP: **79° F**
DEPTH TO ROCK: **5.2'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Scott Cohen**
DRILLER: **Bryan Swartz**
SURFACE ELEVATION: **587.2**
DATUM: **See Remarks**
DATE START: **7/28/20**
DATE FINISH: **7/29/20**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	ELEVATION (FT.)
1	6	4 3 3 2	S-1	3		M	GP	Bwn c-f GRAVEL, some f Sand (FILL)	
3	102	11 52 50 17	S-2	5		M	GM	Tn-wh c-f GRAVEL, and c-f Sand, little Silt (DOLOMITE fragments)	102
5	67+	11 17 50/2	S-3	14		M	GM	Gy-bwn c-f GRAVEL, some Silt (DOLOMITE fragments)	67 582.2
6	3								
7	3								
8	3.5		C-1	52/60	48			Gy, moderately to highly weathered, moderately to highly fractured, soft f grained MUDSTONE, interbedded Silt	
9	3.25								
10	3								577.2
11	3								
12	3								
13	3		C-2	60/60	30			Gy, moderately to highly weathered, moderately to highly fractured, soft f grained MUDSTONE, interbedded Silt	
14	2.75								
15	3								572.2
16	3								
17	3								
18	3		C-3	57/60	48			Gy, moderately weathered, moderately to highly fractured, medium hard f grained MUDSTONE	
19	3								
20								End of Boring at 19.2'	567.2
21									
22									
23									
24									
25									562.2

REMARKS: Boring Coordinates 43.1689232, -78.7229080

BORING LOG 10528.01.GPJ TECTONIC ENG.GDT 9/25/20

Tectonic

PROJECT No. **10528.01**
PROJECT: **Old Upper Mountain Road**
LOCATION: **Lockport, NY**

BORING No. B-16

SHEET No. 1 of 1

CLIENT: **EA Engineering , Science, and Technology Inc.**
CONTRACTOR: **Nothnagle Drilling, Inc**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | | TO
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
CME 55LC Track Mounted Drill Rig with Automatic Hammer

GROUND WATER | DATE | TIME | DEPTH
| | | |
| | | |

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: --- TO ---
WEATHER: **Overcast** TEMP: **75° F**
DEPTH TO ROCK: **Not Encountered'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Liam McGrath**
DRILLER: **Bryan Swartz**
SURFACE ELEVATION: **585.0**
DATUM: **See Remarks**
DATE START: **8/4/20**
DATE FINISH: **8/4/20**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % ✕ ⊗ △ 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	24	13 12 12 9	S-1	16		M	SP	Gravel/Asphalt surface Bwn-blk c-f SAND, and c-f Gravel, trace Silt, trace Organics (FILL)		
3	59+	10 9 50/1	S-2	6		M	SP	Blk-rd c-f SAND, and c-f Gravel, trace Silt (strong petroleum odor) (FILL) Boring terminated by EA Engineering due to possible buried fuel tank and contamination		
5								End of Boring at 4'		580.0
10										575.0
15										570.0
20										565.0
25										560.0

REMARKS: Boring Coordinates: 43.169193, -78.722780

BORING LOG 10528.01.GPJ TECTONIC ENG.GDT 9/25/20

Tectonic

PROJECT No. **10528.01**
PROJECT: **Old Upper Mountain Road**
LOCATION: **Lockport, NY**

BORING No. B-16A

SHEET No. 1 of 1

CLIENT: **EA Engineering , Science, and Technology Inc.**
CONTRACTOR: **Nothnagle Drilling, Inc**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **4 1/4"** | **0** TO **6'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | **2"** | **6** TO **17'**
CME 55LC Track Mounted Drill Rig with Automatic Hammer

GROUND WATER | DATE | TIME | DEPTH
MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: --- TO ---
WEATHER: **Clear** TEMP: **75° F**
DEPTH TO ROCK: **6'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Liam McGrath**
DRILLER: **Bryan Swartz**
SURFACE ELEVATION: **585.0**
DATUM: **See Remarks**
DATE START: **9/3/20**
DATE FINISH: **9/3/20**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % ✕ ⊗ △ 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	23	6 10 13 11	S-1	16		M	GM	Drilled through 5" Asphalt layer Rd-gy c-f GRAVEL, some c-f Sand, some Clayey Silt (FILL)		
3	28	6 21 7 11	S-2	10		M	GC	Bwn-blk-rd c-f GRAVEL, and Silt & Clay, little c-f Gravel (FILL)		
5	58+	12 8 50/4	S-3	12		M	GM	Tn-gy SILT, and c-f Gravel, little c-f Sand		580.0
7	2 2 1 2 2		C-1	50/60	13			Tn-gy, slightly weathered, moderately to highly fractured, m-f grained, hard, DOLOMITE, fractures 0 - 50 degrees from horizontal		575.0
12	2		C-2	10/12	0			Same		
13	2 2 2 2 2		C-3	60/60	13			Gy, slightly weathered, moderately - highly fractured, m-f grained, moderately hard, DOLOMITE/SHALE transition fractures 0 - 30 degrees from horizontal		570.0
17								End of Boring at 17'		565.0
20										560.0

REMARKS: Boring Coordinates: 43.169157, -78.722548

BORING LOG 10528.01.GPJ TECTONIC ENG.GDT 9/25/20

Tectonic

PROJECT No. **10528.01**
PROJECT: **Old Upper Mountain Road**
LOCATION: **Lockport, NY**

BORING No. B-17

SHEET No. 1 of 1

CLIENT: **EA Engineering , Science, and Technology Inc.**
CONTRACTOR: **Nothnagle Drilling, Inc**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **4 1/4"** | **0** TO **7'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | **2"** | **7** TO **12'**
Brainard Kilman Truck Mounted Drill Rig with Automatic Hammer

GROUND WATER | DATE | TIME | DEPTH
| | | |

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: **---** TO **---**
WEATHER: **Overcast** TEMP: **70° F**
DEPTH TO ROCK: **7.0'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Scott Cohen**
DRILLER: **Kevin Busch**
SURFACE ELEVATION: **586.5**
DATUM: **See Remarks**
DATE START: **7/22/20**
DATE FINISH: **7/22/20**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	25	36 16 9 8	S-1	18		M	SM	2" Asphalt, 4" subbase Gravel Rd-bwn c-f SAND, some Clayey Silt, trace f Gravel		
3	33	6 17 16 14	S-2	12		M	GC	Bwn-tn c-f GRAVEL, and c-f Sand, little Clayey Silt		
5	9	6 5 4 8	S-3	8		W	SC	Gy c-f SAND, and Clayey Silt, trace f Gravel		581.5
7	50+	49 50/3	S-4	6		W	GM	Gy c-f GRAVEL, some c-f Sand, little Silt		
8	1.75 1.75 2.75 1.75 2.75		C-1	52.5/60	28			Gy, moderately-highly fractured, moderately weathered, moderately soft, f grained, DOLOMITE, fractures @ 15-30 degrees		576.5
13			C-2	0/60	0			No Recovery: Core barrel damaged and lost in boring New boring offset to B-17A		571.5
17								End of Boring at 17'		566.5
25										561.5

REMARKS: Boring Coordinates 43.1693382, -78.7219277, drilled in Lockport DPW Parking lot.

BORING LOG 10528.01.GPJ TECTONIC ENG.GDT 9/25/20

Tectonic

PROJECT No. **10528.01**
PROJECT: **Old Upper Mountain Road**
LOCATION: **Lockport, NY**

BORING No. B-17A

SHEET No. 1 of 1

CLIENT: **EA Engineering , Science, and Technology Inc.**
CONTRACTOR: **Nothnagle Drilling, Inc**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **4 1/4"** | **0** TO **9'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | **2.5"** | **9** TO **19'**
Brainard Kilman Truck Mounted Drill Rig with Automatic Hammer

GROUND WATER | DATE | TIME | DEPTH
| | | |

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: **---** TO **---**
WEATHER: **Overcast** TEMP: **78° F**
DEPTH TO ROCK: **9'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Scott Cohen**
DRILLER: **Kevin Busch**
SURFACE ELEVATION: **586.5**
DATUM: **See Remarks**
DATE START: **7/22/20**
DATE FINISH: **7/22/20**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % × | WATER CONTENT % ⊗ | LIQUID LIMIT % △ 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1								Augered through overburden to 9', no sampling		
2										
3						M	SM	Bwn c-f SAND, some c-f Gravel, little Silt		
4										
5										581.5
6										
7										
8										
9										
10	2									576.5
11	2							Gy, slightly to moderately weathered, slightly to moderately fractured, soft f grained SHALE, fractures 0 - 45 degrees		
12	2.5		C-1	60/60	72			Mechanical fractures in first 1' of core		
13	2.5									
14	2.5									
15	2									571.5
16	2							Gy, slightly weathered, slightly to moderately fractured, very soft, f grained SHALE, fractures contain flaky, Clay minerals, fractures @ 15 - 30 degrees		
17	1.5		C-2	59/60	68			Mechanical fractures in first 1' of core		
18	2									
19	2									
20								End of Boring at 19'		566.5
21										
22										
23										
24										
25										561.5

REMARKS: Boring Coordinates offset North of B-17

BORING LOG 10528.01.GPJ TECTONIC ENG.GDT 9/25/20

Tectonic

PROJECT No. **10528.01**
PROJECT: **Old Upper Mountain Road**
LOCATION: **Lockport, NY**

BORING No. B-18

SHEET No. 1 of 1

CLIENT: **EA Engineering , Science, and Technology Inc.**
CONTRACTOR: **Nothnagle Drilling, Inc**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **4 1/4"** | **0** TO **3'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | **2"** | **3** TO **18'**
CME 55LC Track Mounted Drill Rig with Automatic Hammer

GROUND WATER | DATE | TIME | DEPTH

INSPECTOR: **Liam McGrath**
DRILLER: **Bryan Swartz**
SURFACE ELEVATION: **590.0**
DATUM: **See Remarks**
DATE START: **8/6/20**
DATE FINISH: **8/6/20**
MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: --- TO ---
WEATHER: **Clear** TEMP: **75° F**
DEPTH TO ROCK: **3'**
*CHANGES IN STRATA ARE INFERRED

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % ⊗ WATER CONTENT % △ LIQUID LIMIT % 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	34	7 10 24 24	S-1	12		M	GM	3" Topsoil like material Bwn-gy c-f GRAVEL, some Silt, some c-f Sand, trace organics		
3	102+	24 52 50/1	S-2	8		D	GP	Gy-bwn c-f GRAVEL, and c-f Sand, trace Silt		102
4	3									
5	2									585.0
6	2		C-1	56/60	45			Gy, slightly weathered, moderately fractured, c-f grained, moderately hard, DOLOMITE, fractures 0 - 30 degrees from horizontal		
7	2									
8	2									
9	2									
10	2									580.0
11	2		C-2	60/60	100			Gy, fresh, moderately - slightly fractured, m-f grained hard, DOLOMITE, fractures 0-10 degree from horizontal		
12	2									
13	2									
14	2									
15	2									575.0
16	2		C-3	0/60				Coring was consistent but no core was retrieved from borehole Rock core still attached to bedrock at 18' Core barrel casing was unable to break rock core free		
17	2									
18	3									
19								End of Boring at 18'		
20										570.0
21										
22										
23										
24										
25										565.0

REMARKS: Borring Coordinates:

BORING LOG 10528.01.GPJ TECTONIC ENG.GDT 9/25/20

Tectonic

PROJECT No. **10528.01**
PROJECT: **Old Upper Mountain Road**
LOCATION: **Lockport, NY**

BORING No. B-19

SHEET No. 1 of 1

CLIENT: **EA Engineering , Science, and Technology Inc.**
CONTRACTOR: **Nothnagle Drilling, Inc**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **4 1/4"** | **0** TO **15.3'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | **2.5"** | **15.3** TO **20.3'**
Brainard Kilman Truck Mounted Drill Rig with Automatic Hammer

GROUND WATER | DATE | TIME | DEPTH
MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: --- TO ---
WEATHER: **Overcast** TEMP: **73° F**
DEPTH TO ROCK: **15.3'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Scott Cohen**
DRILLER: **Kevin Busch**
SURFACE ELEVATION: **583.2**
DATUM: **See Remarks**
DATE START: **7/24/20**
DATE FINISH: **7/24/20**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % ✕ ⊗ △ 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	29	4 6 23 30	S-1	15		M	SM	4" Topsoil like material Bwn-gy c-f SAND, some c-f Gravel, some Silt (FILL)		
3	15	6 4 11 27	S-2	14		M	GM	Bwn c-f GRAVEL, some Silt, some c-f Sand, shale fragments		
5	57+	17 5 52/5	S-3	3		M	GM	Bwn c-f GRAVEL, and Silt, trace roots		578.2
7	50+	37 50/3	S-4	3		M	GM	Bwn c-f GRAVEL, and Silt (Shale fragments)		
9	50+	27 50/3	S-5	9		M	CL-ML	Bwn-tn CLAYEY SILT, little f Gravel		
11	50+	11 50/4	S-6	8		M	ML	Tn SILT, trace f Sand		573.2
13	50+	50/3	S-7	3		M	GM	Gy c-f GRAVEL, some Silt (weathered Shale)		
15	50+	50/3	S-8	3		M	GP	Weathered Shale fragments		568.2
16	2.25									
17	2.25									
18	3.		C-1	54/60	27			Gy, moderately weathered, moderately to highly fractured, f grained, soft SHALE		
19	2.75									
20	2.75									563.2
21								End of Boring at 20.3'		
25										558.2

REMARKS: Boring Coordinates: 43.1701843, -78.7218770

BORING LOG 10528.01.GPJ TECTONIC ENG.GDT 9/25/20

Tectonic

PROJECT No. **10528.01**
PROJECT: **Old Upper Mountain Road**
LOCATION: **Lockport, NY**

BORING No. B-20

SHEET No. 1 of 1

CLIENT: **EA Engineering , Science, and Technology Inc.**
CONTRACTOR: **Nothnagle Drilling, Inc**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **4 1/4"** | **0** TO **2'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | **2.5"** | **2** TO **20'**
CME 55LC Track Mounted Drill Rig with Automatic Hammer

GROUND WATER | DATE | TIME | DEPTH

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: **---** TO **---**
WEATHER: **Clear** TEMP: **85° F**
DEPTH TO ROCK: **2'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Liam McGrath**
DRILLER: **Bryan Swartz**
SURFACE ELEVATION: **583.0**
DATUM: **See Remarks**
DATE START: **8/3/20**
DATE FINISH: **8/4/20**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % ✕ ⊗ △ 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	33	7 18 15 16	S-1	18		M	SM	1' of FILL Bwn-blk-gy c-f SAND, and c-f Gravel, some Silt		
2	50+	50/5	S-2	4		D		Gy c-f GRAVEL, and c-f Sand, trace Silt (bedrock fragments) (spoon refusal)		
3										
4	2									
5	2		C-1	23/48	0			Gy, moderately weathered to decomposed, moderately to highly fractured, m-f grained, hard-very soft SANDSTONE conglomerate fractures 0 - 45 degrees from horizontal		578.0
6	2									
7	3									
8	3									
9	3		C-2	53/60	7			Gy-Bwn, decomposed to moderately weathered, moderately to highly fractured, f grained, medium, very soft SHALE, fractures 0 - 45 degrees from horizontal		
10	3									573.0
11	4									
12	4									
13	3									
14	3		C-3	48/48	0			Same		
15	4									568.0
16	7									
17	3									
18	4		C-4	45/48	19			Gy, moderately to slightly weathered, moderately to highly fractured, f grained, medium hard, SHALE, fractures 0 - 20 degrees from horizontal		
19	4									
20	5									563.0
21								End of Boring at 20'		
22										
23										
24										
25										558.0

REMARKS: Boring Coordinates: 43.170538, -78.721862

BORING LOG 10528.01.GPJ TECTONIC ENG.GDT 9/25/20

Tectonic

PROJECT No. **10528.01**
PROJECT: **Old Upper Mountain Road**
LOCATION: **Lockport, NY**

BORING No. B-21

SHEET No. 1 of 1

CLIENT: **EA Engineering , Science, and Technology Inc.**
CONTRACTOR: **Nothnagle Drilling, Inc**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **4 1/4"** | **0** TO **1.8'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | **2.5"** | TO
CME 55LC Track Mounted Drill Rig with Automatic Hammer

GROUND WATER | DATE | TIME | DEPTH

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: **---** TO **---**
WEATHER: **Overcast** TEMP: **78° F**
DEPTH TO ROCK: **1.8'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Scott Cohen**
DRILLER: **Kevin Busch**
SURFACE ELEVATION: **583.8**
DATUM: **See Remarks**
DATE START: **7/23/20**
DATE FINISH: **7/23/20**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % ⊗ 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	56+	2 6 50/4	S-1	2		M	GM	6" Topsoil like material Gy-tn c-f GRAVEL, and Silt, trace f Sand (DOLOMITE fragments) Auger refusal @ 1.8'		
2										
3	3.25							2-3' Lgt gy, moderately fractured, moderately weathered, f grained, moderately hard, DOLOMITE		
4	3.5									
5	2.5		C-1	48.60	7			3 - 6.5' interbedded Bwn SILT (Residual Soil) (non-plastic) root intrusions		578.8
6	2.5									
7	2									
8	2.5									
9	3.25							Lgt gy, moderately weathered, highly fractured, f grained, moderately hard DOLOMITE, interbedded layers of Silt (Residual Soil) and Shale		
10	2.75		C-2	30/60	0					573.8
11	2.5									
12	2.75									
13	3.5 3		C-3	8/19	0			Gy, highly fractured, highly weathered, medium hard, f grained SHALE		
14	2.5							13.6' - 14.5' Gy-bwn CLAY & SILT		
15	2.5									568.8
16	2		C-4	36/53	20			14.5' - 18.0 Gy, moderately - highly fractured, moderately weathered, very soft, f grained SHALE		
17	3									
18	3									
19								End of Boring at 18'		
20										563.8
21										
22										
23										
24										
25										558.8

REMARKS: Boring Coordinates 43.1709978, -78.7217805

BORING LOG 10528.01.GPJ TECTONIC ENG.GDT 9/25/20

Tectonic

BORING No. B-22

PROJECT No. **10528.01**
PROJECT: **Old Upper Mountain Road**
LOCATION: **Lockport, NY**
SHEET No. 1 of 1

CLIENT: **EA Engineering , Science, and Technology Inc.**
CONTRACTOR: **Nothnagle Drilling, Inc**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **4 1/4"** | **0** TO **8'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
CME 55LC Track Mounted Drill Rig with Automatic Hammer

GROUND WATER | DATE | TIME | DEPTH
| | | |

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: **---** TO **---**
WEATHER: **Clear** TEMP: **75° F**
DEPTH TO ROCK: **8.5'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Liam McGrath**
DRILLER: **Bryan Swartz**
SURFACE ELEVATION: **583.0**
DATUM: **See Remarks**
DATE START: **8/3/20**
DATE FINISH: **8/3/20**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % ⊗ 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	11	1 5 6 8	S-1	16		M	SM	5" Topsoil like material Bwn c-f SAND, some c-f Gravel, little Silt		
3	52	8 10 42 50/5	S-2	14		M	GM	Bwn-gy-rd SILT, and c-f Gravel, some c-f Sand		
5	82	40 38 44 50/2	S-3	14		M	ML	Bwn-gy SILT, and c-f Gravel, little c-f Sand		578.0
7	50+	12 50/3	S-4	5		M	ML	Bwn-gy SILT, some c-f Gravel, little c-f Sand		
9	50+	10 50/2	S-5	4		M	ML	Bwn-gy SILT, little c-f Sand (weathered rock)		
10	5 4 3 3 5		C-1	48/60	0			Bwn-gy, decomposed to highly weathered, highly to moderately fractured, f grained, very soft, medium hard, DOLOMITE, fractures 0 -45 degrees from horizontal		573.0
14	3 3 4 4 3		C-2	60/60	0			Gy, moderately weathered, moderately to highly fractured, f grained, moderately hard, DOLOMITE transitioning to SHALE, fractures 0 - 45 degrees from horizontal		568.0
19	4 4		C-3	24/24	16			Same (SHALE)		563.0
21								End of Boring at 20.5'		558.0
25										

REMARKS: Boring Coordinates: 43.171544, -78.721988

BORING LOG 10528.01.GPJ TECTONIC ENG.GDT 9/25/20

Tectonic

PROJECT No. **10528.01**
PROJECT: **Old Upper Mountain Road**
LOCATION: **Lockport, NY**

BORING No. B-23

SHEET No. 1 of 1

CLIENT: **EA Engineering , Science, and Technology Inc.**
CONTRACTOR: **Nothnagle Drilling, Inc**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **4 1/4"** | **0** TO **18'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
Brainard Kilman Truck Mounted Drill Rig with Automatic Hammer

GROUND WATER | DATE | TIME | DEPTH
MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: --- TO ---
WEATHER: **Overcast** TEMP: **72° F**
DEPTH TO ROCK: **Not Encountered'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Scott Cohen**
DRILLER: **Kevin Busch**
SURFACE ELEVATION: **579.8**
DATUM: **See Remarks**
DATE START: **7/23/20**
DATE FINISH: **7/23/20**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % ✕ ⊗ △ 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLE NUMBER	RECOV. LENGTH (IN.)	RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	17	4 6 11 10	S-1	14		M	SM	4" Topsoil like material Bwn c-f SAND, some Silt, little c-f Gravel		
3	43	20 17 26 34	S-2	24		M	GM	Lgt bwn c-f GRAVEL, and c-f Sand, little Silt, decomposed Shale fragments		
5	98+	15 42 56/4	S-3	14		M	GM	Tn-bwn c-f GRAVEL, some Silt, some c-f Sand, shale fragments		98 574.8
7	50+	29 50/4	S-4	9		M	GM	Tn-bwn c-f GRAVEL, and m-f Sand, some Silt, shale fragments		
9	50+	36 50/3	S-5	8		M	GM	Same (weathered Shale)		
10										569.8
11	50+	36 50/5	S-6	11		M	GM	Same (weathered Shale)		
13	78+	16 28 50/3	S-7	15		M	GM	Same (weathered Shale)		78
15	50+	50/4	S-8	4		M	GM	Same (weathered Shale)		564.8
17								Augered to 18', Auger refusal not encountered		
								End of Boring at 18'		
20										559.8
25										554.8

REMARKS: Boring Coordinates 43.1718676, -78.7224886 Approximately 6' west of service road
Note, when samples S-2 and S-7 were tested in the lab, the weathered shale further broke down to silt, with approximately 24% to 25% gravel and 14% to 30% sand (see lab tests).

BORING LOG 10528.01.GPJ TECTONIC ENG.GDT 9/25/20

Tectonic

PROJECT No. **10528.01**
PROJECT: **Old Upper Mountain Road**
LOCATION: **Lockport, NY**

BORING No. B-24

SHEET No. 1 of 1

CLIENT: **EA Engineering , Science, and Technology Inc.**
CONTRACTOR: **Nothnagle Drilling, Inc**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **4 1/4"** | **0** TO **15'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
CME 55LC Track Mounted Drill Rig with Automatic Hammer

GROUND WATER | DATE | TIME | DEPTH
| | | |

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: --- TO ---
WEATHER: **Clear** TEMP: **77° F**
DEPTH TO ROCK: **Not Encountered'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Scott Cohen**
DRILLER: **Bryan Swartz**
SURFACE ELEVATION: **578.0**
DATUM: **See Remarks**
DATE START: **7/31/20**
DATE FINISH: **7/31/20**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % ✕ 10 20 30 40 50 ⊗ △
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLE NUMBER	RECOV. LENGTH (IN.)	RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	16	2 7 9 11	S-1	9		M	ML	4" Topsoil like material Bwn SILT, some c-f Gravel, trace f Sand		
3	37	11 17 20 34	S-2	24		M	ML	Tn-gy SILT, trace f Gravel (non plastic)		
5	90+	11 40 50/4	S-3	16		M	ML	Tn-gy SILT (non-plastic)		573.0
7	50+	34 50/4	S-4	10		M	ML	Same		
9	49	12 24 25 39	S-5	16		M	CL	Bwn SILT & CLAY		568.0
11	99+	30 49 50/5	S-6	6		M	ML	Gy SILT		
13								Augered to 15' cuttings were tn Silt, little c-f Gravel		
15	50+	50/3	S-7	3		M	ML	Gy SILT, some c-f Gravel		563.0
								End of Boring at 15.3'		
										558.0
										553.0

REMARKS: Boring Coordinates: 43.1723250, -78.7229335

BORING LOG 10528.01.GPJ TECTONIC ENG.GDT 9/25/20

Tectonic

PROJECT No. **10528.01**
PROJECT: **Old Upper Mountain Road**
LOCATION: **Lockport, NY**

BORING No. B-25

SHEET No. 1 of 1

CLIENT: **EA Engineering , Science, and Technology Inc.**
CONTRACTOR: **Nothnagle Drilling, Inc**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **4 1/4"** | **0** TO **2'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | **2"** | **2** TO **20'**
CME 55LC Track Mounted Drill Rig with Automatic Hammer

GROUND WATER | DATE | TIME | DEPTH
MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: --- TO ---
WEATHER: **Overcast** TEMP: **75° F**
DEPTH TO ROCK: **2'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Liam McGrath**
DRILLER: **Bryan Swartz**
SURFACE ELEVATION: **590.0**
DATUM: **See Remarks**
DATE START: **8/13/20**
DATE FINISH: **8/13/20**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % × | WATER CONTENT % ⊗ | LIQUID LIMIT % △ 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	44	4 14 30 50/2	S-1	14		M	SM	4" Topsoil like material Wh-bwn c-f SAND, and c-f Gravel, little Silt (spoon refusal) (fractured DOLOMITE)		
3	1 2 2 2 2		C-1	46/60	31			Tn-gy, slightly weathered, moderately to highly fractured, c-f grained, moderately hard, DOLOMITE, fractures 20 - 60 degrees from horizontal		585.0
8	2 2 2 2 3		C-2	59/60	82			Lgt gy, slightly weathered, slightly-moderately fractured, c-f grained, hard, DOLOMITE, fractures 0 - 30 degrees from horizontal		580.0
13	2 2 3 2 2		C-3	60/60	98			Lgt gy, fresh, slightly-massive fractured, m-f grained, hard, DOLOMITE, fractures 10-30 degrees from horizontal		575.0
18	2 2 2		C-4	17/36	47			Lgt gy, fresh, slightly fractured, m-f grained, hard, DOLOMITE, fractures 10 - 30 degrees from horizontal		570.0
20								End of Boring at 20'		565.0

REMARKS: Boring Coodinates: 43.164965, 78.722852

BORING LOG 10528.01.GPJ TECTONIC ENG.GDT 9/25/20

Tectonic

PROJECT No. **10528.01**
PROJECT: **Old Upper Mountain Road**
LOCATION: **Lockport, NY**

BORING No. B-26

SHEET No. 1 of 1

CLIENT: **EA Engineering , Science, and Technology Inc.**
CONTRACTOR: **Nothnagle Drilling, Inc**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **4 1/4"** | **0** TO **16'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
Brainard Kilman Truck Mounted Drill Rig with Automatic Hammer

GROUND WATER | DATE | TIME | DEPTH
MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: --- TO ---
WEATHER: **Overcast** TEMP: **76° F**
DEPTH TO ROCK: **Not Encountered'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Scott Cohen**
DRILLER: **Kevin Busch**
SURFACE ELEVATION: **576.9**
DATUM: **See Remarks**
DATE START: **7/23/20**
DATE FINISH: **7/23/20**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % ✕ ⊗ △ 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLE NUMBER	RECOV. LENGTH (IN.)	RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	12	4 9 3 4	S-1	6		M	CL	4" Topsoil like material Bwn-gy SILT & CLAY, little m-f Sand, trace f Gravel		
3	19	5 10 9 15	S-2	22		M	CL	Bwn-tn SILTY CLAY, little f Sand		
5	32	6 14 18 22	S-3	18		M	ML	Tn-gy SILT, some c-f Sand, trace f Gravel (non-plastic)		571.9
7	45	7 17 28 26	S-4	18		M	ML	Same (non-plastic)		
9	61	8 21 40 41	S-5	24		M	ML	Same (non-plastic)		
10	50+	21 50/5	S-6	11		M	ML	Same (non-plastic)		566.9
11	50+	50/4	S-7	4		M	GM	Tn-gy c-f GRAVEL, and Silt, trace f Sand (shale fragments)		
15	50+	50/4	S-8	3		M	GM	Same (Shale fragments) Augered to 16', Refusal not encountered		561.9
								End of Boring at 16'		
20										556.9
25										551.9

REMARKS: Boring Coordinates 43.1728004, -78.7233680

BORING LOG 10528.01.GPJ TECTONIC ENG.GDT 9/25/20

Tectonic

PROJECT No. **10528.01**
PROJECT: **Old Upper Mountain Road**
LOCATION: **Lockport, NY**

BORING No. B-27

SHEET No. 1 of 1

CLIENT: **EA Engineering , Science, and Technology Inc.**
CONTRACTOR: **Nothnagle Drilling, Inc**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **4 1/4"** | **0** TO
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | **2.5"** | TO
CME 55LC Track Mounted Drill Rig with Automatic Hammer

GROUND WATER | DATE | TIME | DEPTH
| | | |

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: --- TO ---
WEATHER: **Clear** TEMP: **70° F**
DEPTH TO ROCK: ---
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Scott Cohen**
DRILLER: **Bryan Swartz**
SURFACE ELEVATION: **576.3**
DATUM: **See Remarks**
DATE START: **7/31/20**
DATE FINISH: **7/31/20**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % ×—⊗—△ 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	29	23 11 18 6	S-1	16		M	SP	Bwn c-f SAND, trace Silt, trace c-f Gravel (FILL)		
3	7	3 4 3 6	S-2	4		M	ML	Gy CLAYEY SILT		
5	26	2 9 17 25	S-3	24		M	ML	Tn SILT, trace f Sand (non-plastic)		571.3
7	50+	34 50/5	S-4	10		M	ML	Same		
8								Augered to 8'		
9	32	5 6 26 27	S-5	24		M	ML	Same		
10										566.3
11	61	14 34 27 47	S-6	24		M	ML	Same		61
13								Augered to 15' cuttings consist of tn SILT, tarce c-f Gravel		
15	50+	50/5	S-7	3		M	ML	Gy SILT, little c-f Gravel (shale fragments)		561.3
16								End of Boring at 15.4'		
20										556.3
25										551.3

REMARKS: Boring Coordinates 43.1732628, -78.7234950

BORING LOG 10528.01.GPJ TECTONIC ENG.GDT 9/25/20

Tectonic

PROJECT No. **10528.01**

PROJECT: **Old Upper Mountain Road**

LOCATION: **Lockport, NY**

BORING No. B-28

SHEET No. 1 of 1

CLIENT: **EA Engineering , Science, and Technology Inc.**

CONTRACTOR: **Nothnagle Drilling, Inc**

METHOD OF ADVANCING BORING | DIA. | DEPTH

POWER AUGER: | **4 1/4"** | **0** TO **15'**

ROT. DRILL: | | TO

CASING: | | TO

DIAMOND CORE: | | TO

CME 55LC Track Mounted Drill Rig with Automatic Hammer

GROUND WATER | DATE | TIME | DEPTH

MON. WELL ☐ YES ☒ NO

SCREEN DEPTH: **---** TO **---**

WEATHER: **Clear** TEMP: **80° F**

DEPTH TO ROCK: **Not Encountered'**

*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Scott Cohen**

DRILLER: **Bryan Swartz**

SURFACE ELEVATION: **575.2**

DATUM: **See Remarks**

DATE START: **7/30/20**

DATE FINISH: **7/30/20**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % 10 20 30 40 50

STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	17	10 10 7 2	S-1	12		M	SP	Blk c-f SAND, little c-f Gravel, trace Silt (FILL)		
3	7	1 3 4 7	S-2	10		M	CL	Gy-bwn SILTY CLAY, trace roots		
5	45	11 17 28 25	S-3	21		M	ML	Tn-bwn SILT		570.2
7	61	33 34 27 39	S-4	24		M	ML	Same		
9	61	18 27 34 57	S-5	24		M	ML	Same		
11	52	14 24 28 47	S-6	24		M	ML	Same		565.2
13								Augered to 15' cuttings are tn SILT, little c-f Gravel		
15	50+	50/5	S-7	5		M	ML	Gy SILT, and c-f Gravel (DOLOMITE fragments)		560.2
								End of Boring at 15.4'		
										555.2
										550.2

REMARKS:

BORING LOG 10528.01.GPJ TECTONIC ENG.GDT 9/25/20

Tectonic

PROJECT No. **10528.01**
PROJECT: **Old Upper Mountain Road**
LOCATION: **Lockport, NY**

BORING No. B-29

SHEET No. 1 of 1

CLIENT: **EA Engineering , Science, and Technology Inc.**
CONTRACTOR: **Nothnagle Drilling, Inc**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **4 1/4"** | **0** TO **14'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
Brainard Kilman Truck Mounted Drill Rig with Automatic Hammer

GROUND WATER | DATE | TIME | DEPTH
| | | |

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: --- TO ---
WEATHER: **Overcast** TEMP: **73° F**
DEPTH TO ROCK: **Not Encountered'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Scott Cohen**
DRILLER: **Kevin Busch**
SURFACE ELEVATION: **573.4**
DATUM: **See Remarks**
DATE START: **7/23/20**
DATE FINISH: **7/23/20**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	3	2 2 1 3	S-1	4		M	GP CL	18" loose Gravel surface (FILL) Gy-bwn CLAYEY SILT, little m-f Sand		
3	33	12 16 17 18	S-2	18		M	ML	Gy-bwn SILT, little c-f Sand, trace f Gravel (non-plastic)		
5	39	11 16 23 43	S-3	16		M	ML	Same (non-plastic)		568.4
7	67	10 31 36 45	S-4	16		M	ML	Same (non-plastic)		
9	51	8 21 30 37	S-5	24		M	ML	Same (non-plastic)		563.4
11	46	18 23 23 24	S-6	18		M	ML	Same (non-plastic)		
13	34	8 16 18 21	S-7	24		M	ML	Same (non-plastic)		
15								End of Boring at 14'		558.4
										553.4
										548.4

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REMARKS: Boring Coordinates 43.1736146, -78.7233280

BORING LOG 10528.01.GPJ TECTONIC ENG.GDT 9/25/20

Tectonic

PROJECT No. **10528.01**
PROJECT: **Old Upper Mountain Road**
LOCATION: **Lockport, NY**

BORING No. B-30

SHEET No. 1 of 1

CLIENT: **EA Engineering , Science, and Technology Inc.**
CONTRACTOR: **Nothnagle Drilling, Inc**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **4 1/4"** | **0** TO **24'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
CME 55LC Track Mounted Drill Rig with Automatic Hammer

GROUND WATER | DATE | TIME | DEPTH

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: **---** TO **---**
WEATHER: **Clear** TEMP: **78° F**
DEPTH TO ROCK: **24'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Scott Cohen**
DRILLER: **Bryan Swartz**
SURFACE ELEVATION: **569.5**
DATUM: **See Remarks**
DATE START: **7/30/20**
DATE FINISH: **7/30/20**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % ✕ ⊗ △ 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1–4								Augered through 4.5' of placed Gravel Fill		
5–6	17	1, 7, 10, 13	S-1	10		M	ML	Tn SILT, some c-f Gravel (non-plastic)		564.5
7–8	46	15, 20, 26, 28	S-2	20		M	ML	Tn-gy SILT (non-plastic)		
9								Augered to 9'		
10–11	35	10, 15, 20, 32	S-3	24		M	ML	Same		559.5
12–13	67	24, 32, 35, 37	S-4	24		M	ML	Same		
14–15								Augered to 15' Tn SILT in drill cuttings		554.5
16–17	41	13, 18, 23, 28	S-5	24		M	CL	Bwn-gy CLAY & SILT		
18–20								Augered to 20' Bwn-gy SILT, some c-f Gravel in drill cuttings		549.5
21	50+	15, 50/1	S-6	4		M	ML	Gy SILT, some c-f Gravel (non-platic)		
22–24								Cuttings gy c-f SILT, and c-f Gravel Grinding @ 23.5' Auger refusal @ 24'		
25								End of Boring at 24'		544.5

REMARKS: Boring Coordinates 43.1737185, -78.7233291
5" Gravel placed to provide drill rig access

BORING LOG 10528.01.GPJ TECTONIC ENG.GDT 9/25/20

Tectonic

BORING No. B-32

PROJECT No. **10528.01**
PROJECT: **Old Upper Mountain Road**
LOCATION: **Lockport, NY**
SHEET No. 1 of 1

CLIENT: **EA Engineering , Science, and Technology Inc.**
CONTRACTOR: **Nothnagle Drilling, Inc**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **4 1/4"** | **0** TO **11'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
CME 55LC Track Mounted Drill Rig with Automatic Hammer

GROUND WATER | DATE | TIME | DEPTH

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: --- TO ---
WEATHER: **Clear** TEMP: **75° F**
DEPTH TO ROCK: **Not Encountered'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Liam McGrath**
DRILLER: **Bryan Swartz**
SURFACE ELEVATION: **535.0**
DATUM: **See Remarks**
DATE START: **8/31/20**
DATE FINISH: **8/31/20**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % ✕ ⊗ △ 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLE NUMBER	RECOV. LENGTH (IN.)	RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1–2	10	1 5 5 6	S-1	6		D	SC	Bwn-rd-gy SILT & CLAY, and c-f Gravel, little c-f Sand (FILL)		
3–4	15	4 7 8 8	S-2	16		M	SC	Bwn-gy CLAY & SILT, some c-f Sand, some c-f Gravel (FILL)		
5–6	12	3 6 6 5	S-3	14		M	SC	Bwn-gy CLAY & SILT, and c-f Gravel, little c-f Sand (FILL)		530.0
7–8	9	3 4 5 5	S-4	16		M	SC	Bwn-gy SILT & CLAY, some c-f Gravel, some c-f Sand (metallic slag fragments) (FILL)		
9–10	8	2 4 4 5	S-5	16		M	GC	Bwn-rd-gy CLAY & SILT, some c-f Gravel, some c-f Sand (FILL)		525.0
11–12	12	3 6 6 7	S-6	16		M	GC	Same (FILL)		
13–14	23	7 9 14 20	S-7	14		W	GC	Bwn-gy-rd CLAY & SILT, some c-f Gravel, some c-f Sand		
15–16	75	30 40 35 44	S-8	5		W	SC	Bwn-gy c-f SAND, and c-f Gravel, little Clayey Silt		520.0
								End of Boring at 16'		
17										515.0
21										
25										510.0

REMARKS: Boring Coordinates 43.174244, -78.723551

BORING LOG 10528.01.GPJ TECTONIC ENG.GDT 9/25/20

Tectonic

PROJECT No. **10528.01**
PROJECT: **Old Upper Mountain Road**
LOCATION: **Lockport, NY**

BORING No. B-33

SHEET No. 1 of 1

CLIENT: **EA Engineering , Science, and Technology Inc.**
CONTRACTOR: **Nothnagle Drilling, Inc**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **4 1/4"** | **0** TO **7'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | **2"** | **7** TO **12'**
CME 55LC Track Mounted Drill Rig with Automatic Hammer

GROUND WATER | DATE | TIME | DEPTH
| | | |

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: **---** TO **---**
WEATHER: **Clear** TEMP: **75° F**
DEPTH TO ROCK: **7'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Liam McGrath**
DRILLER: **Bryan Swartz**
SURFACE ELEVATION: **525.0**
DATUM: **See Remarks**
DATE START: **8/31/20**
DATE FINISH: **8/31/20**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % ✕ 10 20 30 40 50 △
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1–2	50	2, 12, 38, 50/2	S-1	12		M	SC	2" Topsoil Bwn-rd-gy CLAYEY SILT, some c-f Sand, some c-f Gravel, trace Organics (roots)		
3–4	20	8, 9, 11, 10	S-2	2		M	GM	Bwn-rd f GRAVEL, some c-f Sand, some Clayey Silt, trace Organics (little recovery) (roots)		
5–6	17	6, 7, 10, 18	S-3	20		M	CL-ML	Bwn-gy CLAY & SILT, little c-f Sand		520.0
7	50+	50/3	S-4	3		M	CL-ML	Bwn-gy CLAY & SILT, and f Gravel, little c-f Sand		
8–12	3, 2, 2, 3, 2		C-1	54/60	52			Gy-tn, slightly weathered, slightly-moderately fractured, m-f grained, hard, SANDSTONE, fractures 20 - 60 degrees from horizontal		515.0
13								End of Boring at 12'		
15										510.0
20										505.0
25										500.0

REMARKS: Boring Coordinates 43.174348, -78.723600

BORING LOG 10528.01.GPJ TECTONIC ENG.GDT 9/25/20

Tectonic

PROJECT No. **10528.01**
PROJECT: **Old Upper Mountain Road**
LOCATION: **Lockport, NY**

BORING No. B-35

SHEET No. 1 of 1

CLIENT: **EA Engineering , Science, and Technology Inc.**
CONTRACTOR: **Nothnagle Drilling, Inc**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **4 1/4"** | **0** TO **4'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | **2"** | **4** TO **9'**
CME 55LC Track Mounted Drill Rig with Automatic Hammer

GROUND WATER | DATE | TIME | DEPTH

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: **---** TO **---**
WEATHER: **Overcast** TEMP:
DEPTH TO ROCK: **4'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Liam McGrath**
DRILLER: **Bryan Swartz**
SURFACE ELEVATION: **504.1**
DATUM: **See Remarks**
DATE START: **9/2/20**
DATE FINISH: **9/2/20**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % ✕ ⊗ △ 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	13	2, 5, 8, 10	S-1	8		M	CL	Bwn CLAYEY SILT, little c-f Sand, trace f Gravel, trace Organics (root fragments)		
2										
3	37	19, 17, 20, 50/3	S-2	8		D	GM	Gy-lgt bwn c-f GRAVEL, and c-f Sand, little Silt		
4										
	50+	50/3	S-3	1		D	GM	Gy-bwn c-f GRAVEL, and c-f Sand, little Silt		
5	2									499.1
6	1									
7	.5		C-1	31/60	33			Gy-bwn, slightly weathered, moderately fractured, m-f grained, hard, SANDSTONE, fractures 0 -30 degrees from horizontal		
8	2									
9	2									
10								End of Boring at 9.5'		494.1
11										
12										
13										
14										
15										489.1
16										
17										
18										
19										
20										484.1
21										
22										
23										
24										
25										479.1

REMARKS: Boring Coordinates 43.174848, -78.723738

BORING LOG 10528.01.GPJ TECTONIC ENG.GDT 9/25/20

Tectonic

PROJECT No. **10528.01**
PROJECT: **Old Upper Mountain Road**
LOCATION: **Lockport, NY**

BORING No. B-36

SHEET No. 1 of 1

CLIENT: **EA Engineering , Science, and Technology Inc.**
CONTRACTOR: **Nothnagle Drilling, Inc**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **4 1/4"** | **0** TO **3.5'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | **2"** | **3.5** TO **11.5'**
CME 55LC Track Mounted Drill Rig with Automatic Hammer

GROUND WATER | DATE | TIME | DEPTH

INSPECTOR: **Liam McGrath**
DRILLER: **Bryan Swartz**
SURFACE ELEVATION: **498.0**
MON. WELL ☐ YES ☒ NO
DATUM: **See Remarks**
SCREEN DEPTH: **---** TO **---**
DATE START: **9/1/20**
WEATHER: **Clear** TEMP: **75° F**
DATE FINISH: **9/1/20**
DEPTH TO ROCK: **3.5'**
*CHANGES IN STRATA ARE INFERRED

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % ✕ ⊗ △ 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLE NUMBER	RECOV. LENGTH (IN.)	RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	6	2 2 4 7	S-1	14		M	CL-ML	Bwn-rd SILT & CLAY, some c-f Sand, little c-f Gravel, trace Organics		
2										
3	67+	9 17 50/5	S-2	8		M	SM	Bwn-rd SILT, some c-f Sand, some c-f Gravel Auger refusal at 3.5'		
4	2									
5	2									493.0
6	3		C-1	40/60	23			Bwn to gy, highly to slightly weathered, highly to moderately fractured, m-f grained, soft-hard, SANDSTONE, fractures 0 - 20 degrees from horizontal		
7	2									
8	2									
9	2									
10	3		C-2	34/36	31			Gy, fresh, highly-moderately fractured, m-f grained, hard, SANDSTONE, fractures 0-30 degrees from horizontal		488.0
11	3									
12								End of Boring at 11.5'		
13										
14										
15										483.0
16										
17										
18										
19										
20										478.0
21										
22										
23										
24										
25										473.0

67

REMARKS: Boring Coordinates: 43.175060, -78.724082

BORING LOG 10528.01.GPJ TECTONIC ENG.GDT 9/25/20

Tectonic

PROJECT No. **10528.01**
PROJECT: **Old Upper Mountain Road**
LOCATION: **Lockport, NY**

BORING No. B-37

SHEET No. 1 of 1

CLIENT: **EA Engineering , Science, and Technology Inc.**
CONTRACTOR: **Nothnagle Drilling, Inc**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **4 1/4"** | **0** TO **3'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | **2"** | **3** TO **11'**
CME 55LC Track Mounted Drill Rig with Automatic Hammer

GROUND WATER | DATE | TIME | DEPTH
| | | |

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: **---** TO **---**
WEATHER: **Clear** TEMP: **75° F**
DEPTH TO ROCK: **3'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Liam McGrath**
DRILLER: **Bryan Swartz**
SURFACE ELEVATION: **498.0**
DATUM: **See Remarks**
DATE START: **8/31/20**
DATE FINISH: **9/1/20**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	11	3 5 6 21	S-1	20		M	CL	Bwn-tn CLAYEY SILT, and c-f Sand, little f Gravel		
2										
3	50+	50/4	S-2	4		M	GM	Bwn-tn c-f GRAVEL, and c-f Sand, little Silt		
4	2							Bwn to gy, highly weathered, highly-moderately fractured, m-f grained, moderately hard, SANDSTONE, fractures all directions (Residual soil - bwn m-f SAND, and Silt was found at the bottom of the core sample)		
5	1		C-1	18/36	0					493.0
6	.5									
			S-3	1		D	GP	Gy c-f GRAVEL, little c-f Sand, little Clay & Silt (fractured SANDSTONE)		
7	2									
8	2									
9	2		C-1	60/60	17			Gy, slightly weathered, highly - moderately fractured, m-f grained, hard, SANDSTONE, fractures 0 - 30 degrees from horizontal		
10	2									488.0
11	2									
12								End of Boring at 11'		
13										
14										
15										483.0
16										
17										
18										
19										
20										478.0
21										
22										
23										
24										
25										473.0

REMARKS: Boring Coordinates: 43.175235, -78.724073

BORING LOG 10528.01.GPJ TECTONIC ENG.GDT 9/25/20

Tectonic

PROJECT No. **10528.01**
PROJECT: **Old Upper Mountain Road**
LOCATION: **Lockport, NY**

BORING No. B-44

SHEET No. 1 of 1

CLIENT: **EA Engineering , Science, and Technology Inc.**
CONTRACTOR: **Nothnagle Drilling, Inc**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **4 1/4"** | **0** TO **7'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | **2"** | **7** TO **17'**
CME 55LC Track Mounted Drill Rig with Automatic Hammer

GROUND WATER | DATE | TIME | DEPTH
MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: --- TO ---
WEATHER: **Clear** TEMP: **80° F**
DEPTH TO ROCK: **7'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Liam McGrath**
DRILLER: **Bryan Swartz**
SURFACE ELEVATION: **575.0**
DATUM: **See Remarks**
DATE START: **8/13/20**
DATE FINISH: **8/13/20**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLE NUMBER	RECOV. LENGTH (IN.)	RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	5	2 2 3 6	S-1	10		M	CL	1" Topsoil like material Bwn-tn CLAYEY SILT, little c-f Sand, trace f Gravel, trace Organics		
3	24	6 11 13 18	S-2	18		M	ML	Lgt bwn-gy SILT, little f Gravel, trace c-f Sand, trace Organics (root fragments)		
5	50	4 18 32 43	S-3	20		M	ML	Lgt bwn-gy SILT, little c-f Sand, trace f Gravel		570.0
7	50+	34 50/2	S-4	8		M	ML	Lgt bwn-gy SILT, some c-f Gravel, trace c-f Sand		
8	1 1 2 2 1		C-1	45/60	0			Gy, moderately weathered, highly fractured, fine grained, medium hard SHALE, fractures 0-30 degrees from horizontal		565.0
13	2 3 2 2 2		C-2	60/60	0			Same		560.0
17								End of Boring at 17'		555.0
25										550.0

REMARKS: Boring Coordinates 43.173211, -78.723017

BORING LOG 10528.01.GPJ TECTONIC ENG.GDT 9/25/20

Tectonic

PROJECT No. **10528.01**
PROJECT: **Old Upper Mountain Road**
LOCATION: **Lockport, NY**

BORING No. B-45

SHEET No. 1 of 2

CLIENT: **EA Engineering , Science, and Technology Inc.**
CONTRACTOR: **Nothnagle Drilling, Inc**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **4 1/4"** | **0** TO **31'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | **2"** | **31** TO **43.5'**
CME 55LC Track Mounted Drill Rig with Automatic Hammer

GROUND WATER | DATE | TIME | DEPTH
MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: **---** TO **---**
WEATHER: **Overcast** TEMP: **50° F**
DEPTH TO ROCK: **31'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Liam McGrath**
DRILLER: **Bryan Swartz**
SURFACE ELEVATION: **567.5**
DATUM: **See Remarks**
DATE START: **10/28/20**
DATE FINISH: **10/28/20**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % ⊗ WATER CONTENT % △ LIQUID LIMIT % 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV.: LENGTH (IN.)	RECOV.: RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1								Drilled to 2' due to boulders at surface (sampling began at 2')		
2										
3	28	5, 6, 22, 12	S-1	12		M	GM	Lgt bwn-gy c-f GRAVEL, some c-f Sand, some Silt		
4										
5	32	5, 14, 18, 20	S-2	14		D	GM	Lgt bwn-gy c-f GRAVEL, and Clayey Silt, little c-f Sand		562.5
6										
7	51	21, 26, 25, 33	S-3	14		D	CL	Lgt bwn-gy CLAY & SILT, little c-f Sand, little c-f Gravel		
8										
9	40	13, 17, 23, 23	S-4	16		D	CL	Lgt bwn CLAY & SILT, trace f Gravel, trace c-f Sand		
10										557.5
11	59	22, 28, 31, 38	S-5	14		D	CL	Same		
12										
13										
14										
15										552.5
16	43	9, 19, 24, 37	S-6	16		D	CL	Lgt bwn-gy CLAY &SILT, trace f Gravel, trace c-f Sand		
17										
18										
19										
20										547.5
21	43	12, 23, 20, 22	S-7	16		M	CL	Lgt bwn CLAY & SLIT, little c-f Sand, trace f Gravel		
22										
23										
24										
25										542.5

REMARKS: Boring Coordinates 43.166417, -78.725254

BORING LOG 10528.01.GPJ TECTONIC ENG.GDT 12/11/20

Tectonic

PROJECT No. **10528.01**

PROJECT: **Old Upper Mountain Road**

LOCATION: **Lockport, NY**

BORING No. B-45

SHEET No. 2 of 2

CLIENT: **EA Engineering , Science, and Technology Inc.**

CONTRACTOR: **Nothnagle Drilling, Inc**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5

PLASTIC LIMIT % × — WATER CONTENT % ⊗ — LIQUID LIMIT % △ 10 20 30 40 50

STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	SAMPLES: RECOV. LENGTH (IN.)	SAMPLES: RECOV. RQD (%)	SAMPLES: MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
26	52	12 22 30 50/1	S-8	10		M	CL	Lgt bwn-gy SILT & CLAY, little c-f Sand, little f Gravel		
27										
28										
29										
30	50+	50/4	S-9	4		M	CL	Lgt bwn-gy SILT & CLAY, some c-f Gravel, some c-f Sand (weathered Shale)		537.5
31										
32										
33			C-1	46/48	23			Gy, slightly weathered, moderately fractured, c-f grained, medium hard, DOLOSTONE, fractures 30 - 50 degrees from horizontal		
34										
35										532.5
36	2									
37	2									
38	.5		C-2	55/60	21			Gy, slightly-completely weathered, moderately to highly fractured, c-f grained, medium hard DOLOSTONE with Limestone layers, fractures 30 - 50 degrees		
39	2									
40	3									527.5
41										
42			C-3	26/42	14			Same (slightly RXN with 10% HCL solution, rock powder reacted more vigorously)		
43								end of boring due to fractured rock jamming the core barrel		
44										
45								End of Boring at 43.5'		522.5
46										
47										
48										
49										
50										517.5
51										
52										
53										
54										
55										512.5

REMARKS: Boring Coordinates 43.166417, -78.725254

BORING LOG 10528.01.GPJ TECTONIC ENG.GDT 12/11/20

Tectonic

PROJECT No. **10528.01**
PROJECT: **Old Upper Mountain Road**
LOCATION: **Lockport, NY**

BORING No. B-46

SHEET No. 1 of 3

CLIENT: **EA Engineering , Science, and Technology Inc.**
CONTRACTOR: **Nothnagle Drilling, Inc**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | | TO
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO

GROUND WATER | DATE | TIME | DEPTH

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: --- TO ---
WEATHER: **Overcast** TEMP: **75° F**
DEPTH TO ROCK: **5.5'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Liam McGrath**
DRILLER: **Bryan Swartz**
SURFACE ELEVATION: **588.0**
DATUM: **See Remarks**
DATE START: **8/10/20**
DATE FINISH: **8/12/20**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % ✕ ⊗ △ 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	34	3 16 18 10	S-1	14		M	SP	3" Topsoil like material Bwn-gy c-f SAND, and c-f Gravel, trace Silt, trace Organics		
3	14	8 6 8 12	S-2	8		M	SM	Bwn-gy c-f AND, and c-f Gravel, little Silt, trace Organics (root fibers)		
5	61+	6 11 50/4	S-3	6		M	GP-GM	Bwn-gy c-f GRAVEL, and c-f Sand, trace Silt Auger refusal @ 5.5'		583.0
6	1		C-1	19/55	28			Gy, slightly weathered, slightly - moderately fractured, m-f grained, hard, DOLOMITE, fractures 30 degrees from horizontal		
7	2									
8	.5									
9	.5									
10	2									578.0
11	.5		C-2	45/60	48			Same		
12	2									
13	2									
14	2									
15	2									573.0
16	2		C-3	56/60	70			Gy, slightly weathered, slightly - moderately fractured, m-f grained, hard, DOLOMITE, fractures 10 - 90 degrees from horizontal		
17	2									
18	2									
19	3									
20	3									568.0
21	3		C-4	58/60	63			Gy-blk, slightly weathered, slightly - moderately fractured, f grained, hard SHALE, fractures 10-45 degrees from horizontal		
22	3									
23	2									
24	2									
25	2									563.0

REMARKS: Boring Coordinates 43.166532, -78.725266

BORING LOG 10528.01.GPJ TECTONIC ENG.GDT 9/25/20

Tectonic

PROJECT No. **10528.01**
PROJECT: **Old Upper Mountain Road**
LOCATION: **Lockport, NY**

BORING No. B-46

SHEET No. 2 of 3

CLIENT: **EA Engineering , Science, and Technology Inc.**
CONTRACTOR: **Nothnagle Drilling, Inc**

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	SAMPLES: RECOV. LENGTH (IN.)	SAMPLES: RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
26	2									
27	2									
28	2		C-5	59/60	91			Same		
29	2									
30	3									558.0
31	2									
32	3							Gy, fresh, slightly - moderately fractured, f grained, moderately soft, SHALE, fractures 10 - 30 degrees from horizontal		
33	2		C-6	55/60	79					
34	3									
35	3									553.0
36	2									
37	3									
38	3		C-7	60/60	87			Same		
39	3									
40	2									548.0
41	2									
42	3									
43	3		C-8	50/60	83			Same		
44	3									
45	3									543.0
46	3									
47	2									
48	3		C-9	60/60	72			Gy, slightly weathered, slightly - moderately fractured, f grained, moderately hard, SHALE, fractures 10-30 degrees from horizontal		
49	3									
50	3									538.0
51	2									
52	2									
53	3		C-10	60/60	75			Gy, moderately-slightly weathered, moderately fractured, m-f grained, moderately hard, SHALE with fossils, fractures 0-45 degrees from horizontal		
54	2									
55	2									533.0

UNCONFINED COMPRESS. STRENGTH (TONS/FT)
1 2 3 4 5
PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT %
10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.)
10 20 30 40 50

REMARKS: Boring Coordinates 43.166532, -78.725266

Tectonic

PROJECT No. **10528.01**

PROJECT: **Old Upper Mountain Road**

LOCATION: **Lockport, NY**

BORING No. B-46

SHEET No. 3 of 3

CLIENT: **EA Engineering , Science, and Technology Inc.**

CONTRACTOR: **Nothnagle Drilling, Inc**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5

PLASTIC LIMIT % × — WATER CONTENT % ⊗ — LIQUID LIMIT % △ 10 20 30 40 50

STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	SAMPLES: RECOV. LENGTH (IN.)	SAMPLES: RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
56	2									
57	2							Gy, slightly weathered, slightly-moderately fractured, m-f grained, moderately hard, SHALE with fossils, fractures 10-30 degrees from horizontal		
58	2		C-11	59/60	72					
59	2									
60	3									528.0
61	2									
62	3							Gy, fresh, slightly-moderately fractured, m-f grained, moderately soft, SHALE with fossils, fractures 10-45 degrees from horizontal		
63	3		C-12	60/60	100					
64	2									
65	3									523.0
66	3									
67	2							Gy, fresh, moderately-massive fracturing, f grained, moderately hard, SHALE, fractures 10-80 degrees from horizontal		
68	3		C-13	54/60	86					
69	3									
70	3									518.0
71	3									
72	2		C-14	48/48	87.5			Gy, fresh, slightly to moderately fractured, m-f grained, moderately hard SHALE with fossil, fractures 10-30 degrees from horizontal		
73	3									
74	3							End of boring due to blockage in core barrel		
75								End of Boring at 74'		513.0
76										
77										
78										
79										
80										508.0
81										
82										
83										
84										
85										503.0

REMARKS: Boring Coordinates 43.166532, -78.725266

Tectonic

PROJECT No. **10528.01**
PROJECT: **Old Upper Mountain Road**
LOCATION: **Lockport, NY**

BORING No. B-47

SHEET No. 1 of 3

CLIENT: **EA Engineering , Science, and Technology Inc.**
CONTRACTOR: **Nothnagle Drilling, Inc**

METHOD OF ADVANCING BORING	DIA.	DEPTH
POWER AUGER:	**4 1/4"**	**0** TO **4'**
ROT. DRILL:	**3 7/8"**	**0** TO **20'**
CASING:	**4"**	**0** TO **10'**
DIAMOND CORE:	**2"**	**4** TO **75'**

CME 55LC Track Mounted Drill Rig with Automatic Hammer

GROUND WATER	DATE	TIME	DEPTH

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: --- TO ---
WEATHER: **Overcast** TEMP: **35° F**
DEPTH TO ROCK: **4'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Liam McGrath**
DRILLER: **Bryan Swartz**
SURFACE ELEVATION: **588.0**
DATUM: **See Remarks**
DATE START: **11/2/20**
DATE FINISH: **11/4/20**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT % 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV.: LENGTH (IN.)	RECOV.: RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	70+	4 20 50/1	S-1	6		M	GM	6" Topsoil Bwn-tn c-f GRAVEL, and c-f Sand, little Silt, trace Organics		70
3	14	8 8 6 14	S-2	12		M	CL-ML	Bwn-tn-rd SILT & CLAY, little c-f Sand, little c-f Gravel		
5	2 3 .5 2 2		C-1	48/60	40			Tn, slightly weathered, moderately fractured, c-f grained, moderately hard, LIMESTONE, fractures 30 - 50 degrees from horizontal		583.0
10	2 3 3 2 2		C-2	59/60	66			Gy, fresh, moderately fractured, m-f grained, hard, DOLOSTONE / LIMESTONE, transition fractures 0 - 90 degrees from horizontal		578.0
15	2 2 3 3 2		C-3	58/60	90			Gy, slightly weathered, slightly-moderately fractured, m-f grained, hard, DOLOSTONE, fractures 0 - 30 degrees from horizontal		573.0
20										568.0
21	2 2 2 3 5		C-4	56/60	42.5			Gy, slightly to highly weathered, moderately fractured, m-f grained, moderately hard, DOLOSTONE, fractures 0 - 20 degrees from horizontal		563.0

REMARKS: Boring Coordinates 43.166617, -78.725072

BORING LOG 10528.01.GPJ TECTONIC ENG.GDT 12/11/20

Tectonic

PROJECT No. **10528.01**

PROJECT: **Old Upper Mountain Road**

LOCATION: **Lockport, NY**

BORING No. B-47

CLIENT: **EA Engineering , Science, and Technology Inc.**

CONTRACTOR: **Nothnagle Drilling, Inc**

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	SAMPLES: RECOV. LENGTH (IN.)	SAMPLES: RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
26	2									
27	2									
28	2		C-5	53/60	64			Gy, slightly weathered, moderately fractured, m-f grained, soft DOLOSTONE, fractures 0 - 30 degrees from horizontal		
29	2									
30	2									558.0
31	2									
32	2									
33	2		C-6	60/60	75			Gy, slightly weathered, slightly-moderately fractured, m-f grained, moderately hard, DOLOSTONE, fractures 0 - 50 degrees from horizontal		
34	2									
35	2									553.0
36	2									
37	2									
38	2		C-7	60/60	91			Gy, fresh, moderately fractured, m-f grained, moderately hard, DOLOSTONE, fractures 0 - 20 degrees from horizontal		
39	2									
40	2									548.0
41	2									
42	2									
43	3		C-8	58/60	80			Same		
44	3									
45	2									543.0
46	3									
47	3									
48	2		C-9	60/60	77			Gy, fresh, slightly to moderately fractured, m-f grained, moderately hard DOLOSTONE, fractures 0 - 90 degrees from horizontal		
49	2									
50	2									538.0
51	2									
52	3									
53	3		C-10	60/60	57			Gy, slightly weathered, moderately to highly fractured, c-f grained, moderately hard DOLOSTONE with fossils fractures 0 - 80 degrees from horizontal		
54	2									
55	2									533.0

UNCONFINED COMPRESS. STRENGTH (TONS/FT)
1 2 3 4 5

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT %
10 20 30 40 50

STANDARD PENETRATION (BLOWS/FT.)
10 20 30 40 50

REMARKS: Boring Coordinates 43.166617, -78.725072

Tectonic

PROJECT No. **10528.01**

PROJECT: **Old Upper Mountain Road**

LOCATION: **Lockport, NY**

BORING No. B-47

SHEET No. 3 of 3

CLIENT: **EA Engineering , Science, and Technology Inc.**

CONTRACTOR: **Nothnagle Drilling, Inc**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5

PLASTIC LIMIT % × — WATER CONTENT % ⊗ — LIQUID LIMIT % △ 10 20 30 40 50

STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	SAMPLES: RECOV. LENGTH (IN.)	SAMPLES: RECOV. RQD (%)	SAMPLES: MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
56	2									
57	2							Gy, slightly weathered, moderately to highly fractured, c-f grained, moderately hard-soft DOLOSTONE with fossils, fractures 0 - 60 degrees from horizontal		
58	2		C-11	60/60	43					
59	2									
60	2									528.0
61	2									
62	2							Gy, fresh, slightly fractured, m-f grained, moderately hard DOLOSTONE, fractures 10 - 90 degrees from horizontal		
63	2		C-12	60/60	100					
64	2									
65	2									523.0
66	2									
67	3							Gy, fresh, slightly - moderately fractured, m-f grained, moderately hard DOLOSTONE, fractures 0 - 60 degrees from horizontal		
68	2		C-13	56/60	75					
69	2									
70	2									518.0
71	2									
72	3									
73	3		C-14	60/60	97			Same with fossils		
74	2									
75	2									513.0
76								End of Boring at 75'		
77										
78										
79										
80										508.0
81										
82										
83										
84										
85										503.0

REMARKS: Boring Coordinates 43.166617, -78.725072

Tectonic

PROJECT No. **10528.01**
PROJECT: **Old Upper Mountain Road**
LOCATION: **Lockport, NY**

BORING No. B-48

SHEET No. 1 of 2

CLIENT: **EA Engineering , Science, and Technology Inc.**
CONTRACTOR: **Nothnagle Drilling, Inc**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **4 1/4"** | **0** TO **40'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
CME 55LC Track Mounted Drill Rig with Automatic Hammer

GROUND WATER | DATE | TIME | DEPTH

MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: --- TO ---
WEATHER: **Overcast** TEMP: **45° F**
DEPTH TO ROCK: **Not Encountered'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Liam McGrath**
DRILLER: **Bryan Swartz**
SURFACE ELEVATION: **545.6**
DATUM: **See Remarks**
DATE START: **10/27/20**
DATE FINISH: **10/28/20**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1–2								Drilled to 2' (boulders at surface)		
3–4	48	12, 33, 15, 16	S-1	12		M	SM	Lgt gy-bwn c-f SAND, some Clayey Silt, some c-f Gravel		
5–6	42	16, 20, 22, 24	S-2	12		D	CL	Lgt gy CLAY & SILT, trace c-f Sand		540.6
7–8	33	7, 15, 18, 24	S-3	14		D	CL	Lgt gy CLAY & SILT, little c-f Gravel, trace c-f Sand		
9–10	29	16, 15, 14, 14	S-4	12		D	CL	Lgt gy CLAY & SILT, trace c-f Sand, trace Organics (root fragments)		535.6
11–12	30	11, 14, 16, 18	S-5	14		D	CL	Lgt bwn-gy CLAY & SILT, some c-f Sand, little c-f Gravel		
13–14										
15–16	38	15, 16, 22, 32	S-6	14		D	CL	Same		530.6
17–18										
19–20										525.6
21–22	49	18, 22, 27, 35	S-7	16		D	CL	Lgt bwn CLAY & SILT, some c-f Gravel, trace c-f Sand		
23–24										
25										520.6

REMARKS: Boring Coordinates 43.166582, -78.724791

BORING LOG 10528.01.GPJ TECTONIC ENG.GDT 12/11/20

Tectonic

PROJECT No. **10528.01**

PROJECT: **Old Upper Mountain Road**

LOCATION: **Lockport, NY**

BORING No. B-48

SHEET No. 2 of 2

CLIENT: **EA Engineering , Science, and Technology Inc.**

CONTRACTOR: **Nothnagle Drilling, Inc**

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	SAMPLES: RECOV. LENGTH (IN.)	SAMPLES: RECOV. RQD (%)	SAMPLES: MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	ELEVATION (FT.)
26	23	15 12 11 16	S-8	14		D	CL	Lgt bwn CLAY & SILT, trace c-f Sand	
30	50+	10 50/3	S-9	4		M	GM	Gy-bwn c-f GRAVEL, some Clay & Silt, some c-f Sand (limestone & shale fragments)	515.6
35	50+	50/2	S-10	0				No Recovery	510.6
40	50+	50/4	S-11	4		M	SC	Bwn-gy CLAY & SILT, and c-f Gravel, little c-f Sand	505.6
								End of Boring at 40.33'	
45									500.6
50									495.6
55									490.6

LITHOLOGY*

UNCONFINED COMPRESS. STRENGTH (TONS/FT)
1 2 3 4 5

PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT %
10 20 30 40 50

STANDARD PENETRATION (BLOWS/FT.)
10 20 30 40 50

REMARKS: Boring Coordinates 43.166582, -78.724791

BORING LOG 10528.01.GPJ TECTONIC ENG.GDT 12/11/20

Tectonic

PROJECT No. **10528.01**
PROJECT: **Old Upper Mountain Road**
LOCATION: **Lockport, NY**

BORING No. B-49

SHEET No. 1 of 2

CLIENT: **EA Engineering , Science, and Technology Inc.**
CONTRACTOR: **Nothnagle Drilling, Inc**
METHOD OF ADVANCING BORING | DIA. | DEPTH
POWER AUGER: | **4 1/4"** | **0** TO **27'**
ROT. DRILL: | | TO
CASING: | | TO
DIAMOND CORE: | | TO
CME 55LC Track Mounted Drill Rig with Automatic Hammer

GROUND WATER | DATE | TIME | DEPTH
MON. WELL ☐ YES ☒ NO
SCREEN DEPTH: --- TO ---
WEATHER: **Overcast** TEMP: **75° F**
DEPTH TO ROCK: **27'**
*CHANGES IN STRATA ARE INFERRED

INSPECTOR: **Liam McGrath**
DRILLER: **Bryan Swartz**
SURFACE ELEVATION: **526.0**
DATUM: **See Remarks**
DATE START: **8/7/20**
DATE FINISH: **8/7/20**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5
PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % 10 20 30 40 50
STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	RECOV. LENGTH (IN.)	RECOV. RQD (%)	MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
1	11	5 5 6 7	S-1	14		M	CL	3" Topsoil like material Bwn-tn SILTY CLAY, some c-f SAND, trace f Gravel, trace organics (roots)		
3	24	6 8 16 12	S-2	12		M	CL	Tn-wh SILTY CLAY, little c-f Sand, trace organics (roots fragments)		
5	17	4 7 10 14	S-3	16		M	CL	Tn-wh SILTY CLAY, trace c-f Sand, trace organics (root fragments)		521.0
7	29	11 14 15 17	S-4	18		M	CL	Tn-bwn SILTY CLAY, some c-f Sand, trace organics		
9	22	4 8 14 17	S-5	16		M	CL	Tn-bwn SILTY CLAY, trace f Gravel, trace c-f Sand, trace organics (root fragments)		516.0
11	55	19 25 30 32	S-6	20		M	CL	Tn-bwn SILTY CLAY, trace c-f Sand, trace f Gravel		
15										511.0
16	42	4 16 26 38	S-7	20		M	CL	Lgt bwn SILTY CLAY, some c-f Sand, trace f Gravel		
20										506.0
21	50+	36 50/5	S-8	6		D	GP-GM	Gy c-f GRAVEL, and c-f Sand, trace Silt		
25								Gy c-f SAND, some Silt, some c-f Gravel		501.0

REMARKS: Boring Coordinates: 43.166858, -78.724641

BORING LOG 10528.01.GPJ TECTONIC ENG.GDT 9/25/20

Tectonic

PROJECT No. **10528.01**

PROJECT: **Old Upper Mountain Road**

LOCATION: **Lockport, NY**

BORING No. B-49

SHEET No. 2 of 2

CLIENT: **EA Engineering , Science, and Technology Inc.**

CONTRACTOR: **Nothnagle Drilling, Inc**

UNCONFINED COMPRESS. STRENGTH (TONS/FT) ● 1 2 3 4 5

PLASTIC LIMIT % × — WATER CONTENT % ⊗ — LIQUID LIMIT % △ 10 20 30 40 50

STANDARD PENETRATION (BLOWS/FT.) ● 10 20 30 40 50

DEPTH (FT.)	N OR MIN./FT.	PENETRATION RESISTANCE (BL/6 IN.)	SAMPLES: SAMPLE NUMBER	SAMPLES: RECOV. LENGTH (IN.)	SAMPLES: RECOV. RQD (%)	SAMPLES: MOISTURE	UNIFIED SOIL CLASS.	DESCRIPTION OF MATERIAL	LITHOLOGY*	ELEVATION (FT.)
26	50+	102 50/1	S-9	6		M	SM	(weathered rock) Spoon refusal at 25.5' Auger refusal @ 27'		
27								End of Boring at 27'		
30										496.0
35										491.0
40										486.0
45										481.0
50										476.0
55										471.0

REMARKS: Boring Coordinates: 43.166858, -78.724641

BORING LOG 10528.01.GPJ TECTONIC ENG.GDT 9/25/20

Tectonic
PRACTICAL SOLUTIONS. EXCEPTIONAL SERVICE.

LEGEND FOR SOIL DESCRIPTION

COARSE GRAINED SOIL (Coarser then No. 200 Sieve)

DESCRIPTIVE TERM & GRAIN SIZE

TERM	SAND					GRAVEL
coarse - c	No.	4	Sieve to No.	10	Sieve	3" to 3/4"
medium - m	No.	10	Sieve to No.	40	Sieve	3/4" to 3/16"
fine - f	No,	40	Sieve to No.	200	Sieve	

COBBLES 3" to 10"

BOULDERS 10" +

GRADATION DESIGNATIONS	PROPORTIONS OF COMPONENT
fine, f	Less than 10% coarse to medium
medium to fine, m-f	Less than 10% coarse
medium, m	Less than 10% coarse and fine
coarse to medium, c-m	Less than 10% fine
coarse, c	Less than 10% medium and fine
coarse to fine, c-f	All greater than 10%

FINE GRAINED SOIL (Finer than No. 200 Sieve)

DESCRIPTION	PLASTICITY INDEX	PLASTICITY
Silt	0 - 1	none
Clayey Silt	2 - 5	slight
Silt & Clay	6 - 10	low
Clay & Silt	11 - 20	medium
Silty Clay	21 - 40	high
Clay	greater than 40	very high

PROPORTION

DESCRIPTIVE TERM	PERCENT OF SAMPLE WEIGHT
trace	1 - 10
little	10 - 20
some	20 - 35
and	35 - 50

The primary component is fully capitalized

COLOR

Blue - blue	Gy - gray	Wh - white
Blk - black	Or - orange	Yl - yellow
Bwn - brown	Rd - red	Lgt - light
Gn - green	Tn - tan	Dk - dark

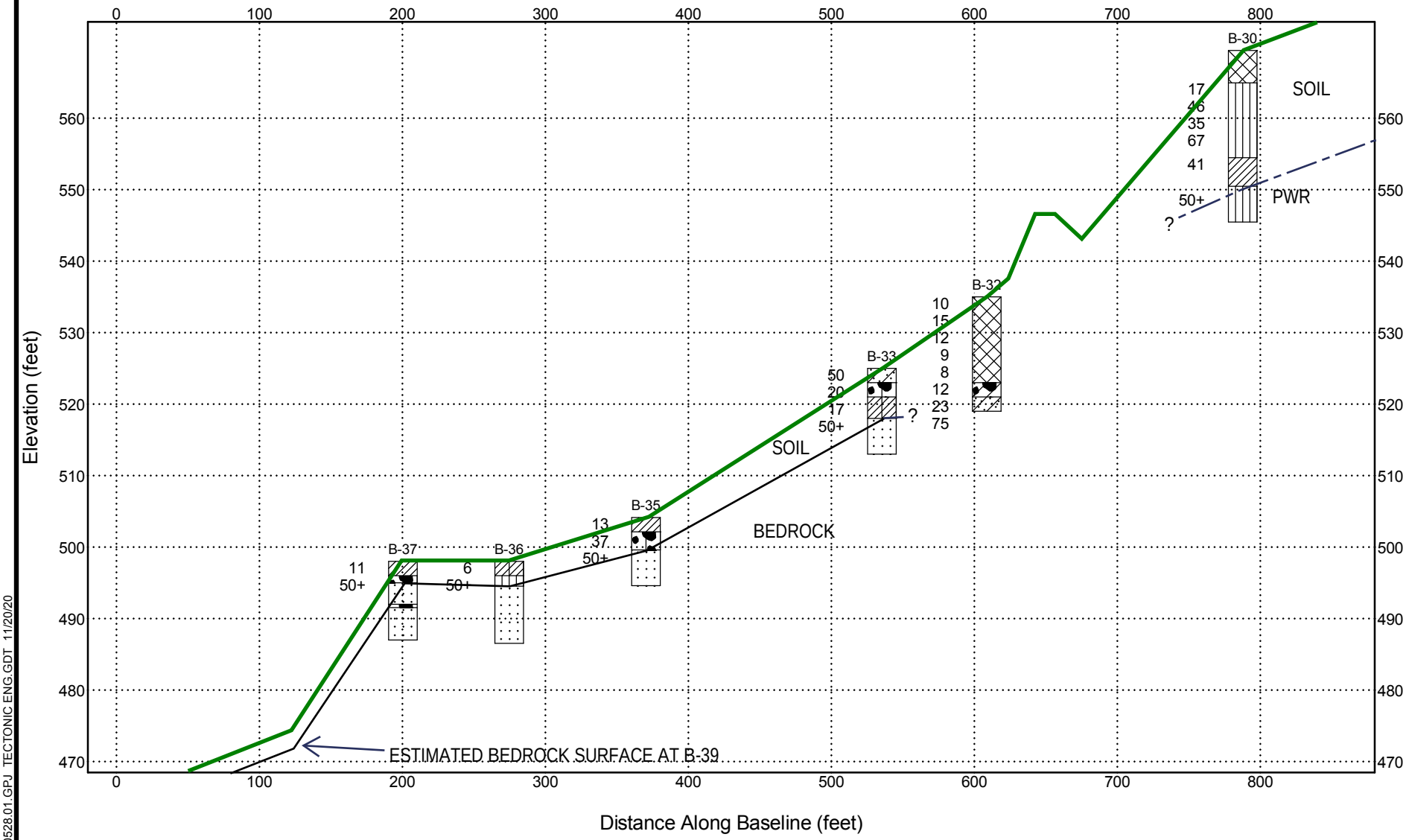
SAMPLE NOTATION

S - Split Spoon Soil Sample
U - Undisturbed Tube Sample
C - Core Sample
B - Bulk Soil Sample
NR - No Recovery of Sample

WOC - Weight of Casing
WOR - Weight of Rods
WOH - Weight of Hammer
PPR - Compressive Strength based on Pocket Penetrometer
TV - Shear Strength (tsf) based on Torvane

ADDITIONAL CLASSIFICATIONS

New York City Building Code soil classifications are given in parentheses at the end of each description of material, if applicable. See sections 1804.2 of the 2008 Building Code for further details.



STRATIGRAPHY & GW 10528.01.GPJ TECTONIC ENG.GDT 11/20/20

Tectonic

280 Little Britian Road
Newburgh, NY 12550
Telephone: (845) 563-9081 Fax: (845) 563-9085

NOTES:

"SOIL" INDICATES ALL TYPES OF SOIL, INCLUDING FILL

.

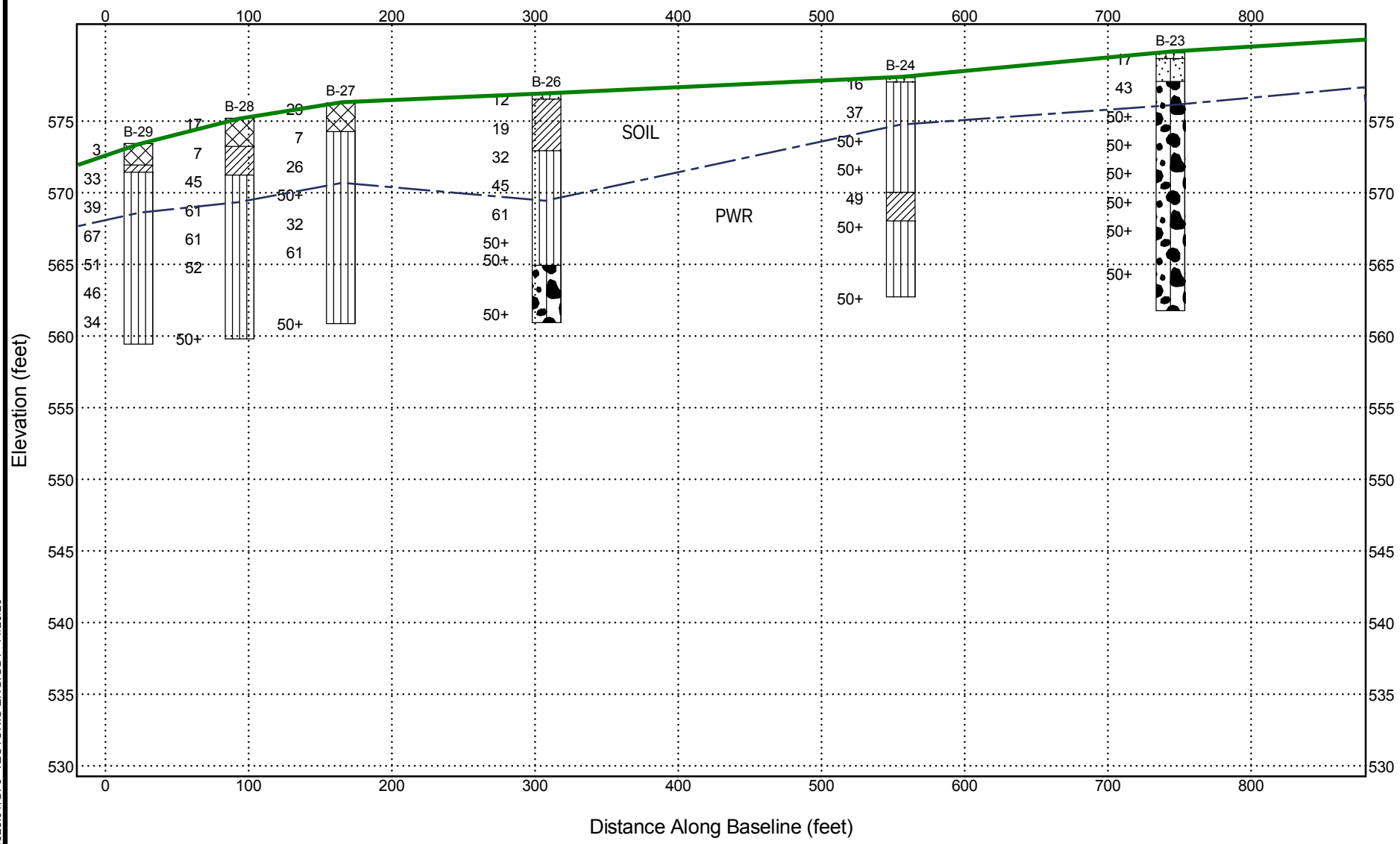
"PWR" INDICATES PARTIALLY WEATHERED ROCK

PROFILE 1 - STA 0+00 TO 8+30 (APPROX.)

Project No: **10528.01** Date: **11/20/20**

Project: **Old Upper Mountain Road**

Location: **Lockport, NY**



Tectonic

280 Little Britian Road
Newburgh, NY 12550
Telephone: (845) 563-9081 Fax: (845) 563-9085

NOTES:

"SOIL" INDICATES ALL TYPES OF SOIL, INCLUDING FILL

.

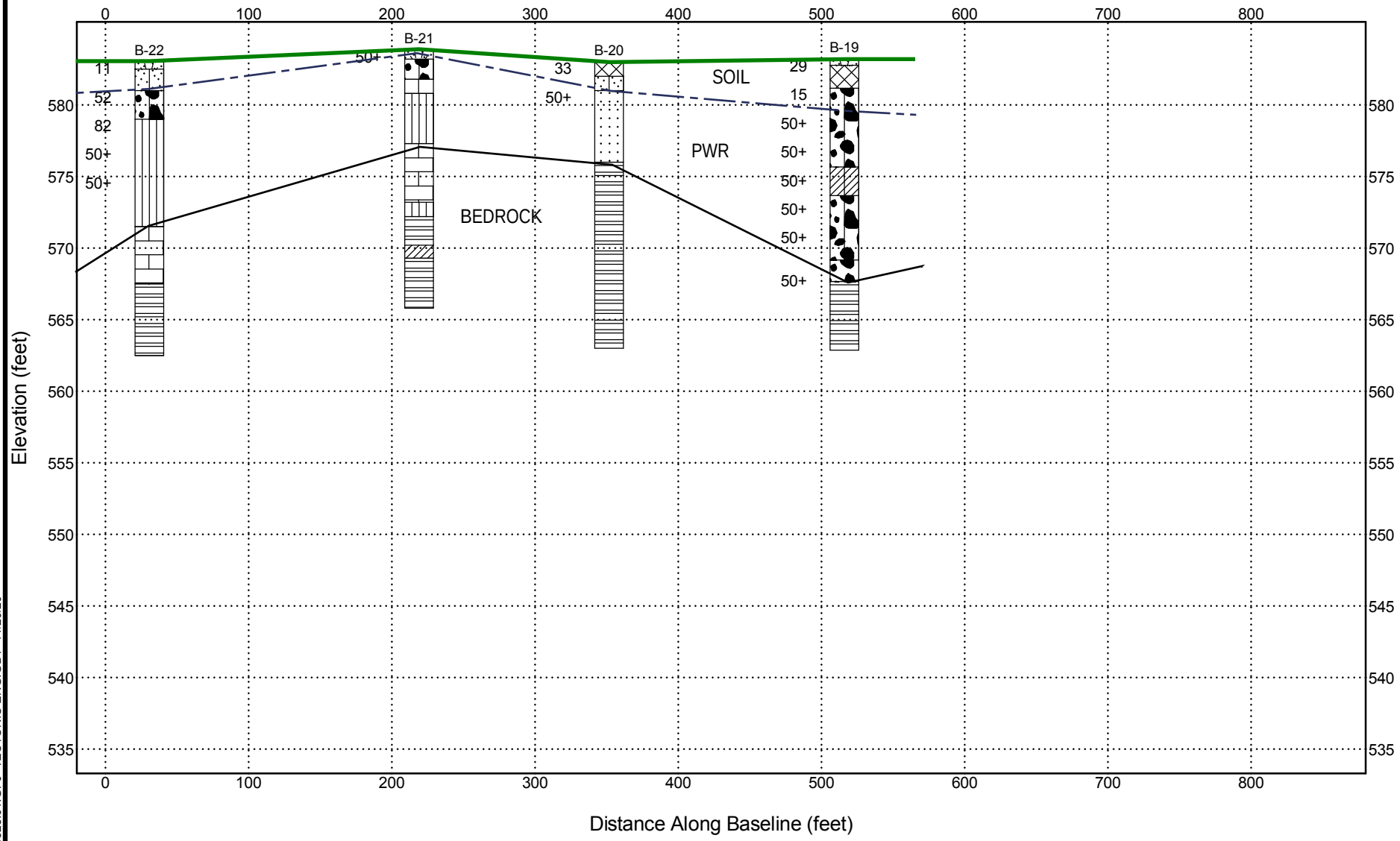
"PWR" INDICATES PARTIALLY WEATHERED ROCK

PROFILE 2 - STA. 8+20 TO 16+70 (APPROX.)

Project No: **10528.01** Date: **11/20/20**

Project: **Old Upper Mountain Road**

Location: **Lockport, NY**



Tectonic

280 Little Britian Road
Newburgh, NY 12550
Telephone: (845) 563-9081 Fax: (845) 563-9085

NOTES:

"SOIL" INDICATES ALL TYPES OF SOIL, INCLUDING FILL

.

"PWR" INDICATES PARTIALLY WEATHERED ROCK

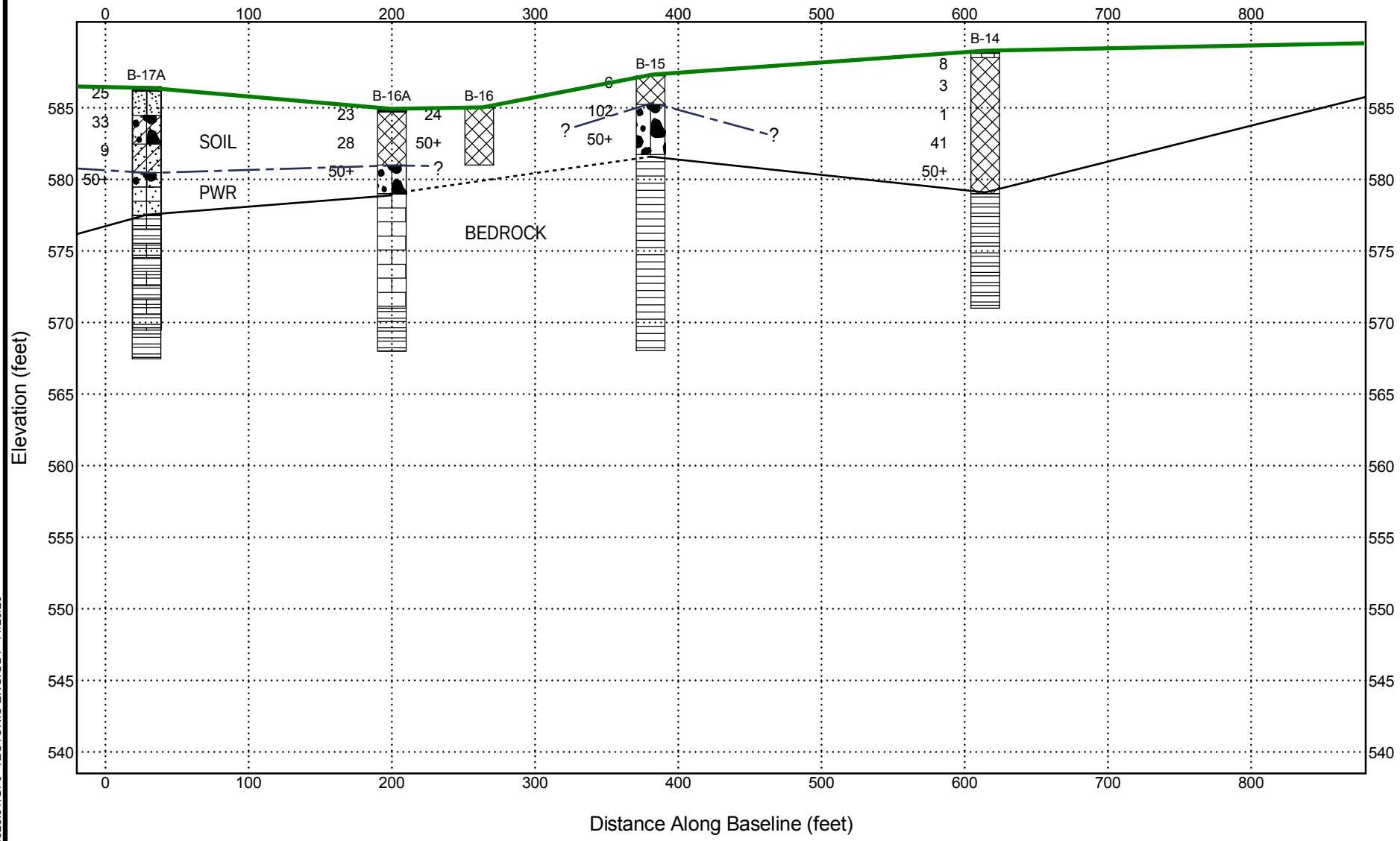
PROFILE 3 - STA. 17+20 TO 22+50 (APPROX.)

Project No: **10528.01** Date: **11/20/20**

Project: **Old Upper Mountain Road**

Location: **Lockport, NY**

STRATIGRAPHY & GW 10528.01.GPJ TECTONIC.ENG.GDT 11/20/20



Tectonic

280 Little Britian Road
Newburgh, NY 12550
Telephone: (845) 563-9081 Fax: (845) 563-9085

NOTES:

"SOIL" INDICATES ALL TYPES OF SOIL, INCLUDING FILL

.

"PWR" INDICATES PARTIALLY WEATHERED ROCK

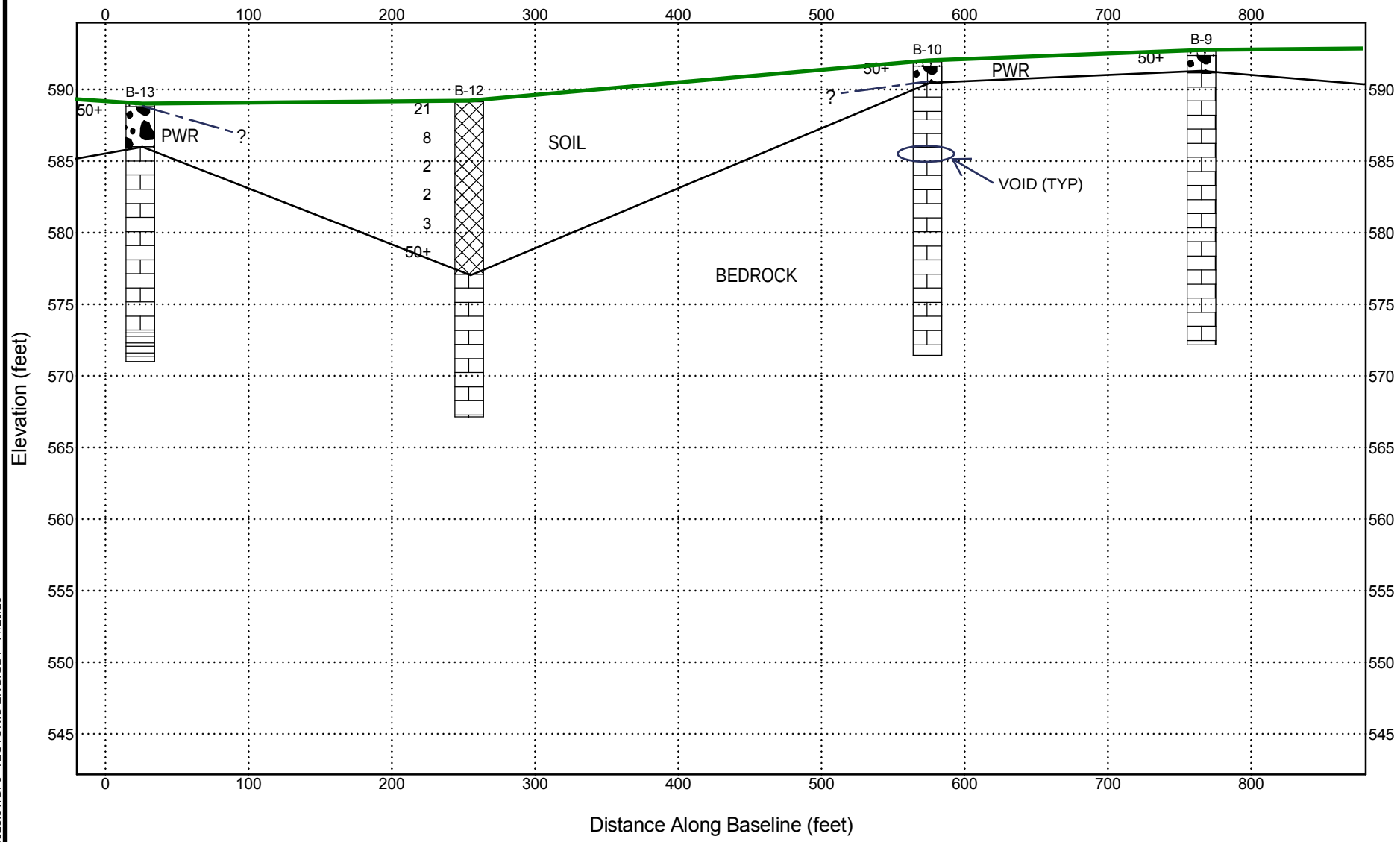
PROFILE 4 - STA. 25+30 TO 33+20 (APPROX.)

Project No: **10528.01** Date: **11/20/20**

Project: **Old Upper Mountain Road**

Location: **Lockport, NY**

STRATIGRAPHY & GW 10528.01.GPJ TECTONIC.ENG.GDT 11/20/20



Tectonic

280 Little Britian Road
Newburgh, NY 12550
Telephone: (845) 563-9081 Fax: (845) 563-9085

NOTES:

"SOIL" INDICATES ALL TYPES OF SOIL, INCLUDING FILL

.

"PWR" INDICATES PARTIALLY WEATHERED ROCK

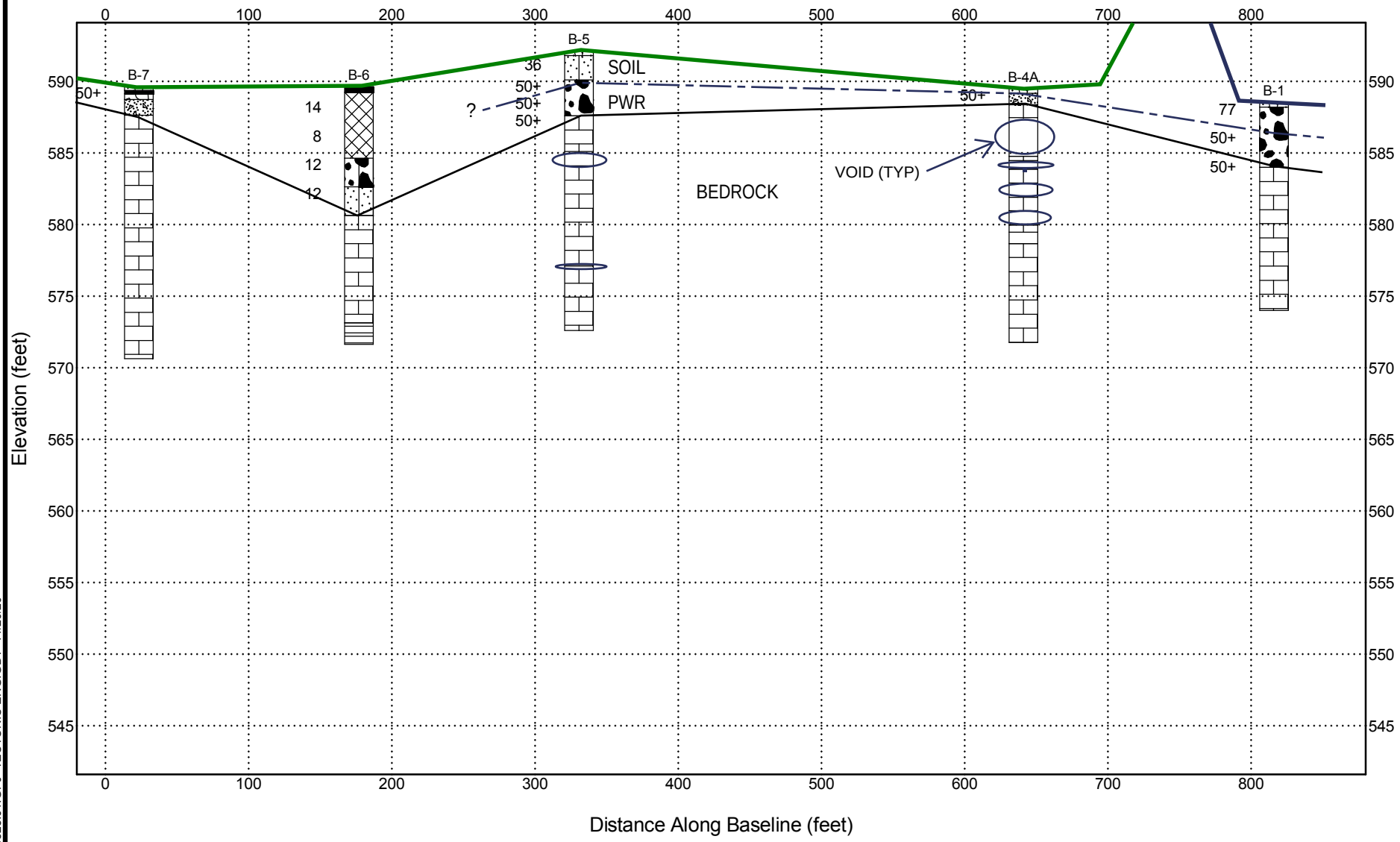
PROFILE 5 - STA 33+20 TO 41+00 (APPROX.)

Project No: **10528.01** Date: **11/20/20**

Project: **Old Upper Mountain Road**

Location: **Lockport, NY**

STRATIGRAPHY & GW 10528.01.GPJ TECTONIC.ENG.GDT 11/20/20



Tectonic

280 Little Britian Road
Newburgh, NY 12550
Telephone: (845) 563-9081 Fax: (845) 563-9085

NOTES:

"SOIL" INDICATES ALL TYPES OF SOIL, INCLUDING FILL

.

"PWR" INDICATES PARTIALLY WEATHERED ROCK

PROFILE 6 - STA. 42+10 TO 50+50 (APPROX.)

Project No: **10528.01** Date: **11/20/20**

Project: **Old Upper Mountain Road**

Location: **Lockport, NY**

STRATIGRAPHY & GW 10528.01.GPJ TECTONIC ENG.GDT 11/20/20

NYSDEC
Division of Environmental Remediation

NYSDEC Contract No. D009806

Site Location: Lockport, New York

NYSDEC PM: Brianna Scharf

EA PM: Matt Smith

Weather Conditions				
General Description		AM	Partly cloudy	PM
Temperature		AM	73 F	PM
Wind		AM	5 mph	PM

Health & Safety
If any box below is checked "Yes", provide explanation under "Health & Safety Comments".

Were there any changes to the Health & Safety Plan?	*Yes	No **X**	NA
Were there any exceedances of the perimeter air monitoring reported on this date?	*Yes	No	NA **X**
Were there any nuisance issues reported/observed on this date?	*Yes	No **X**	NA

Health & Safety Comments

None.

Summary of Work Performed	Arrived at site:	10:45	Departed Site:	16:30

Performed manual boring/sediment probing at Sewer Realignment Boring Locations 38 and 39. Measured and marked new survey areas for Locations 16 and 11 (i.e., established Locations 16A and 11A, respectively).

Equipment/Material Tracking
If any box below is checked "Yes", provide explanation under "Material Tracking Comments".

Were there any vehicles which did not display proper D.O.T numbers and placards?	* Yes	No	NA **X**
Were there any vehicles which were not tarped?	* Yes	No	NA **X**
Were there any vehicles which were not decontaminated prior to exiting the work site?	* Yes	No	NA **X**

Personnel and Equipment

Individual	Company	Trade	Total Hours
Jeremy Fontaine	EA	Geologist	5.75

Equipment Description	Contractor/Vendor	Quantity	Used

Material Description	Imported/ Delivered to Site	Exported off Site	Waste Profile (If Applicable)	Source or Disposal Facility (If Applicable)	Daily Loads	Daily Weight (tons)*

*On-Site scale for off-site shipment, delivery ticket for material received

Equipment/Material Tracking Comments:

None.

Visitors to Site: None.

Name	Representing	Entered Exclusion/CRZ Zone	
		Yes	**No**
		Yes	**No**
		Yes	**No**
		Yes	**No**

Site Representatives:

Name	Representing
Jeremy Fontaine	EA

Project Schedule Comments

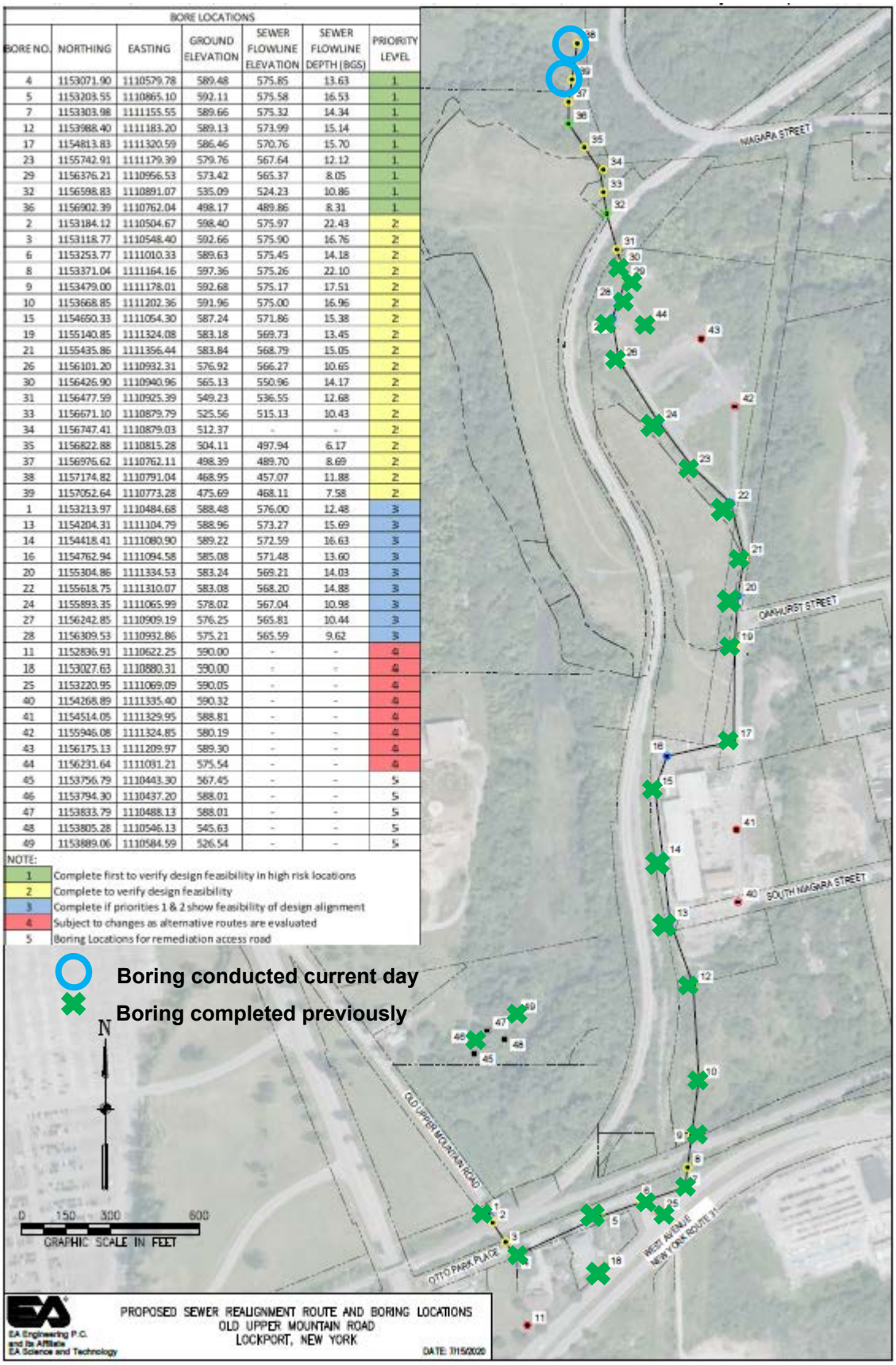
None.

Issues Pending

None.

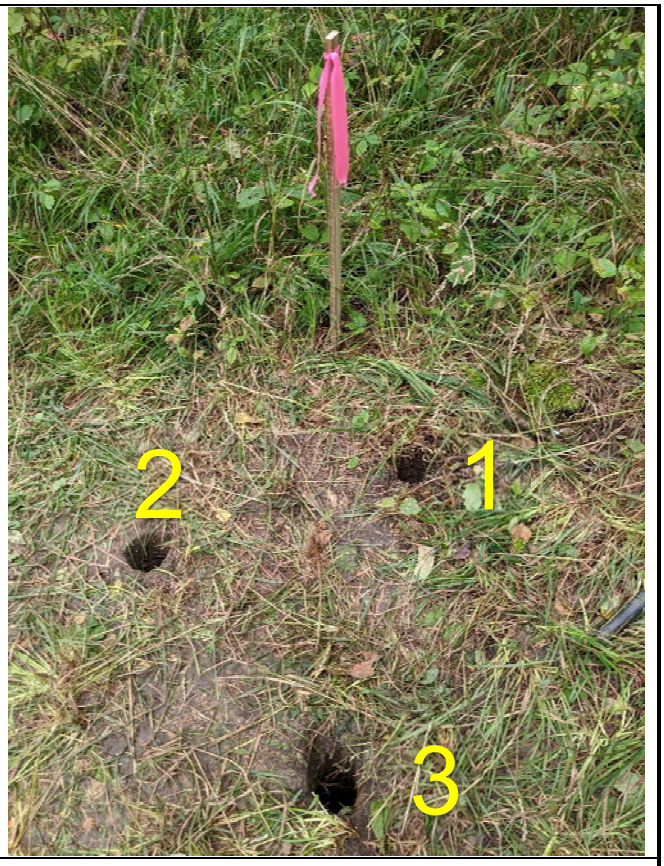
Interaction with Public, Property Owners, Media, etc.

None.


BORE LOCATIONS
BORE NO. | NORTHING | EASTING | GROUND ELEVATION | SEWER FLOWLINE ELEVATION | SEWER FLOWLINE DEPTH (BGS) | PRIORITY LEVEL
4 | 1153071.90 | 1110579.78 | 589.48 | 575.85 | 13.63 | 1
5 | 1153203.55 | 1110865.10 | 592.11 | 575.58 | 16.53 | 1
7 | 1153303.98 | 1111155.55 | 589.66 | 575.32 | 14.34 | 1
12 | 1153988.40 | 1111183.20 | 589.13 | 573.99 | 15.14 | 1
17 | 1154813.83 | 1111320.59 | 586.46 | 570.76 | 15.70 | 1
23 | 1155742.91 | 1111179.39 | 579.76 | 567.64 | 12.12 | 1
29 | 1156376.21 | 1110956.53 | 573.42 | 565.37 | 8.05 | 1
32 | 1156598.83 | 1110891.07 | 535.09 | 524.23 | 10.86 | 1
36 | 1156902.39 | 1110762.04 | 498.17 | 489.86 | 8.31 | 1
2 | 1153184.12 | 1110504.67 | 598.40 | 575.97 | 22.43 | 2
3 | 1153118.77 | 1110548.40 | 592.66 | 575.90 | 16.76 | 2
6 | 1153253.77 | 1111010.33 | 589.63 | 575.45 | 14.18 | 2
8 | 1153371.04 | 1111164.16 | 597.36 | 575.26 | 22.10 | 2
9 | 1153479.00 | 1111178.01 | 592.68 | 575.17 | 17.51 | 2
10 | 1153668.85 | 1111202.36 | 591.96 | 575.00 | 16.96 | 2
15 | 1154650.33 | 1111054.30 | 587.24 | 571.86 | 15.38 | 2
19 | 1155140.85 | 1111324.08 | 583.18 | 569.73 | 13.45 | 2
21 | 1155435.86 | 1111356.44 | 583.84 | 568.79 | 15.05 | 2
26 | 1156101.20 | 1110932.31 | 576.92 | 566.27 | 10.65 | 2
30 | 1156426.90 | 1110940.96 | 565.13 | 550.96 | 14.17 | 2
31 | 1156477.59 | 1110925.39 | 549.23 | 536.55 | 12.68 | 2
33 | 1156671.10 | 1110879.79 | 525.56 | 515.13 | 10.43 | 2
34 | 1156747.41 | 1110879.03 | 512.37 | - | - | 2
35 | 1156822.88 | 1110815.28 | 504.11 | 497.94 | 6.17 | 2
37 | 1156976.62 | 1110762.11 | 498.39 | 489.70 | 8.69 | 2
38 | 1157174.82 | 1110791.04 | 468.95 | 457.07 | 11.88 | 2
39 | 1157052.64 | 1110773.28 | 475.69 | 468.11 | 7.58 | 2
1 | 1153213.97 | 1110484.68 | 588.48 | 576.00 | 12.48 | 3
13 | 1154204.31 | 1111104.79 | 588.96 | 573.27 | 15.69 | 3
14 | 1154418.41 | 1111080.90 | 589.22 | 572.59 | 16.63 | 3
16 | 1154762.94 | 1111094.58 | 585.08 | 571.48 | 13.60 | 3
20 | 1155304.86 | 1111334.53 | 583.24 | 569.21 | 14.03 | 3
22 | 1155618.75 | 1111310.07 | 583.08 | 568.20 | 14.88 | 3
24 | 1155893.35 | 1111065.99 | 578.02 | 567.04 | 10.98 | 3
27 | 1156242.85 | 1110909.19 | 576.25 | 565.81 | 10.44 | 3
28 | 1156309.53 | 1110932.86 | 575.21 | 565.59 | 9.62 | 3
11 | 1152836.91 | 1110622.25 | 590.00 | - | - | 4
18 | 1153027.63 | 1110880.31 | 590.00 | - | - | 4
25 | 1153220.95 | 1111069.09 | 590.05 | - | - | 4
40 | 1154268.89 | 1111335.40 | 590.32 | - | - | 4
41 | 1154514.05 | 1111329.95 | 588.81 | - | - | 4
42 | 1155946.08 | 1111324.85 | 580.19 | - | - | 4
43 | 1156175.13 | 1111209.97 | 589.30 | - | - | 4
44 | 1156231.64 | 1111031.21 | 575.54 | - | - | 4
45 | 1153756.79 | 1110443.30 | 567.45 | - | - | 5
46 | 1153794.30 | 1110437.20 | 588.01 | - | - | 5
47 | 1153833.79 | 1110488.13 | 588.01 | - | - | 5
48 | 1153805.28 | 1110546.13 | 545.63 | - | - | 5
49 | 1153889.06 | 1110584.59 | 526.54 | - | - | 5
NOTE:
1 Complete first to verify design feasibility in high risk locations
2 Complete to verify design feasibility
3 Complete if priorities 1 & 2 show feasibility of design alignment
4 Subject to changes as alternative routes are evaluated
5 Boring Locations for remediation access road
Boring conducted current day
Boring completed previously
N
0 150 300 600
GRAPHIC SCALE IN FEET
NIAGARA STREET
OAKHURST STREET
SOUTH NIAGARA STREET
OLD UPPER MOUNTAIN ROAD
OTTO PARK PLACE
WEST AVENUE
NEW YORK ROUTE 31
EA Engineering P.C. and its Affiliate EA Science and Technology
PROPOSED SEWER REALIGNMENT ROUTE AND BORING LOCATIONS
OLD UPPER MOUNTAIN ROAD
LOCKPORT, NEW YORK
DATE: 7/15/2020

	
Location 38, at the corner of a concrete slab with manhole and fallen tree limbs.	SAA.
	
Beyond the first foot, the light brown clay transitions to a lighter tan clay. At Location 38 (where greater depths were reached with the handheld auger) the clay transitions again at a depth of about 20” to a dull gray and appears to be mottled with yellowish and reddish brown redoximorphic features. More reddish brown clay (such as that depicted in the previous photo) underlies the mottled gray clay.	Close-up of 10 ft rebar following deep sediment probing (3–7 ft.) at Location 38. Note the occurrence of wet, light gray clay. This clay was not found at 39 (where refusal was encountered at or before 3 ft).

Manual borings at Location 38. Boring was started closest to the staked location, at **1**. Managed to auger down about a foot and then hit resistance. Moved to **2**, and encountered auger refusal at 32". Dropped rebar into the hole and heard a definitive *clink*; could not drive rebar further into the ground. Moved to **3**, and encountered the same thing: auger refusal at 32", dropped rebar into the hole and heard a *clink*; could not drive rebar further into the ground. Decided to start one last hole, diagonal to the concrete slab. At **4**, encountered auger refusal at 36", and was able to drive rebar an additional 4 ft into the ground. The refusal encountered at 7 ft was not definitive (no hard stop or telltale sound—the rebar just slowed to a stop). Tried driving the rebar further with a sledgehammer and it would not move. Final recorded refusal depth: 7 ft. (Bedrock probing measurement T2-B is visible from this location, where a 10 ft section of rebar was driven more than 9 ft into the ground.)



Manual borings at Location 39. Boring was started closest to the staked location, at **1**. Managed to auger down to refusal at 18"; was able to drive rebar about 2 more inches into the ground (20" bgs). Moved to **2**, and encountered auger refusal again at 18"; was able to drive rebar an additional 8" (26" bgs). Moved to **3**, and encountered auger refusal at the same depth: about 18.5". Initially was able to drive rebar only a few more inches into the ground (22" bgs); tried again and managed to drive the rebar to 28" bgs. After a short break, tried augering further at **3**, and managed to get to 20". Probed around in the borehole with the rebar and was able to penetrate down to a maximum depth of 40" bgs before absolute refusal.

Comments

Summary of data collected during the manual boring:

Location	Hole	Auger refusal	Rebar refusal
38	1	~1'	—
	2	2.67'	2.67'
	3	2.67'	2.67'
	4	3'	7'
39	1	1.5'	1.67'
	2	1.5'	2.17'
	3	1.67'	3.33'

Site Inspector(s): Jeremy Fontaine

Date: 8/26/2020

APPENDIX II

SJB SERVICES, INC.

Contract
Drilling
and
Testing

BUFFALO OFFICE
CORPORATE OFFICE
5167 South Park Avenue
Hamburg, NY 14075
p: 716.649.8110
f: 716.649.8051

ROCHESTER OFFICE
535 Summit Point Drive
Henrietta, NY 14667
p: 585.359.2730
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Cortland, NY 13045
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www.sjbempire.net
info@sjbempire.net

PROJECT:	**LABORATORY TESTING** **OLD UPPER MOUNTAIN ROAD SITE**
CLIENT:	**EA SCIENCE & TECHNOLOGY**
PROJECT NO.	**BT-20-123**
REPORT NO.:	**LTR-1**
DATE:	**AUGUST 14, 2020**

This report presents the results of laboratory testing performed on various soils & rock samples collected from the above referenced project site. All results contained in this report represent the samples listed in work order #10528.01 as received from the Client.

The testing conducted was as follows:

ASTM D-4318
Liquid Limit, Plastic Limit, and Plasticity Index of Soil

ASTM D-6913
Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

ASTM D-5731
Determination of the Uniaxial Compressive Strength of Rock
Using the Point Load Test

Samples were received at the SJB Services, Inc. laboratory from the Client on July 31, 2020 where they were processed for testing.

The results of the report relate only to the items inspected or tested. The report shall not be reproduced, except in full, without the written approval of SJB Services, Inc. If you have any questions regarding the report, please do not hesitate to contact our office.

Sincerely,
SJB SERVICES, INC.

Paul Gregorczyk
Laboratory Manager

Buffalo Office
5167 South Park Avenue
Hamburg, NY 14075
Phone: (716) 649-8110
Fax: (716) 649-8051

Laboratory Test Report

PROJECT: **Laboratory Testing**
Old Upper Mountain Road Site

CLIENT: **EA Science & Technology**

DATE: **August 14, 2020**

PROJECT NO.: BT-20-123
REPORT NO.: LTR-1

ASTM D-4318: Liquid Limit, Plastic Limit, and Plasticity Index of Soil

SJB Sample Number	Sample Location	Liquid Limit	Plastic Limit	Plasticity Index
20-922	B-19, S-5: 8' – 8.8'	26	21	5
20-923	B-26, S-2: 2' – 4'	46	23	23
20-924	B-28, S-2: 2' – 4'	44	23	21
20-925	B-30, S-5: 15' – 17'	38	23	15

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Laboratory Test Report

PROJECT: Laboratory Testing
Old Upper Mountain Road Site

CLIENT: EA Science & Technology

DATE: August 14, 2020

PROJECT NO.: BT-20-123
REPORT NO.: LTR-1

SJB Sample Number: 20-926
Sample Location: B-6, S-4: 7' – 9'

ASTM D-6913: Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

Sieve Size	*Percent Passing*
1 ½"	100.0
1"	93.1
¾"	87.8
½"	77.8
3/8"	69.9
¼"	61.0
#4	55.9
#8	45.5
#16	37.4
#30	31.4
#50	23.9
#100	15.8
#200	11.4

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Laboratory Test Report

PROJECT: Laboratory Testing
Old Upper Mountain Road Site

CLIENT: EA Science & Technology

DATE: August 14, 2020

PROJECT NO.: BT-20-123
REPORT NO.: LTR-1

SJB Sample Number: 20-927
Sample Location: B-12, S-3: 4' – 6'

ASTM D-6913: Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

Sieve Size	*Percent Passing*
¾"	100.0
½"	97.5
⅜"	88.8
¼"	84.1
#4	79.6
#8	73.1
#16	67.4
#30	61.8
#50	53.0
#100	39.6
#200	24.3

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Laboratory Test Report

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Old Upper Mountain Road Site

CLIENT: **EA Science & Technology**

DATE: **August 14, 2020**

PROJECT NO.: BT-20-123
REPORT NO.: LTR-1

SJB Sample Number: 20-928
Sample Location: B-15, S-2: 2' – 4'

ASTM D-6913: Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

Sieve Size	*Percent Passing*
1 ½"	100.0
1"	92.4
¾"	80.3
½"	70.5
⅜"	62.5
¼"	57.4
#4	54.3
#8	46.9
#16	40.0
#30	32.6
#50	26.8
#100	21.8
#200	15.7

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Laboratory Test Report

PROJECT: Laboratory Testing
Old Upper Mountain Road Site

CLIENT: EA Science & Technology

DATE: August 14, 2020

PROJECT NO.: BT-20-123
REPORT NO.: LTR-1

SJB Sample Number: 20-929
Sample Location: B-17, S-2: 2' – 4'

ASTM D-6913: Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

Sieve Size	*Percent Passing*
1"	100.0
¾"	85.1
½"	75.3
3/8"	70.0
¼"	61.2
#4	54.6
#8	43.0
#16	34.7
#30	29.4
#50	25.6
#100	22.0
#200	17.8

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Laboratory Test Report

PROJECT: **Laboratory Testing**
Old Upper Mountain Road Site

CLIENT: **EA Science & Technology**

DATE: **August 14, 2020**

PROJECT NO.: BT-20-123
REPORT NO.: LTR-1

SJB Sample Number: 20-930
Sample Location: B-19, S-2: 2' – 4'

ASTM D-6913: Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

Sieve Size	*Percent Passing*
1 ½"	100.0
1"	94.4
¾"	87.0
½"	75.1
⅜"	69.9
¼"	64.2
#4	61.8
#8	57.0
#16	53.2
#30	49.5
#50	45.5
#100	39.7
#200	32.1

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Laboratory Test Report

PROJECT: Laboratory Testing
Old Upper Mountain Road Site

CLIENT: EA Science & Technology

DATE: August 14, 2020

PROJECT NO.: BT-20-123
REPORT NO.: LTR-1

SJB Sample Number: 20-931
Sample Location: B-23, S-2: 2' – 4'

ASTM D-6913: Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

Sieve Size	*Percent Passing*
1 ½"	100.0
1"	84.4
¾"	84.4
½"	79.2
⅜"	77.9
¼"	75.5
#4	75.4
#8	74.2
#16	71.8
#30	69.8
#50	67.8
#100	65.5
#200	61.9

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Laboratory Test Report

PROJECT: Laboratory Testing
Old Upper Mountain Road Site

CLIENT: EA Science & Technology

DATE: August 14, 2020

PROJECT NO.: BT-20-123
REPORT NO.: LTR-1

SJB Sample Number: 20-932
Sample Location: B-23, S-7: 12' – 13.3'

ASTM D-6913: Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

Sieve Size	*Percent Passing*
¾"	100.0
½"	97.3
3/8"	90.0
¼"	81.1
#4	76.3
#8	67.1
#16	60.5
#30	56.2
#50	53.4
#100	50.8
#200	46.6

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Old Upper Mountain Road Site

CLIENT: **EA Science & Technology**

DATE: **August 14, 2020**

PROJECT NO.: BT-20-123
REPORT NO.: LTR-1

SJB Sample Number: 20-933
Sample Location: B-26, S-6: 10' – 10.9'

ASTM D-6913: Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

Sieve Size	*Percent Passing*
½"	100.0
3/8"	99.4
¼"	94.4
#4	90.6
#8	80.9
#16	72.9
#30	67.8
#50	64.3
#100	60.8
#200	55.8

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PROJECT: **Laboratory Testing**
Old Upper Mountain Road Site

CLIENT: **EA Science & Technology**

DATE: **August 14, 2020**

PROJECT NO.: BT-20-123
REPORT NO.: LTR-1

SJB Sample Number: 20-934
Sample Location: B-29, S-5: 8' – 10'

ASTM D-6913: Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

Sieve Size	*Percent Passing*
¾"	100.0
½"	97.4
3/8"	97.0
¼"	95.0
#4	93.6
#8	90.1
#16	86.9
#30	84.9
#50	83.3
#100	81.3
#200	78.1

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Laboratory Test Report

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Old Upper Mountain Road Site

CLIENT: **EA Science & Technology**

DATE: **August 14, 2020**

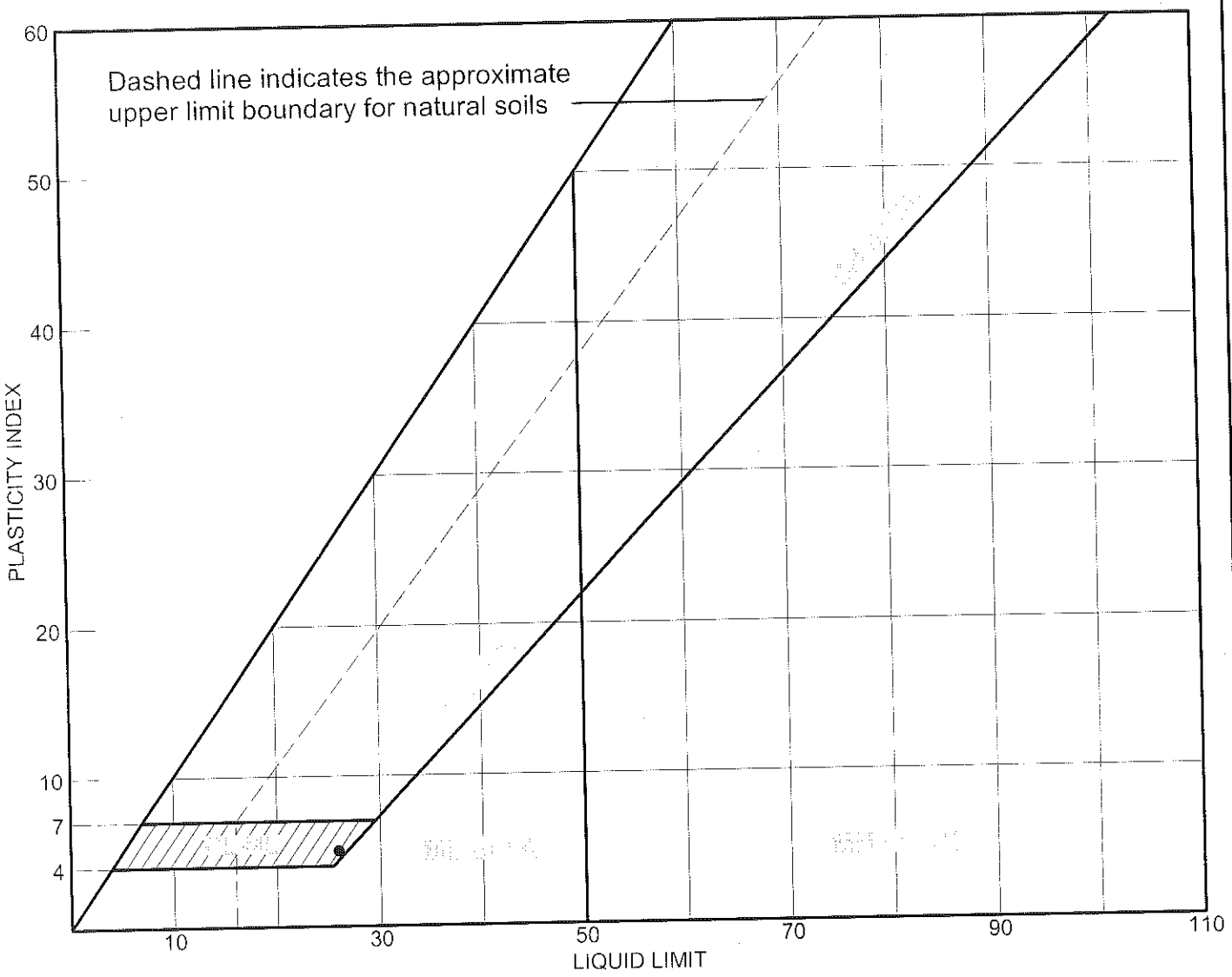
PROJECT NO.: BT-20-123
REPORT NO.: LTR-1

ASTM D-5731
Determination of the Uniaxial Compressive Strength of Rock Using the Point Load Test

Sample Number	Sample Location	Rock Type	Sample Diameter inches	Failure Load lbs.	Uncorrected Point Load Strength Index psi	Uniaxial Compressive Strength psi
20-940	B-4, C-4: 15.0'	Limestone	2.48	5633	916	22,440
20-941	B-5, C-2: 12.0'	Dolomite	2.49	2100	339	8,300
20-942	B-5, C-3: 17.0'	Dolomite	2.48	2673	435	10,650
20-943	B-6, C-1: 9.0'	Limestone	2.48	4296	699	17,110
20-944	B-6, C-2: 17.5'	Shale	2.49	5824	939	23,010
20-945	B-7, C-2: 7.0'	Limestone	2.48	2673	435	10,650
20-946	B-7, C-3: 12.0'	Limestone	2.49	2005	323	7,920
20-947	B-9, C-2: 6.5'	Limestone	2.49	1575	254	6,230
20-948	B-9, C-4: 18.0'	Limestone	2.49	4392	708	17,350
20-949	B-10, C-3: 16.0'	Limestone	2.48	2960	481	11,790
20-950	B-12, C-1: 15.0'	Dolomite	1.98	2769	706	16,240
20-951	B-15, C-1: 7.0'	Siltstone	2.49	477	77	1,890
20-952	B-15, C-3: 17.0'	Siltstone	2.49	239	38	940
20-953	B-17A, C-1: 11.0'	Shale	2.48	2291	373	9,130

REMARKS: Diametral testing was utilized to obtain results

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	B-19	S-5	8' - 8.8'		21	26	5	

LIQUID AND PLASTIC LIMITS TEST REPORT

SJB SERVICES, INC.

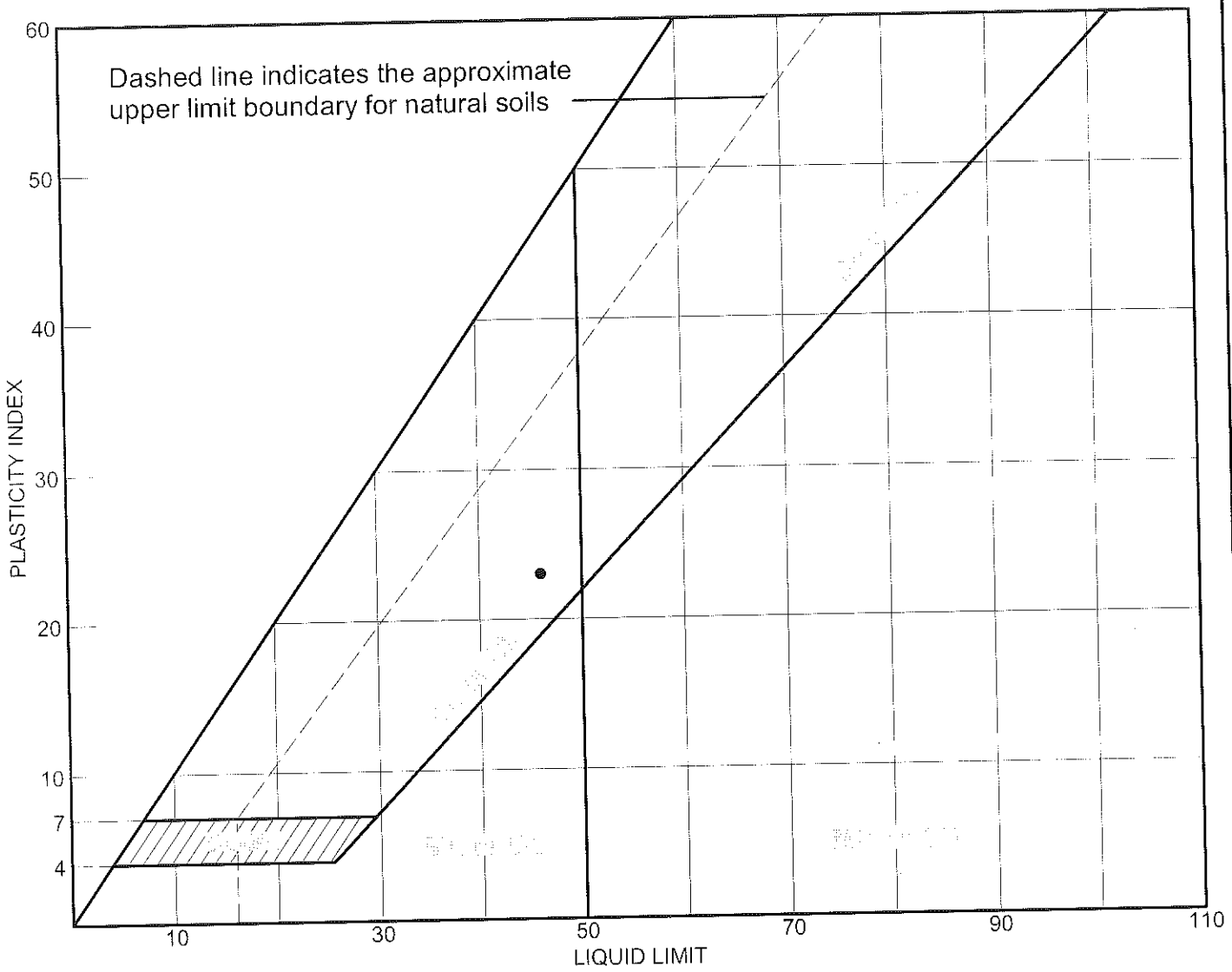
Client: EA SCIENCE & TECHNOLOGY

Project: LABORATORY TESTING
OLD UPPER MOUNTAIN ROAD PROJECT

Project No.: BT-20-123

Plate

LIQUID AND PLASTIC LIMITS TEST REPORT

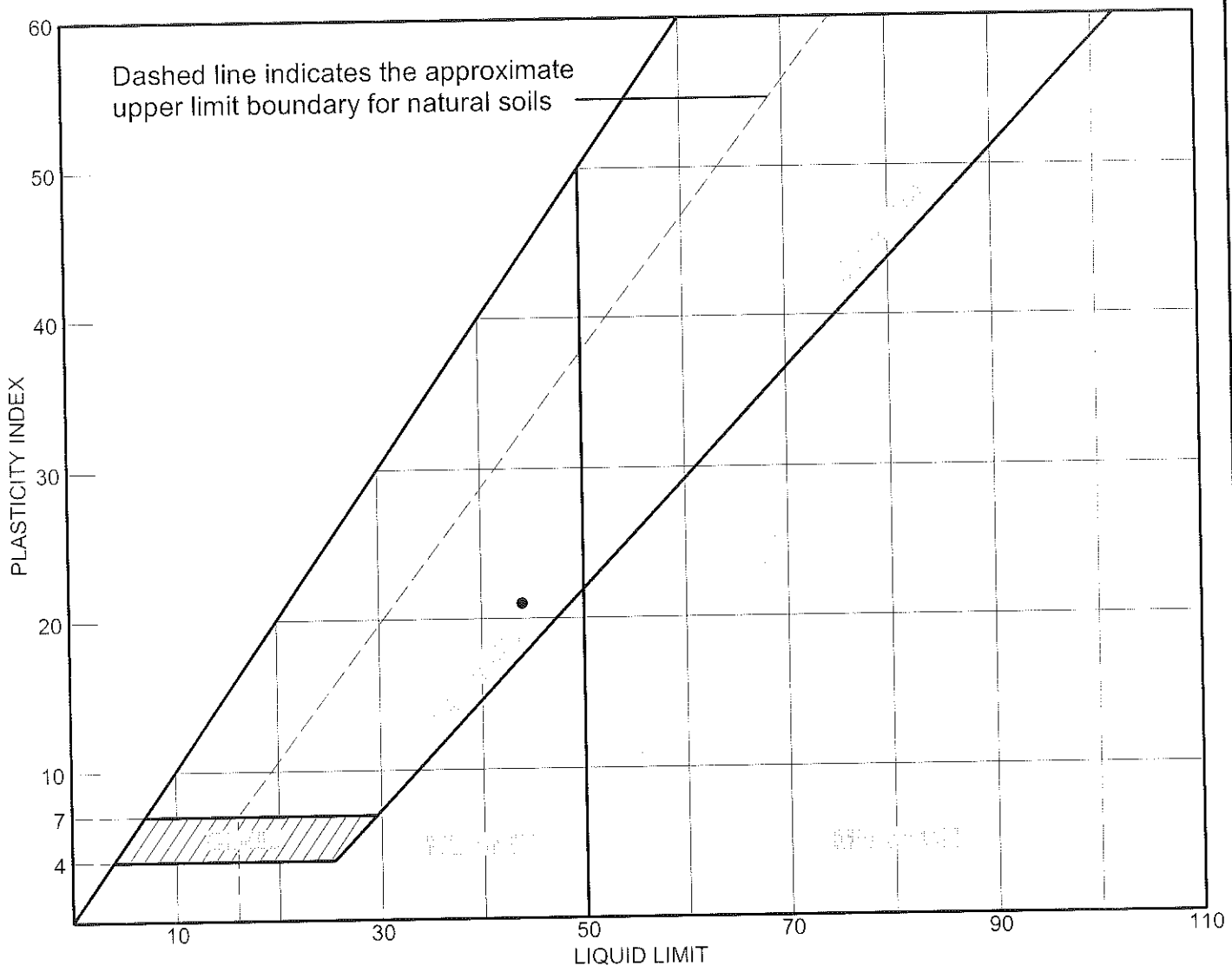


SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	B-26	S-2	2' - 4'		23	46	23	

LIQUID AND PLASTIC LIMITS TEST REPORT **SJB SERVICES, INC.**	**Client:** EA SCIENCE & TECHNOLOGY **Project:** LABORATORY TESTING OLD UPPER MOUNTAIN ROAD PROJECT **Project No.:** BT-20-123 **Plate**

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	B-28	S-2	2' - 4'		23	44	21	

LIQUID AND PLASTIC LIMITS TEST REPORT

SJB SERVICES, INC.

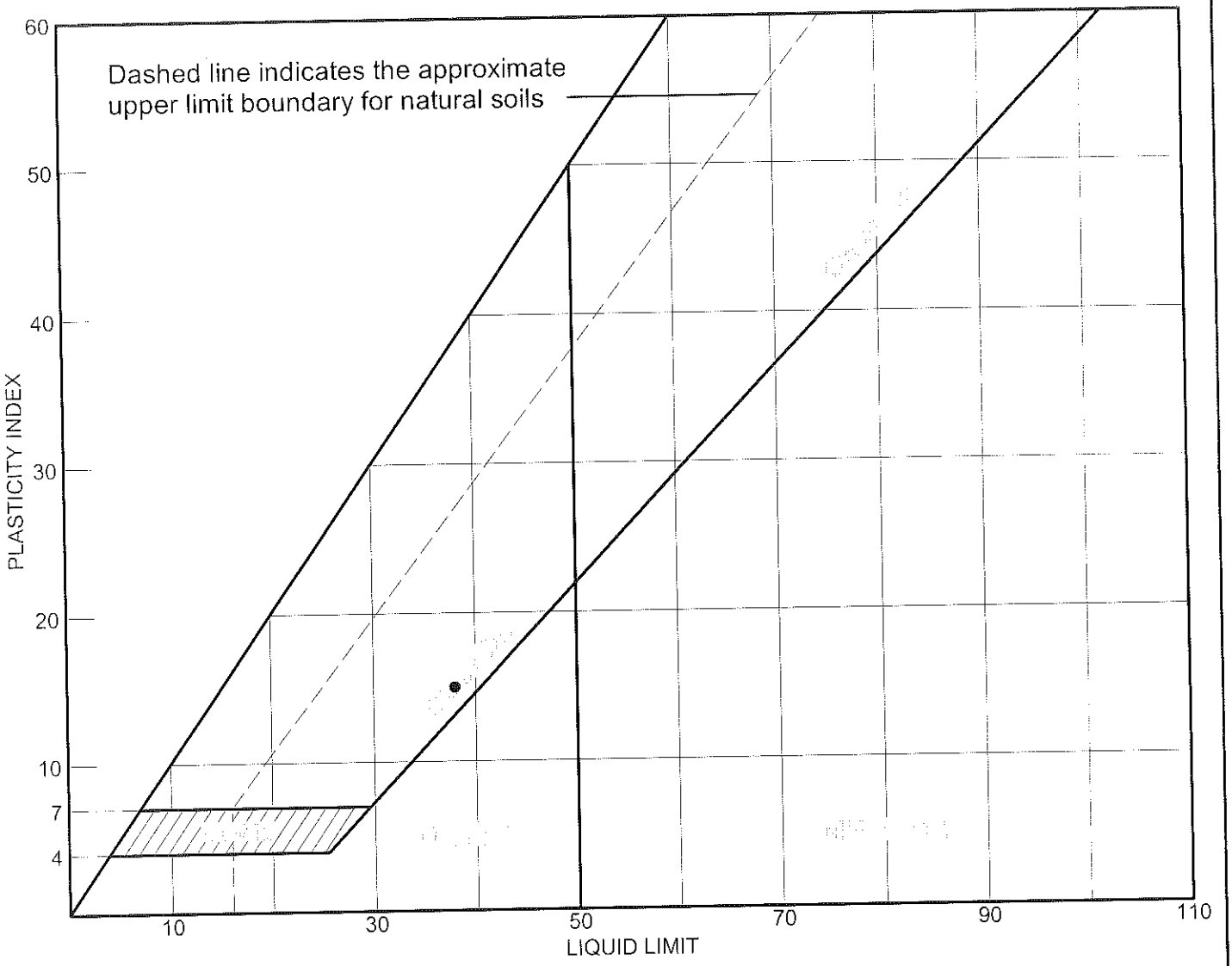
Client: EA SCIENCE & TECHNOLOGY

Project: LABORATORY TESTING
OLD UPPER MOUNTAIN ROAD PROJECT

Project No.: BT-20-123

Plate

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	B-30	S-5	15' - 17'		23	38	15	

LIQUID AND PLASTIC LIMITS TEST REPORT

SJB SERVICES, INC.

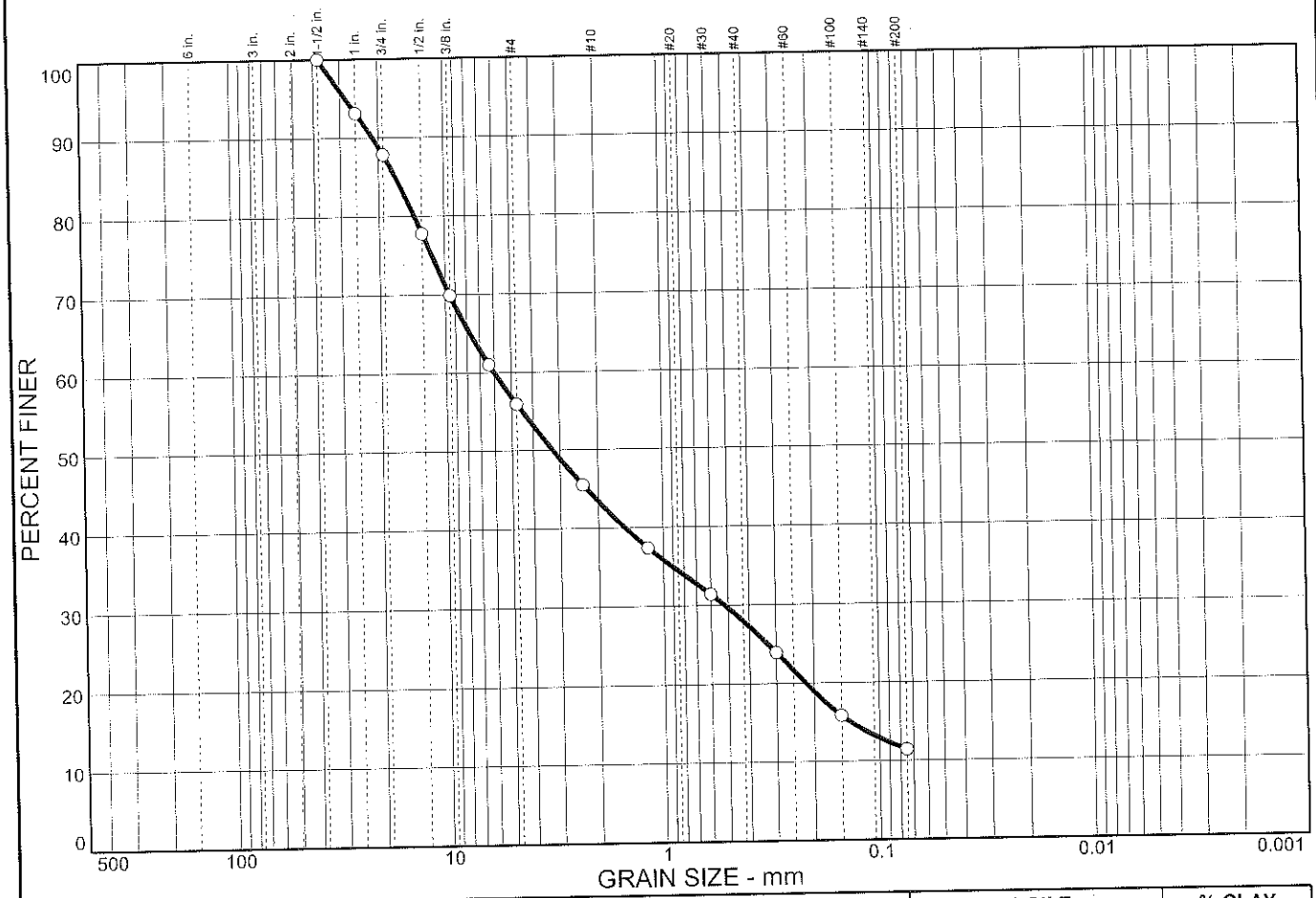
Client: EA SCIENCE & TECHNOLOGY

Project: LABORATORY TESTING
OLD UPPER MOUNTAIN ROAD PROJECT

Project No.: BT-20-123

Plate

Particle Size Distribution Report ASTM D-6913



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	44.1	44.5	11.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5 in.	100.0		
1 in.	93.1		
.75 in.	87.8		
.5 in.	77.8		
.375 in.	69.9		
.25 in.	61.0		
#4	55.9		
#8	45.5		
#16	37.4		
#30	31.4		
#50	23.9		
#100	15.8		
#200	11.4		

* (no specification provided)

Soil Description

B-6, S-4: 7' - 9'

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 16.8 D_{60}= 6.02 D_{50}= 3.25
D_{30}= 0.519 D_{15}= 0.137 D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

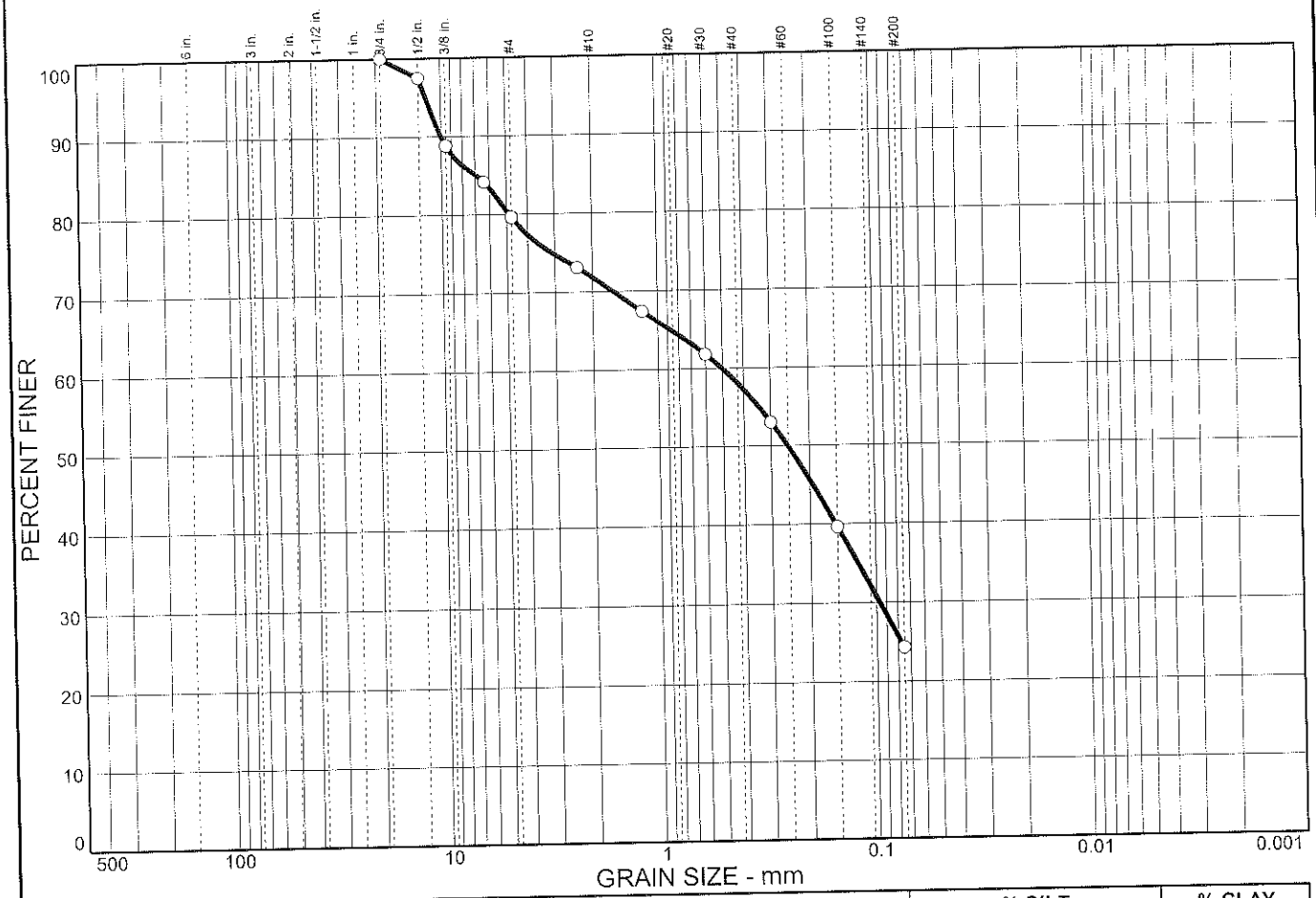
LTR-1
SAMPLE NUMBER: 20-926

Sample No.: S-4 **Source of Sample:** B-6 **Date:** 8-11-2020
Location: B-6, S-4: 7' - 9' **Elev./Depth:** 7' - 9'

SJB SERVICES, INC.

Client: EA SCIENCE & TECHNOLOGY
Project: LABORATORY TESTING
OLD UPPER MOUNTAIN ROAD PROJECT
Project No: BT-20-123 **Plate**

Particle Size Distribution Report ASTM D-6913



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	20.4	55.3	24.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75 in.	100.0		
.5 in.	97.5		
.375 in.	88.8		
.25 in.	84.1		
#4	79.6		
#8	73.1		
#16	67.4		
#30	61.8		
#50	53.0		
#100	39.6		
#200	24.3		

* (no specification provided)

Soil Description

B-12, S-3: 4' - 6'

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 6.94 D_{60}= 0.504 D_{50}= 0.252
D_{30}= 0.0968 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

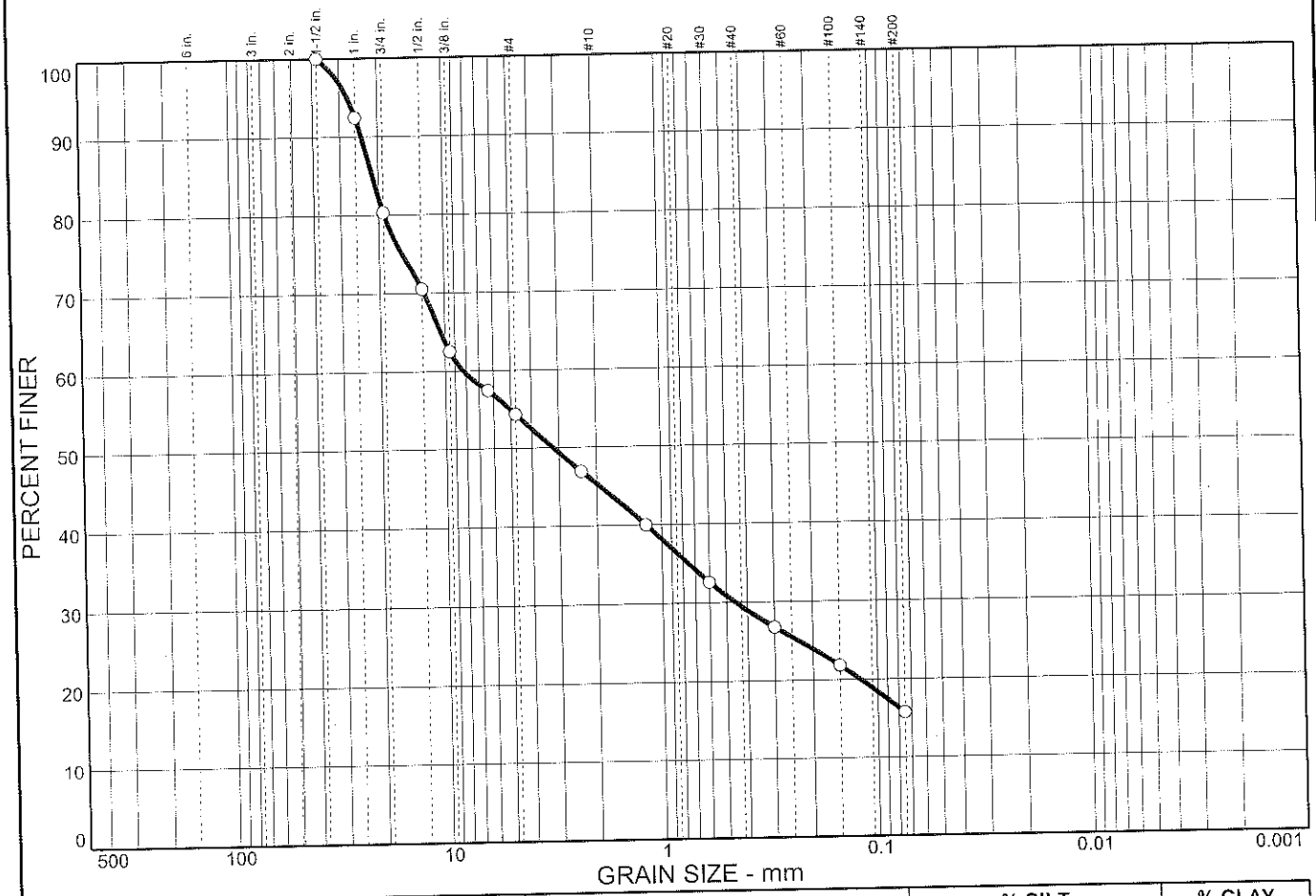
LTR-1
SAMPLE NUMBER: 20-927

Sample No.: S-3 **Source of Sample:** B-12 **Date:** 8-11-2020
Location: B-12, S-3: 4' - 6' **Elev./Depth:** 4' - 6'

SJB SERVICES, INC.

Client: EA SCIENCE & TECHNOLOGY
Project: LABORATORY TESTING
OLD UPPER MOUNTAIN ROAD PROJECT
Project No: BT-20-123 **Plate**

Particle Size Distribution Report ASTM D-6913



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	45.7	38.6	15.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5 in.	100.0		
1 in.	92.4		
.75 in.	80.3		
.5 in.	70.5		
.375 in.	62.5		
.25 in.	57.4		
#4	54.3		
#8	46.9		
#16	40.0		
#30	32.6		
#50	26.8		
#100	21.8		
#200	15.7		

* (no specification provided)

Soil Description

B-15, S-2: 2' - 4'

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 21.3 D_{60}= 8.28 D_{50}= 3.20
D_{30}= 0.453 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

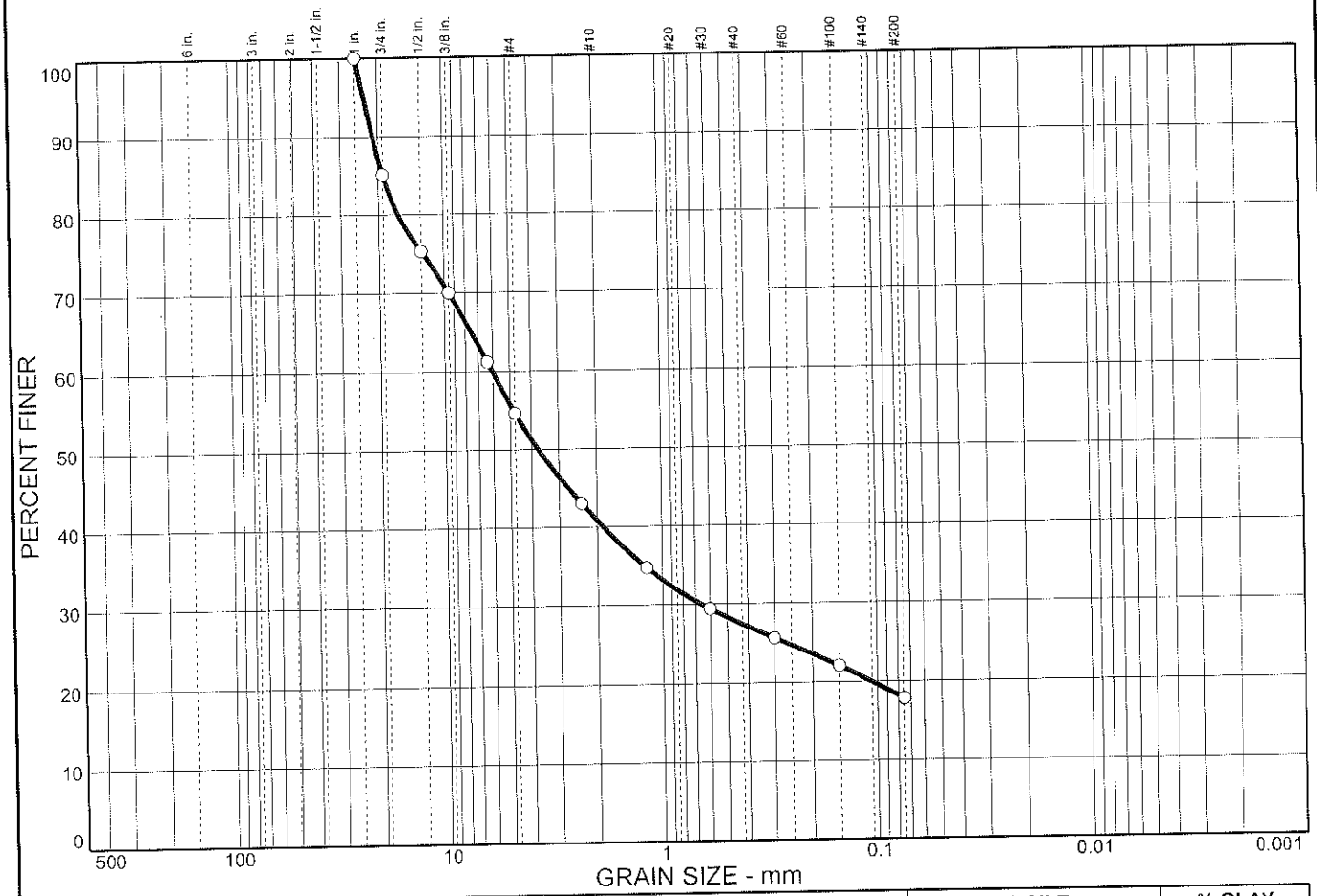
LTR-1
SAMPLE NUMBER: 20-928

Sample No.: S-2 **Source of Sample:** B-15 **Date:** 8-11-2020
Location: B-15, S-2: 2' - 4' **Elev./Depth:** 2' - 4'

SJB SERVICES, INC.

Client: EA SCIENCE & TECHNOLOGY
Project: LABORATORY TESTING
OLD UPPER MOUNTAIN ROAD PROJECT
Project No: BT-20-123 **Plate**

Particle Size Distribution Report ASTM D-6913



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	45.4	36.8	17.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 in.	100.0		
.75 in.	85.1		
.5 in.	75.3		
.375 in.	70.0		
.25 in.	61.2		
#4	54.6		
#8	43.0		
#16	34.7		
#30	29.4		
#50	25.6		
#100	22.0		
#200	17.8		

* (no specification provided)

Soil Description

B-17, S-2: 2' - 4'

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 19.0 D_{60}= 6.03 D_{50}= 3.74
D_{30}= 0.659 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

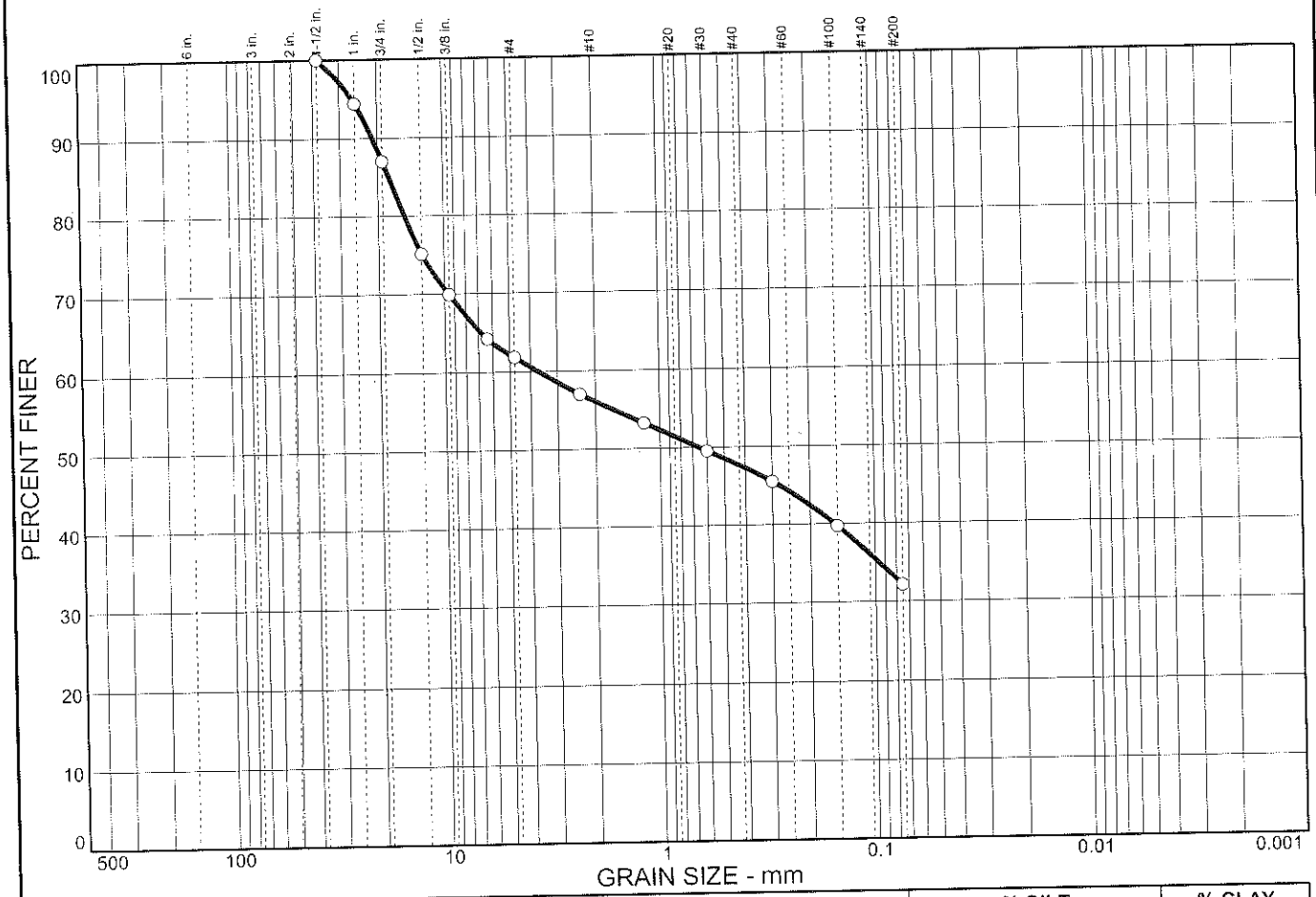
LTR-1
SAMPLE NUMBER: 20-929

Sample No.: S-2 **Source of Sample:** B-17 **Date:** 8-11-2020
Location: B-17, S-2: 2' - 4' **Elev./Depth:** 2' - 4'

SJB SERVICES, INC.

Client: EA SCIENCE & TECHNOLOGY
Project: LABORATORY TESTING
OLD UPPER MOUNTAIN ROAD PROJECT
Project No: BT-20-123 **Plate**

Particle Size Distribution Report ASTM D-6913



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	38.2	29.7	32.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5 in.	100.0		
1 in.	94.4		
.75 in.	87.0		
.5 in.	75.1		
.375 in.	69.9		
.25 in.	64.2		
#4	61.8		
#8	57.0		
#16	53.2		
#30	49.5		
#50	45.5		
#100	39.7		
#200	32.1		

* (no specification provided)

Soil Description

B-19, S-2: 2' - 4'

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 17.8 D_{60}= 3.69 D_{50}= 0.658
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

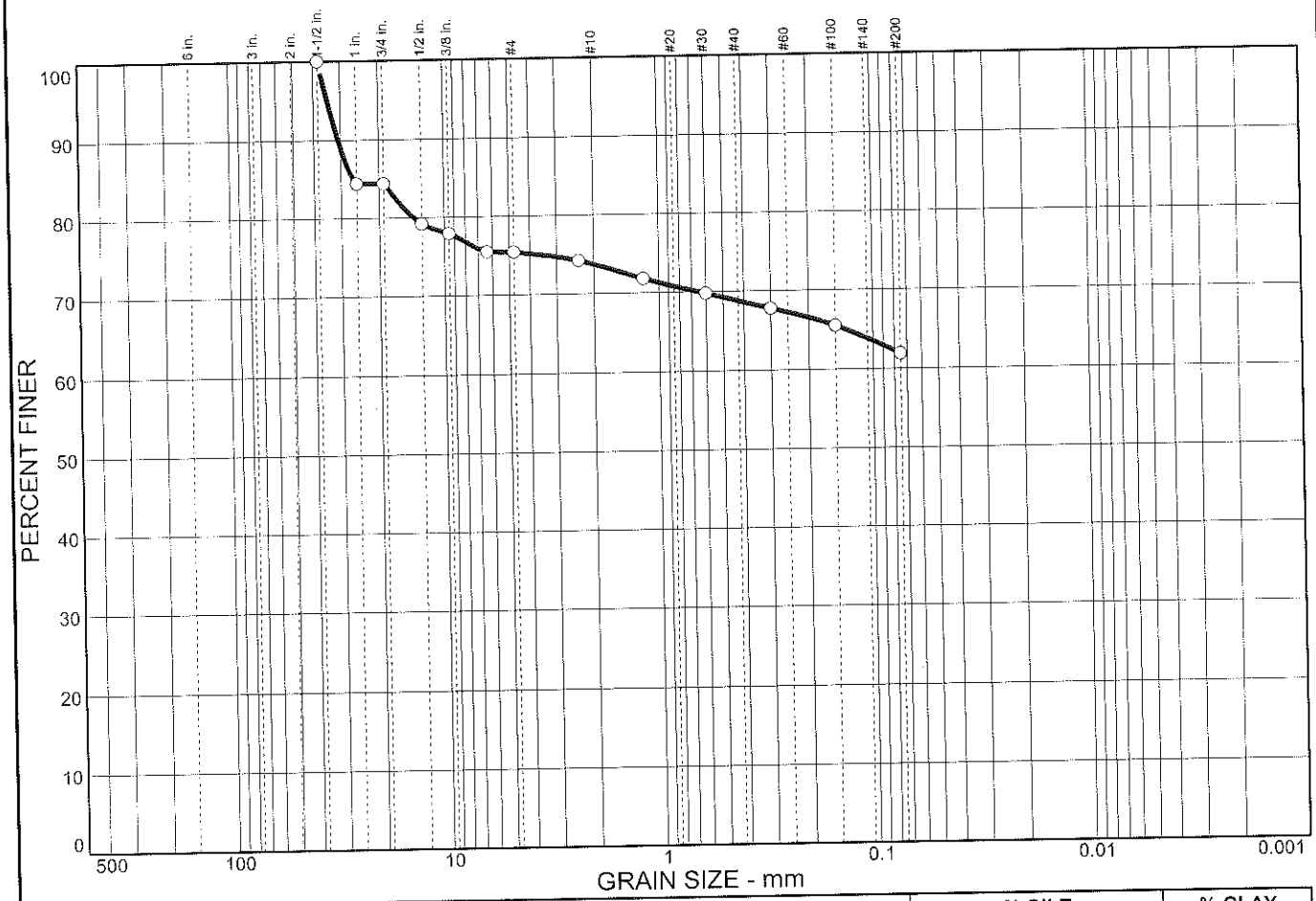
LTR-1
SAMPLE NUMBER: 20-930

Sample No.: S-2 **Source of Sample:** B-19 **Date:** 8-11-2020
Location: B-19, S-2: 2' - 4' **Elev./Depth:** 2' - 4'

SJB SERVICES, INC.

Client: EA SCIENCE & TECHNOLOGY
Project: LABORATORY TESTING
OLD UPPER MOUNTAIN ROAD PROJECT
Project No: BT-20-123 **Plate**

Particle Size Distribution Report ASTM D-6913



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	24.6	13.5	61.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5 in.	100.0		
1 in.	84.4		
.75 in.	84.4		
.5 in.	79.2		
.375 in.	77.9		
.25 in.	75.5		
#4	75.4		
#8	74.2		
#16	71.8		
#30	69.8		
#50	67.8		
#100	65.5		
#200	61.9		

* (no specification provided)

Soil Description

B-23, S-2: 2' - 4'

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 26.4 D_{60}= D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

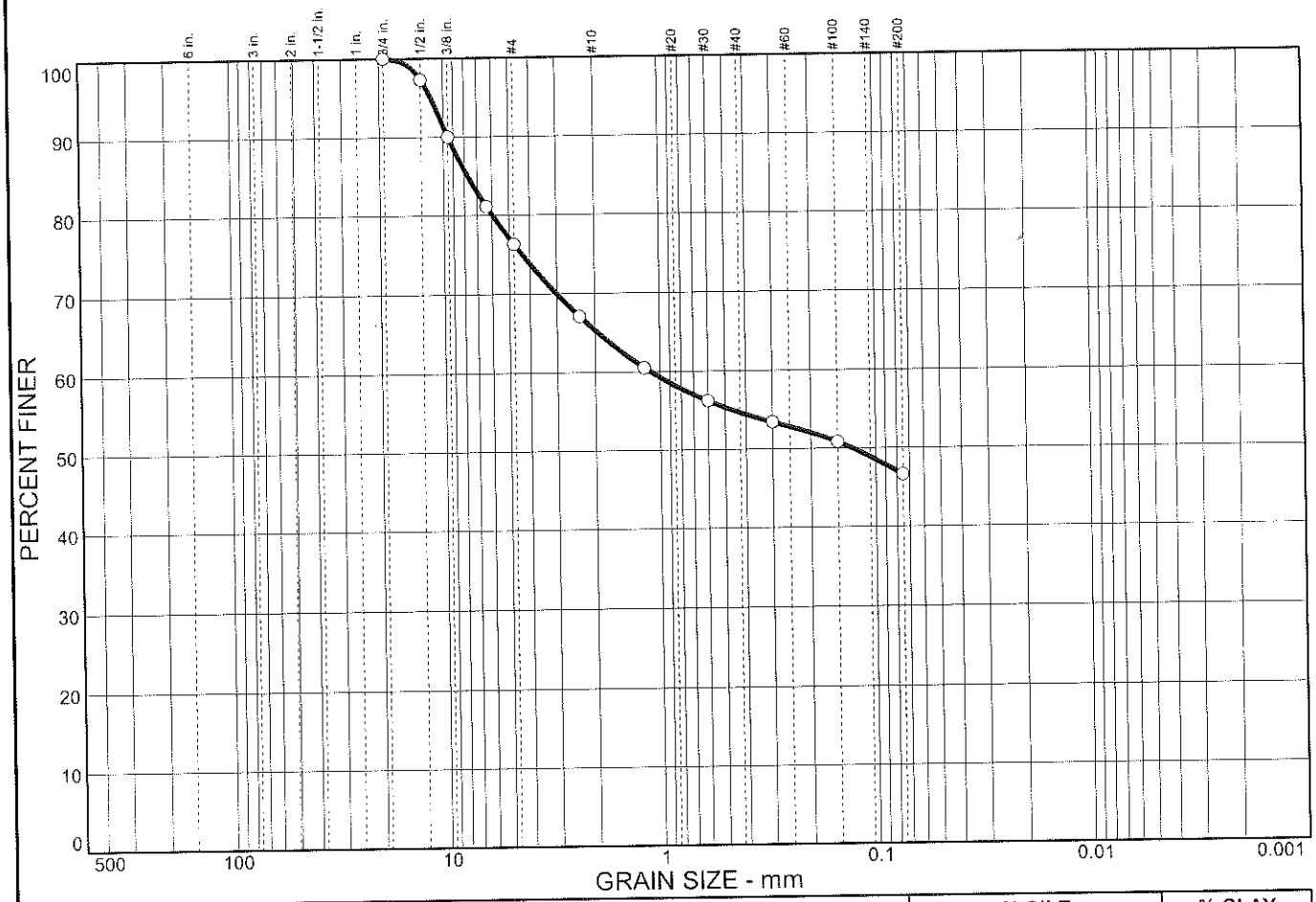
LTR-1
SAMPLE NUMBER: 20-931

Sample No.: S-2 **Source of Sample:** B-23 **Date:** 8-11-2020
Location: B-23, S-2: 2' - 4' **Elev./Depth:** 2' - 4'

SJB SERVICES, INC.

Client: EA SCIENCE & TECHNOLOGY
Project: LABORATORY TESTING
OLD UPPER MOUNTAIN ROAD PROJECT
Project No: BT-20-123 **Plate**

Particle Size Distribution Report ASTM D-6913



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	23.7	29.7	46.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75 in.	100.0		
.5 in.	97.3		
.375 in.	90.0		
.25 in.	81.1		
#4	76.3		
#8	67.1		
#16	60.5		
#30	56.2		
#50	53.4		
#100	50.8		
#200	46.6		

* (no specification provided)

Soil Description

B-23, S-7: 12' - 13.3'

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 7.74 D_{60}= 1.11 D_{50}= 0.129
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

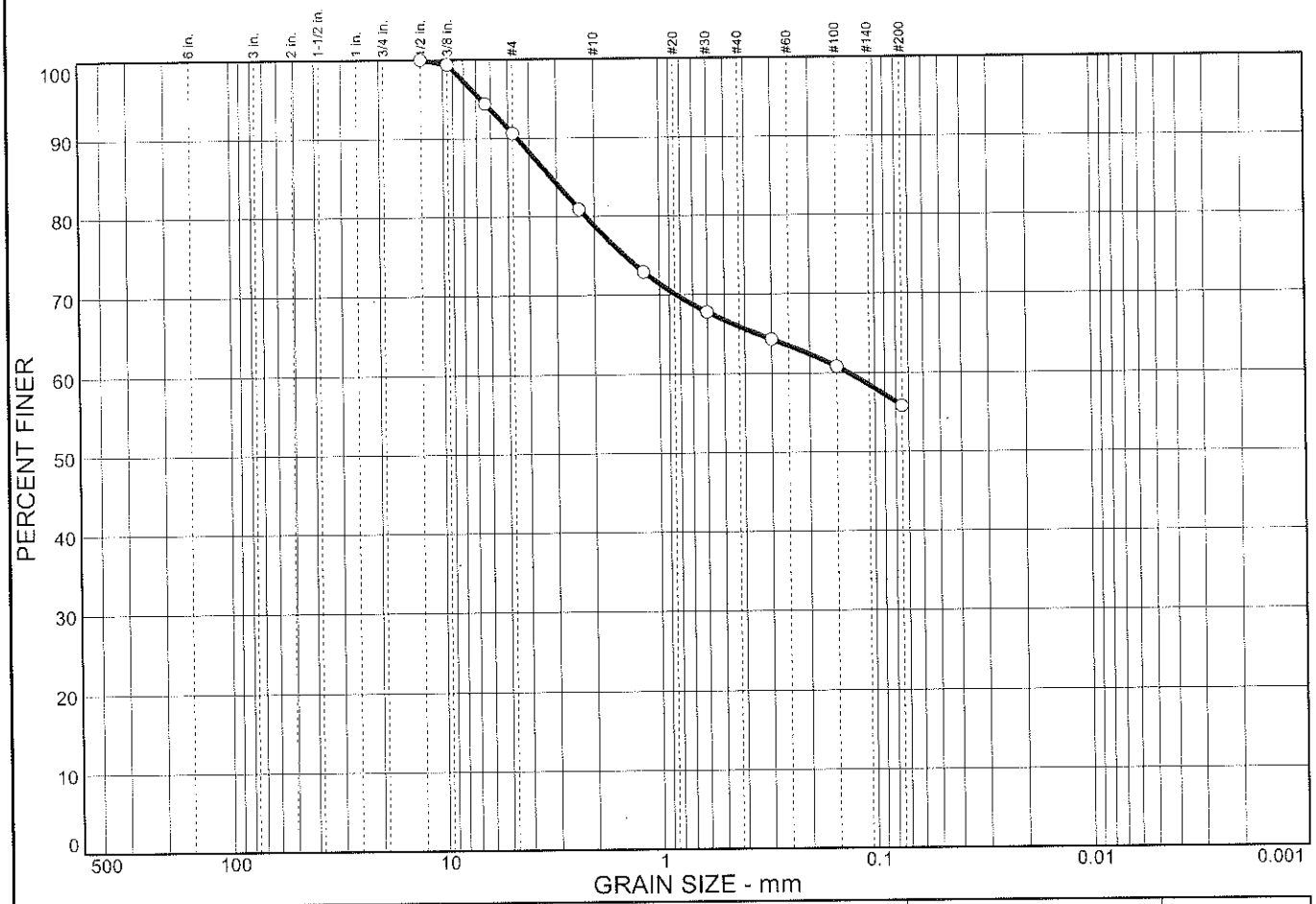
LTR-1
SAMPLE NUMBER: 20-932

Sample No.: S-7 **Source of Sample:** B-23 **Date:** 8-11-2020
Location: B-23, S-7: 12' - 13.3' **Elev./Depth:** 12' - 13.3'

SJB SERVICES, INC.

Client: EA SCIENCE & TECHNOLOGY
Project: LABORATORY TESTING
OLD UPPER MOUNTAIN ROAD PROJECT
Project No: BT-20-123 **Plate**

Particle Size Distribution Report ASTM D-6913



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	9.4	34.8	55.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.5 in.	100.0		
.375 in.	99.4		
.25 in.	94.4		
#4	90.6		
#8	80.9		
#16	72.9		
#30	67.8		
#50	64.3		
#100	60.8		
#200	55.8		

* (no specification provided)

Soil Description

B-26, S-6: 10' - 10.9'

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 3.18 D_{60}= 0.132 D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

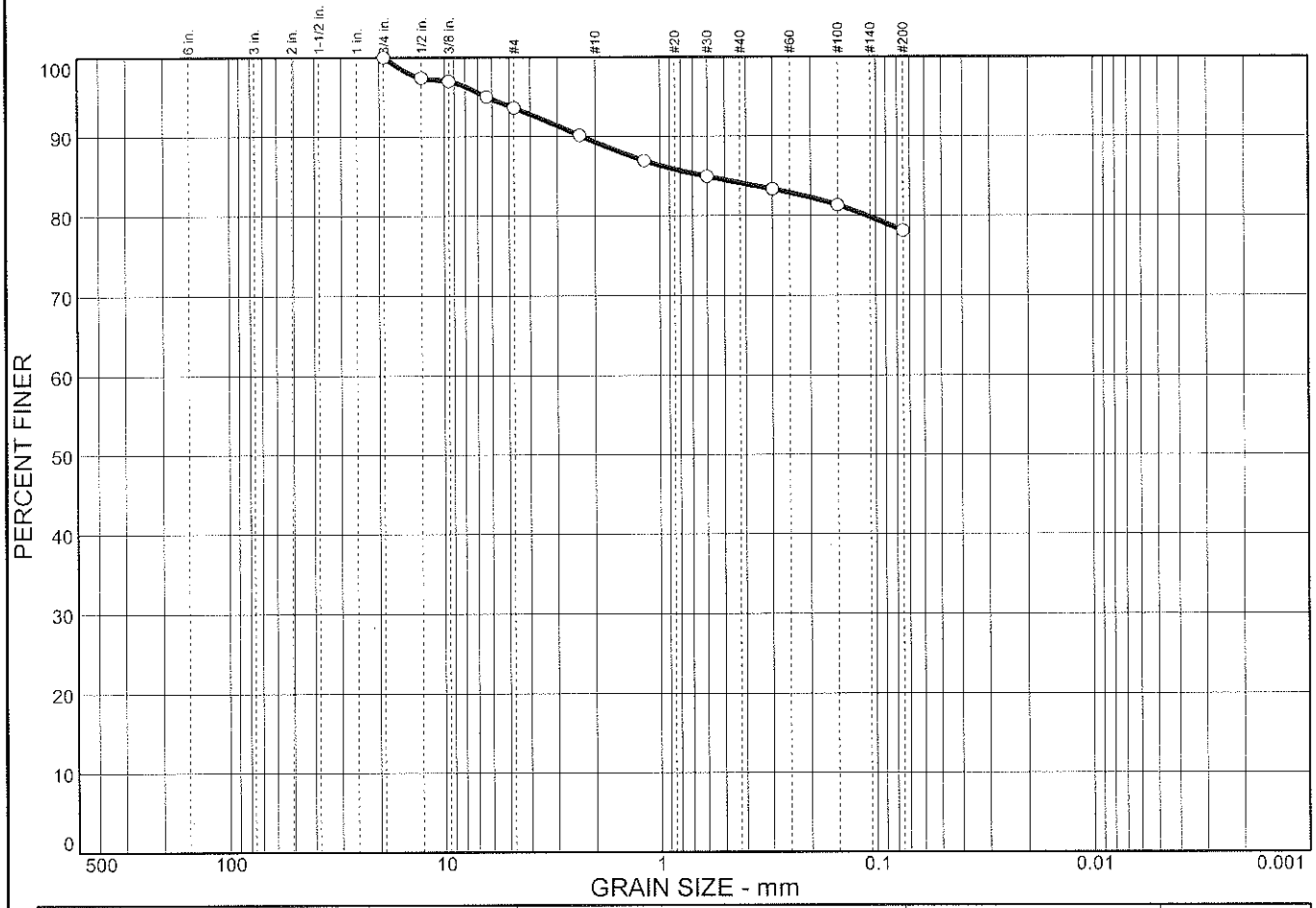
LTR-1
SAMPLE NUMBER: 20-933

Sample No.: S-6 **Source of Sample:** B-26 **Date:** 8-11-2020
Location: B-26, S-6: 10' - 10.9' **Elev./Depth:** 10' - 10.9'

SJB SERVICES, INC.

Client: EA SCIENCE & TECHNOLOGY
Project: LABORATORY TESTING
OLD UPPER MOUNTAIN ROAD PROJECT
Project No: BT-20-123 **Plate**

Particle Size Distribution Report ASTM D-6913



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	6.4	15.5	78.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75 in.	100.0		
.5 in.	97.4		
.375 in.	97.0		
.25 in.	95.0		
#4	93.6		
#8	90.1		
#16	86.9		
#30	84.9		
#50	83.3		
#100	81.3		
#200	78.1		

* (no specification provided)

Soil Description

B-29, S-5: 8' - 10'

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.625 D_{60}= D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

LTR-1
SAMPLE NUMBER: 20-934

Sample No.: S-5 **Source of Sample:** B-29 **Date:** 8-11-2020
Location: B-29, S-5: 8' - 10' **Elev./Depth:** 8' - 10'

SJB SERVICES, INC.

Client: EA SCIENCE & TECHNOLOGY
Project: LABORATORY TESTING
OLD UPPER MOUNTAIN ROAD PROJECT
Project No: BT-20-123 **Plate**

SJB SERVICES, INC.

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PROJECT: LABORATORY TESTING
OLD UPPER MOUNTAIN ROAD SITE

CLIENT: EA SCIENCE & TECHNOLOGY

PROJECT NO. BT-20-123

REPORT NO.: LTR-2

DATE: SEPTEMBER 10, 2020

This report presents the results of laboratory testing performed on various soils & rock samples collected from the above referenced project site. All results contained in this report represent the samples listed in work order #10528.01 as received from the Client.

The testing conducted was as follows:

ASTM D 854
Specific Gravity of Soils

ASTM D-4318
Liquid Limit, Plastic Limit, and Plasticity Index of Soil

ASTM D-6913
Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

ASTM D-5731
Determination of the Uniaxial Compressive Strength of Rock
Using the Point Load Test

Samples were received at the SJB Services, Inc. laboratory from the Client on August 14, 2020 where they were processed for testing.

The results of the report relate only to the items inspected or tested. The report shall not be reproduced, except in full, without the written approval of SJB Services, Inc. If you have any questions regarding the report, please do not hesitate to contact our office.

Sincerely,
SJB SERVICES, INC.

Paul Gregorczyk
Laboratory Manager

Buffalo Office
5167 South Park Avenue
Hamburg, NY 14075
Phone: (716) 649-8110
Fax: (716) 649-8051

Laboratory Test Report

PROJECT: **Laboratory Testing**
Old Upper Mountain Road Site

CLIENT: **EA Science & Technology**

DATE: **September 10, 2020**

PROJECT NO.: BT-20-123
REPORT NO.: LTR-2

ASTM D-854: Specific Gravity of Soils

SJB Sample Number	Sample Location	Specific Gravity at 20°C
20-1063	B-22, S-3: 4' – 6'	2.70
20-1064	B-44, S-2: 2' – 4'	2.68
20-1065	B-49, S-6: 10' – 12'	2.67

ASTM D-4318: Liquid Limit, Plastic Limit, and Plasticity Index of Soil

SJB Sample Number	Sample Location	Liquid Limit	Plastic Limit	Plasticity Index
20-1066	B-49, S-5: 8' – 10'	43	22	21

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Laboratory Test Report

PROJECT: **Laboratory Testing**
Old Upper Mountain Road Site

CLIENT: **EA Science & Technology**

DATE: **September 10, 2020**

PROJECT NO.: BT-20-123
REPORT NO.: LTR-2

SJB Sample Number: 20-1067
Sample Location: B-18, S-1: 0' – 2'

ASTM D-6913: Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

Sieve Size	*Percent Passing*
1 ½"	100.0
1"	80.9
¾"	72.8
½"	61.4
⅜"	56.6
¼"	53.3
#4	51.6
#8	46.8
#16	43.6
#30	40.8
#50	38.0
#100	34.5
#200	31.3

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Laboratory Test Report

PROJECT: **Laboratory Testing**
Old Upper Mountain Road Site

CLIENT: **EA Science & Technology**

DATE: **September 10, 2020**

PROJECT NO.: BT-20-123
REPORT NO.: LTR-2

SJB Sample Number: 20-1068
Sample Location: B-20, S-1: 0' – 2'

ASTM D-6913: Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

Sieve Size	*Percent Passing*
¾"	100.0
½"	86.0
3/8"	77.2
¼"	69.4
#4	63.4
#8	51.4
#16	41.5
#30	34.9
#50	30.2
#100	26.1
#200	22.0

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Laboratory Test Report

PROJECT: **Laboratory Testing**
Old Upper Mountain Road Site

CLIENT: **EA Science & Technology**

DATE: **September 10, 2020**

PROJECT NO.: BT-20-123
REPORT NO.: LTR-2

SJB Sample Number: 20-1069
Sample Location: B-22, S-2: 2' – 4'

ASTM D-6913: Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

Sieve Size	*Percent Passing*
1 ½"	100.0
1"	92.2
¾"	89.1
½"	76.7
⅜"	72.9
¼"	68.2
#4	64.8
#8	59.0
#16	55.0
#30	51.9
#50	48.4
#100	43.8
#200	37.0

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Laboratory Test Report

PROJECT: **Laboratory Testing**
Old Upper Mountain Road Site

CLIENT: **EA Science & Technology**

DATE: **September 10, 2020**

PROJECT NO.: BT-20-123
REPORT NO.: LTR-2

SJB Sample Number: 20-1070
Sample Location: B-44, S-3: 4' – 6'

ASTM D-6913: Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

Sieve Size	*Percent Passing*
½"	100.0
3/8"	99.6
¼"	98.1
#4	96.8
#8	92.4
#16	89.1
#30	86.8
#50	85.0
#100	83.5
#200	81.5

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Laboratory Test Report

PROJECT: **Laboratory Testing**
Old Upper Mountain Road Site

CLIENT: **EA Science & Technology**

DATE: **September 10, 2020**

PROJECT NO.: BT-20-123
REPORT NO.: LTR-2

SJB Sample Number: 20-1071
Sample Location: B-49, S-7: 15' – 17'

ASTM D-6913: Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

Sieve Size	*Percent Passing*
½"	100.0
3/8"	99.5
¼"	99.5
#4	98.5
#8	93.3
#16	87.7
#30	84.1
#50	81.7
#100	80.2
#200	78.4

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Laboratory Test Report

PROJECT: **Laboratory Testing**
Old Upper Mountain Road Site

CLIENT: **EA Science & Technology**

DATE: **September 10, 2020**

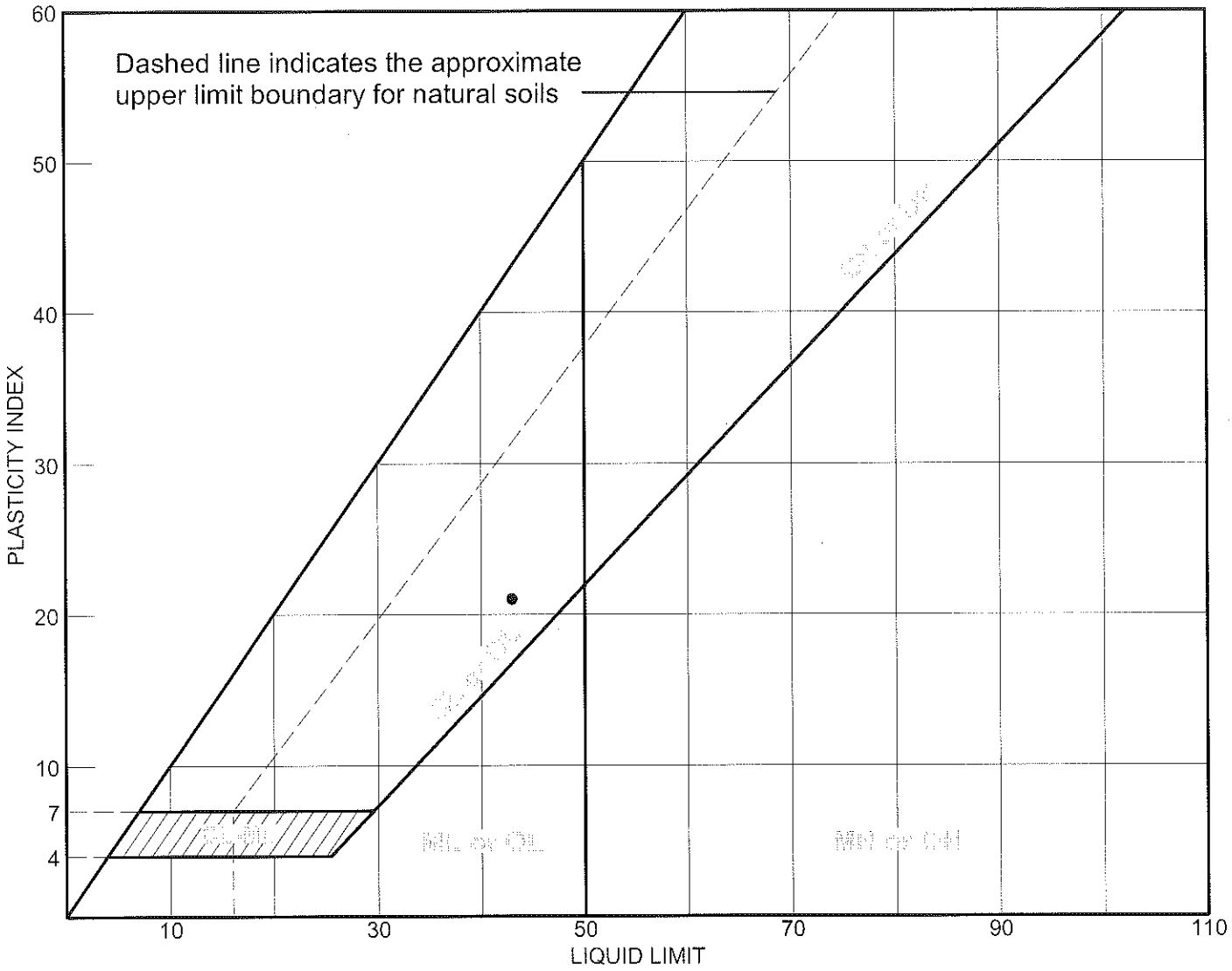
PROJECT NO.: BT-20-123
REPORT NO.: LTR-2

ASTM D-5731
Determination of the Uniaxial Compressive Strength of Rock
Using the Point Load Test

Sample Number	Sample Location	Rock Type	Sample Diameter inches	Failure Load lbs.	Uncorrected Point Load Strength Index psi	Uniaxial Compressive Strength psi
20-1072	B-1, C-2: 13'	dolomite/ limestone	1.98	2196	560	12,880
20-1073	B-13, C-3: 16'	dolostone/ shale	2.49	2769	447	10,940
20-1074	B-14, C-1: 14'	shale	2.49	2960	477	10,980
20-1075	B-18, C-2: 12'	dolomitic limestone	1.98	2100	536	12,320
20-1076	B-25, C-3: 14'	dolostone	1.98	2100	536	12,320
20-1077	B-46, C-2: 13'	dolomite/ limestone	1.98	2291	584	13,440
20-1078	B-46, C-4: 23'	dolomite	1.98	1623	414	9,520
20-1079	B-46, C-6: 33'	shale	1.98	191	49	1,120
20-1080	B-46, C-8: 43'	shale	1.98	286	73	1,680
20-1081	B-46, C-10: 53'	shale	1.98	1432	365	8,400
20-1082	B-46, C-12: 62'	shale	1.98	286	73	1,680

REMARKS: Diametral testing was utilized to obtain results

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	B-49	S-5	8' - 10'		22	43	21	

LIQUID AND PLASTIC LIMITS TEST REPORT

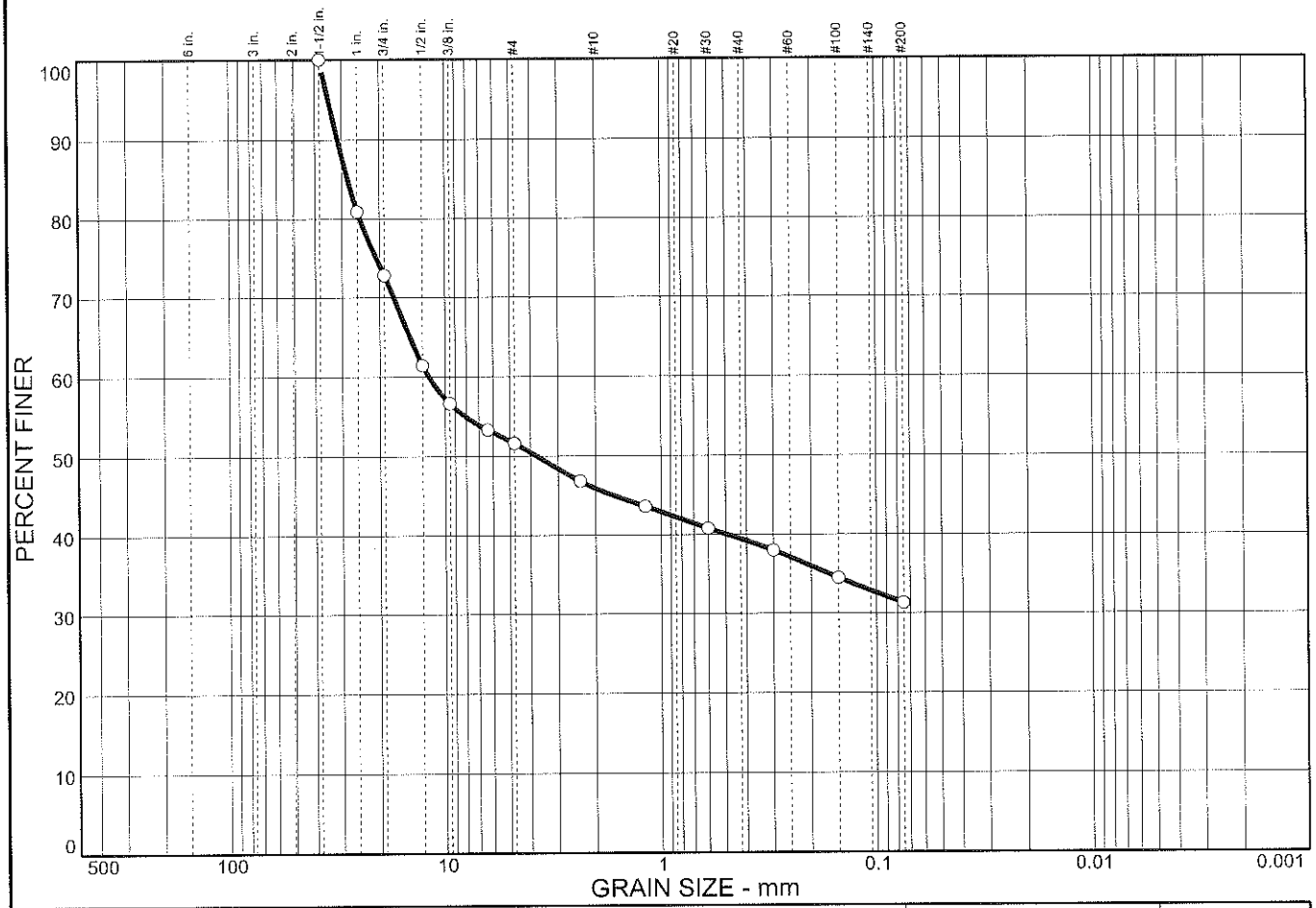
SJB SERVICES, INC.

Client: EA SCIENCE & TECHNOLOGY

Project: LABORATORY TESTING
OLD UPPER MOUNTAIN ROAD PROJECT

Project No.: BT-20-123 **Plate**

Particle Size Distribution Report ASTM D-6913



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	48.4	20.3	31.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5 in.	100.0		
1 in.	80.9		
.75 in.	72.8		
.5 in.	61.4		
.375 in.	56.6		
.25 in.	53.3		
#4	51.6		
#8	46.8		
#16	43.6		
#30	40.8		
#50	38.0		
#100	34.5		
#200	31.3		

* (no specification provided)

Soil Description

B-18, S-1: 0' - 2'

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 28.2 D_{60}= 11.9 D_{50}= 3.75
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

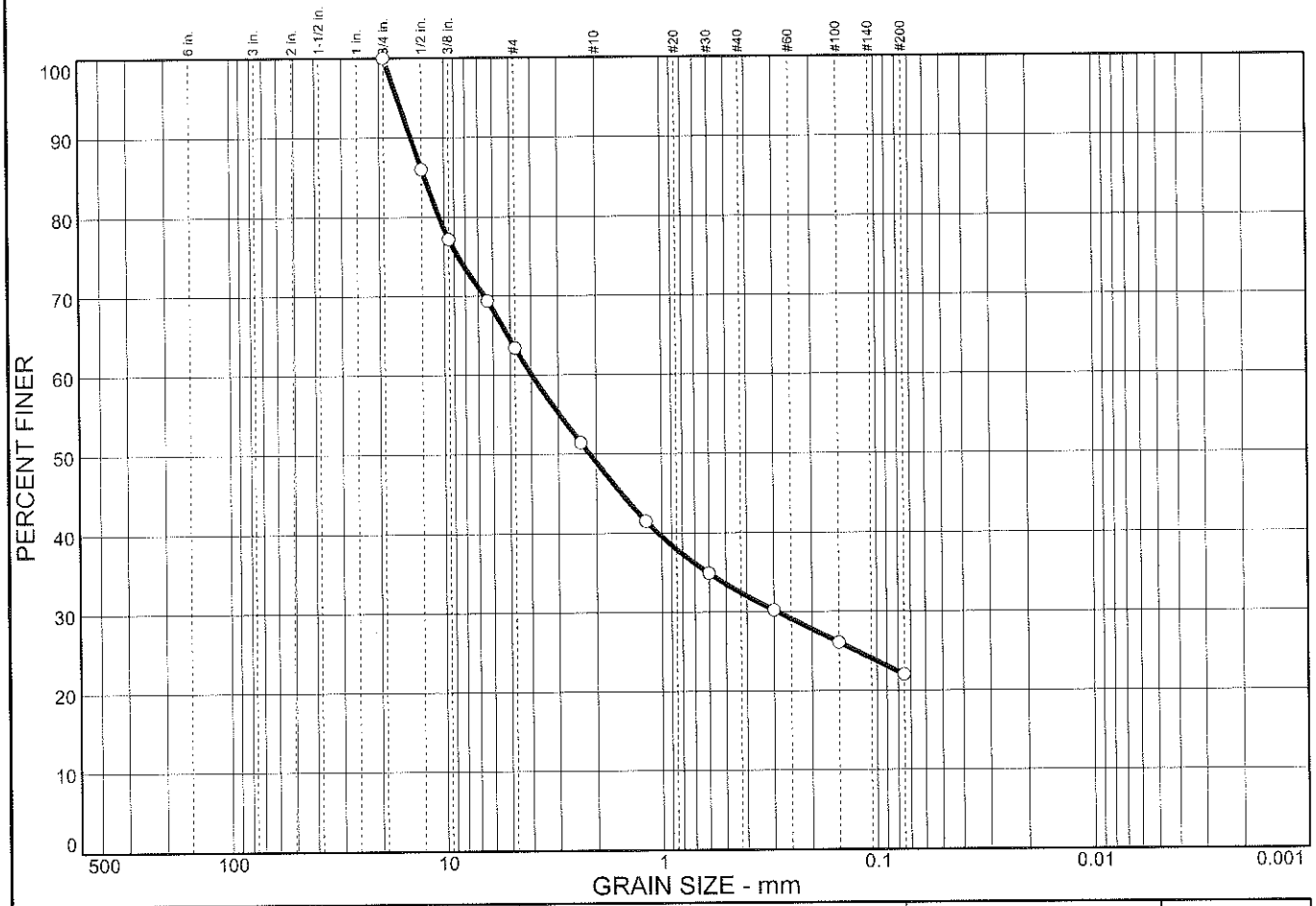
LTR-2
SAMPLE NUMBER: 20-1067

Sample No.: S-1 **Source of Sample:** B-18 **Date:** 9-10-2020
Location: B-18, S-1: 0' - 2' **Elev./Depth:** 0' - 2'

SJB SERVICES, INC.

Client: EA SCIENCE & TECHNOLOGY
Project: LABORATORY TESTING
OLD UPPER MOUNTAIN ROAD PROJECT
Project No: BT-20-123 **Plate**

Particle Size Distribution Report ASTM D-6913



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	36.6	41.4	22.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75 in.	100.0		
.5 in.	86.0		
.375 in.	77.2		
.25 in.	69.4		
#4	63.4		
#8	51.4		
#16	41.5		
#30	34.9		
#50	30.2		
#100	26.1		
#200	22.0		

* (no specification provided)

Soil Description

B-20, S-1: 0' - 2'

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 12.3 D_{60}= 3.99 D_{50}= 2.15
D_{30}= 0.290 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

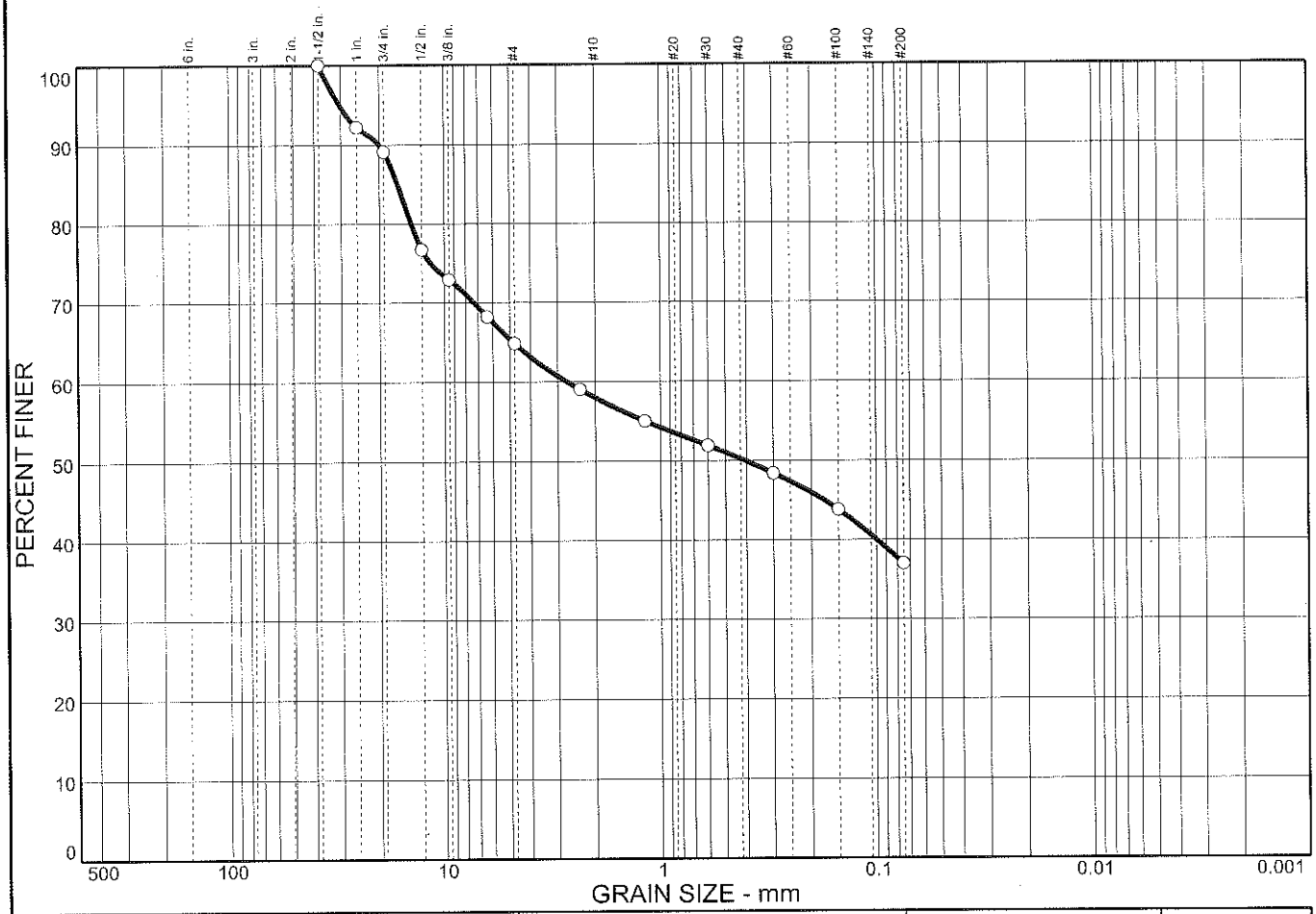
LTR-2
SAMPLE NUMBER: 20-1068

Sample No.: S-1 **Source of Sample:** B-20 **Date:** 9-10-2020
Location: B-20, S-1: 0' - 2' **Elev./Depth:** 0' - 2'

SJB SERVICES, INC.

Client: EA SCIENCE & TECHNOLOGY
Project: LABORATORY TESTING
OLD UPPER MOUNTAIN ROAD PROJECT
Project No: BT-20-123 **Plate**

Particle Size Distribution Report ASTM D-6913



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	35.2	27.8	37.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5 in.	100.0		
1 in.	92.2		
.75 in.	89.1		
.5 in.	76.7		
.375 in.	72.9		
.25 in.	68.2		
#4	64.8		
#8	59.0		
#16	55.0		
#30	51.9		
#50	48.4		
#100	43.8		
#200	37.0		

* (no specification provided)

Soil Description

B-22, S-2: 2' - 4'

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 16.5 D_{60}= 2.73 D_{50}= 0.405
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

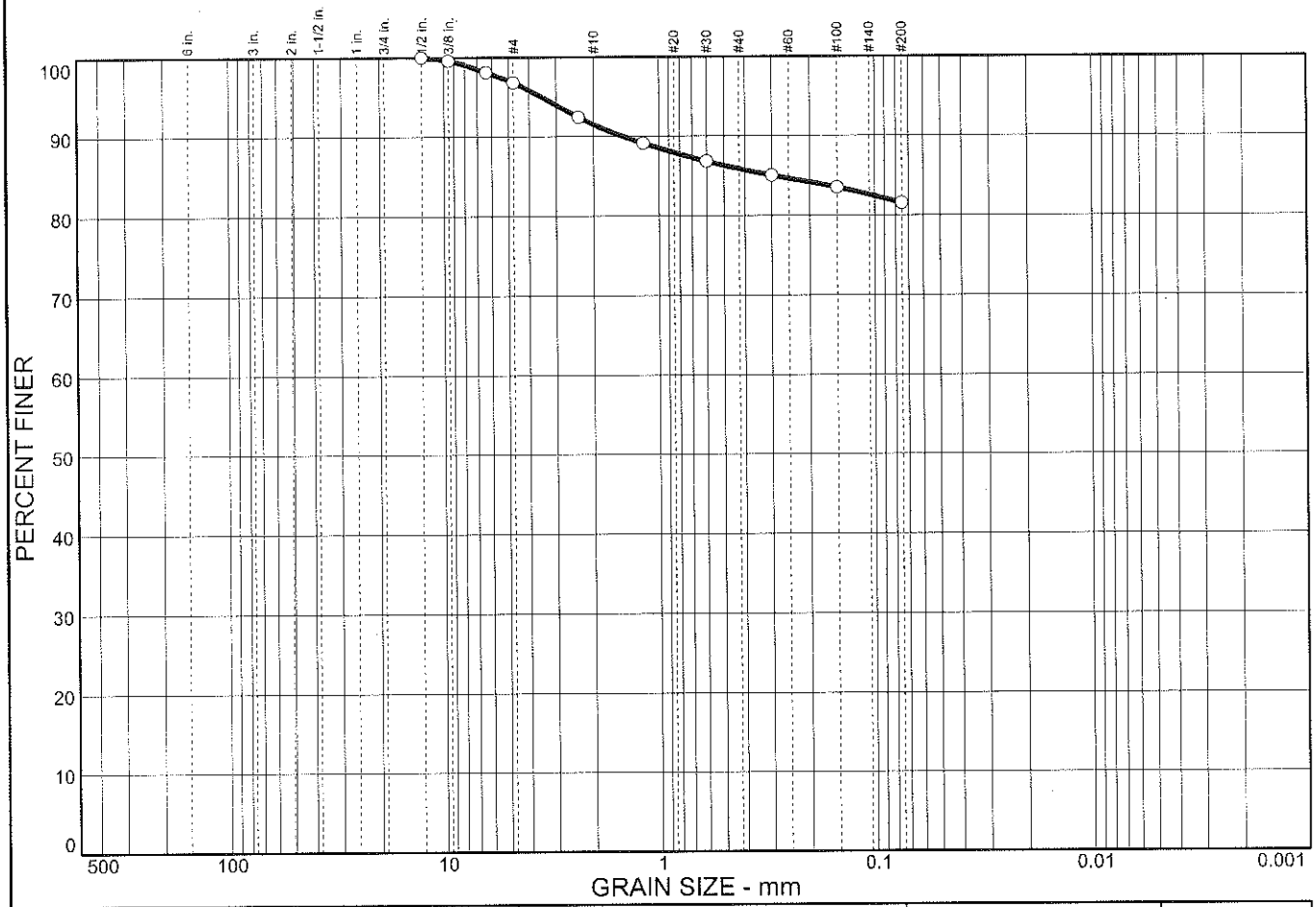
LTR-2
SAMPLE NUMBER: 20-1069

Sample No.: S-2 **Source of Sample:** B-22 **Date:** 9-10-2020
Location: B-22, S-2: 2' - 4' **Elev./Depth:** 2' - 4'

SJB SERVICES, INC.

Client: EA SCIENCE & TECHNOLOGY
Project: LABORATORY TESTING
OLD UPPER MOUNTAIN ROAD PROJECT
Project No: BT-20-123 **Plate**

Particle Size Distribution Report ASTM D-6913



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	3.2	15.3	81.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.5 in.	100.0		
.375 in.	99.6		
.25 in.	98.1		
#4	96.8		
#8	92.4		
#16	89.1		
#30	86.8		
#50	85.0		
#100	83.5		
#200	81.5		

* (no specification provided)

Soil Description

B-44, S-3: 4' - 6'

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.300 D_{60}= D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

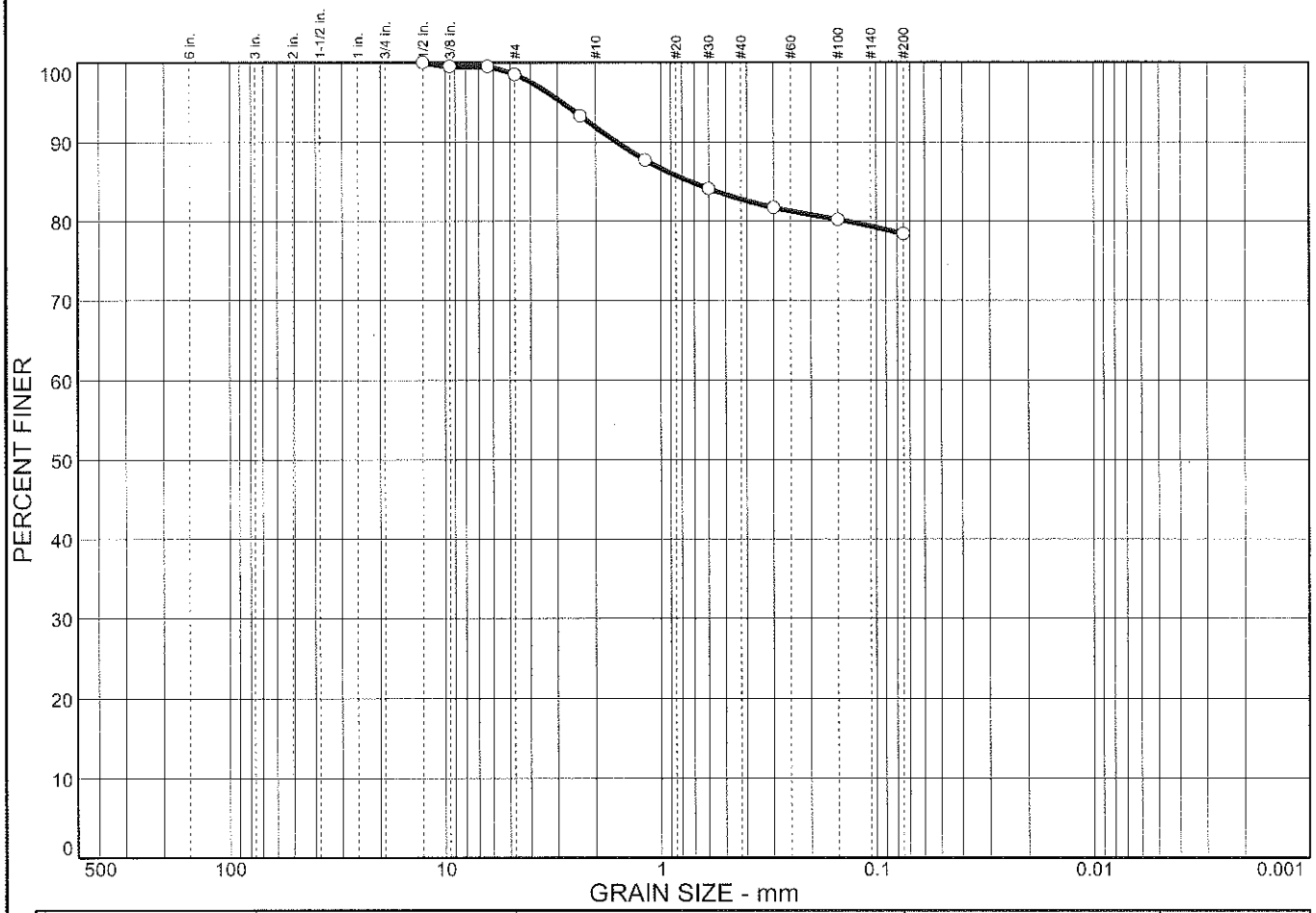
LTR-2
SAMPLE NUMBER: 20-1070

Sample No.: S-3 **Source of Sample:** B-44 **Date:** 9-10-2020
Location: B-44, S-3: 4' - 6' **Elev./Depth:** 4' - 6'

SJB SERVICES, INC.

Client: EA SCIENCE & TECHNOLOGY
Project: LABORATORY TESTING
OLD UPPER MOUNTAIN ROAD PROJECT
Project No: BT-20-123 **Plate**

Particle Size Distribution Report ASTM D-6913



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	1.5	20.1	78.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.5 in.	100.0		
.375 in.	99.5		
.25 in.	99.5		
#4	98.5		
#8	93.3		
#16	87.7		
#30	84.1		
#50	81.7		
#100	80.2		
#200	78.4		

* (no specification provided)

Soil Description

B-49, S-7: 15' - 17'

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.733 D_{60}= D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

LTR-2
SAMPLE NUMBER: 20-1071

Sample No.: S-7 **Source of Sample:** B-49 **Date:** 9-10-2020
Location: B-49, S-7: 15' - 17' **Elev./Depth:** 15' - 17'

SJB SERVICES, INC.

Client: EA SCIENCE & TECHNOLOGY
Project: LABORATORY TESTING
OLD UPPER MOUNTAIN ROAD PROJECT
Project No: BT-20-123 **Plate**

SJB SERVICES, INC.

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and
Testing

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PROJECT: LABORATORY TESTING
OLD UPPER MOUNTAIN ROAD SITE

CLIENT: EA SCIENCE & TECHNOLOGY

PROJECT NO. BT-20-123

REPORT NO.: LTR-3

DATE: SEPTEMBER 24, 2020

This report presents the results of laboratory testing performed on various soils & rock samples collected from the above referenced project site. All results contained in this report represent the samples listed in work order #10528.01 as received from the Client.

The testing conducted was as follows:

ASTM D 854
Specific Gravity of Soils

ASTM D-2216
Laboratory Determination of Water (Moisture) Content of Soil &Rock

ASTM D-4318
Liquid Limit, Plastic Limit, and Plasticity Index of Soil

ASTM D-6913
Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

ASTM D-5731
Determination of the Uniaxial Compressive Strength of Rock
Using the Point Load Test

Samples were received at the SJB Services, Inc. laboratory from the Client on September 4, 2020 where they were processed for testing.

The results of the report relate only to the items inspected or tested. The report shall not be reproduced, except in full, without the written approval of SJB Services, Inc. If you have any questions regarding the report, please do not hesitate to contact our office.

Sincerely,
SJB SERVICES, INC.

Paul Gregorczyk
Laboratory Manager

Buffalo Office
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Laboratory Test Report

PROJECT: **Laboratory Testing**
Old Upper Mountain Road Site

CLIENT: **EA Science & Technology**

DATE: **September 24, 2020**

PROJECT NO.: BT-20-123
REPORT NO.: LTR-3

ASTM D-2216:Laboratory Determination of Water (Moisture) Content of Soil &Rock
ASTM D-854: Specific Gravity of Soils

SJB Sample Number	Sample Location	Moisture Content	Specific Gravity at 20°C
20-1097	B-32, S-2: 2' -4'	16.0 %	2.69
20-1098	B-32, S-6: 10' – 12'	14.1 %	2.69
20-1099	B-32, S-8: 14' – 16'	14.6 %	2.71

ASTM D-2216:Laboratory Determination of Water (Moisture) Content of Soil &Rock

SJB Sample Number	Sample Location	Moisture Content
20-1100	B-32, S-1: 0' – 2'	11.5 %
20-1101	B-32, S-4: 6' – 8'	19.0 %

ASTM D-2216:Laboratory Determination of Water (Moisture) Content of Soil &Rock
ASTM D-4318: Liquid Limit, Plastic Limit, and Plasticity Index of Soil

SJB Sample Number	Sample Location	Moisture Content	Liquid Limit	Plastic Limit	Plasticity Index
20-1102	B-33, S-3: 4' – 6'	19.8 %	37	22	15

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Laboratory Test Report

PROJECT: **Laboratory Testing**
Old Upper Mountain Road Site

CLIENT: **EA Science & Technology**

DATE: **September 24, 2020**

PROJECT NO.: BT-20-123
REPORT NO.: LTR-3

SJB Sample Number: 20-1103
Sample Location: B-11, S-1: 0' – 2'

ASTM D-2216:Laboratory Determination of Water (Moisture) Content of Soil &Rock

Moisture Content = 7.4 %

ASTM D-6913: Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

Sieve Size	*Percent Passing*
1 ½"	100.0
1"	92.9
¾"	87.7
½"	84.8
⅜"	78.1
¼"	71.0
#4	67.1
#8	60.0
#16	54.4
#30	49.0
#50	43.2
#100	39.3
#200	36.5

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Laboratory Test Report

PROJECT: **Laboratory Testing**
Old Upper Mountain Road Site

CLIENT: **EA Science & Technology**

DATE: **September 24, 2020**

PROJECT NO.: BT-20-123
REPORT NO.: LTR-3

SJB Sample Number: 20-1104
Sample Location: B-16A, S-3: 4' – 6'

ASTM D-2216:Laboratory Determination of Water (Moisture) Content of Soil &Rock

Moisture Content = 11.4 %

ASTM D-6913: Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

Sieve Size	*Percent Passing*
1 ½"	100.0
1"	93.6
¾"	87.0
½"	77.0
3/8"	72.2
¼"	67.0
#4	63.5
#8	58.2
#16	55.5
#30	54.0
#50	52.9
#100	50.6
#200	44.0

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Laboratory Test Report

PROJECT: **Laboratory Testing**
Old Upper Mountain Road Site

CLIENT: **EA Science & Technology**

DATE: **September 24, 2020**

PROJECT NO.: BT-20-123
REPORT NO.: LTR-3

SJB Sample Number: 20-1105
Sample Location: B-32, S-3: 4' – 6'

ASTM D-2216:Laboratory Determination of Water (Moisture) Content of Soil &Rock

Moisture Content = 17.7 %

ASTM D-6913: Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

Sieve Size	*Percent Passing*
1 ½"	100.0
1"	93.7
¾"	90.6
½"	82.0
3/8"	80.1
¼"	77.9
#4	77.4
#8	74.5
#16	71.3
#30	68.6
#50	65.3
#100	60.9
#200	57.2

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Laboratory Test Report

PROJECT: **Laboratory Testing**
Old Upper Mountain Road Site

CLIENT: **EA Science & Technology**

DATE: **September 24, 2020**

PROJECT NO.: BT-20-123
REPORT NO.: LTR-3

SJB Sample Number: 20-1106
Sample Location: B-32, S-5: 8' – 10'

ASTM D-2216:Laboratory Determination of Water (Moisture) Content of Soil &Rock

Moisture Content = 13.3 %

ASTM D-6913: Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

Sieve Size	*Percent Passing*
1 ½"	100.0
1"	90.7
¾"	87.8
½"	83.6
3/8"	79.5
¼"	72.1
#4	66.9
#8	57.7
#16	53.4
#30	51.0
#50	49.2
#100	47.1
#200	42.6

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Laboratory Test Report

PROJECT: **Laboratory Testing**
Old Upper Mountain Road Site

CLIENT: **EA Science & Technology**

DATE: **September 24, 2020**

PROJECT NO.: BT-20-123
REPORT NO.: LTR-3

SJB Sample Number: 20-1107
Sample Location: B-32, S-7: 12' – 14'

ASTM D-2216:Laboratory Determination of Water (Moisture) Content of Soil &Rock

Moisture Content = 17.9 %

ASTM D-6913: Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

Sieve Size	*Percent Passing*
1 ½"	100.0
1"	93.9
¾"	81.0
½"	77.2
3/8"	75.8
¼"	71.7
#4	67.9
#8	59.5
#16	52.7
#30	48.4
#50	46.5
#100	45.2
#200	42.3

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Laboratory Test Report

PROJECT: **Laboratory Testing**
Old Upper Mountain Road Site

CLIENT: **EA Science & Technology**

DATE: **September 24, 2020**

PROJECT NO.: BT-20-123
REPORT NO.: LTR-3

SJB Sample Number: 20-1108
Sample Location: B-33, S-1: 0' – 2'

ASTM D-2216:Laboratory Determination of Water (Moisture) Content of Soil &Rock

Moisture Content = 12.6 %

ASTM D-6913: Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

Sieve Size	*Percent Passing*
1 ½"	100.0
1"	92.4
¾"	84.4
½"	83.6
3/8"	81.5
¼"	79.1
#4	77.1
#8	72.3
#16	68.8
#30	65.6
#50	60.5
#100	52.3
#200	45.5

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Laboratory Test Report

PROJECT: **Laboratory Testing**
Old Upper Mountain Road Site

CLIENT: **EA Science & Technology**

DATE: **September 24, 2020**

PROJECT NO.: BT-20-123
REPORT NO.: LTR-3

SJB Sample Number: 20-1109
Sample Location: B-35, S-1: 0' – 2'

ASTM D-6913: Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

Sieve Size	*Percent Passing*
½"	100.0
3/8"	98.9
¼"	98.5
#4	97.7
#8	96.5
#16	95.1
#30	93.5
#50	91.6
#100	89.0
#200	86.0

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Laboratory Test Report

PROJECT: **Laboratory Testing**
Old Upper Mountain Road Site

CLIENT: **EA Science & Technology**

DATE: **September 24, 2020**

PROJECT NO.: BT-20-123
REPORT NO.: LTR-3

SJB Sample Number: 20-1110
Sample Location: B-36, S-2: 2' – 4'

ASTM D-6913: Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

Sieve Size	*Percent Passing*
1 ½"	100.0
1"	92.5
¾"	88.2
½"	80.5
⅜"	78.3
¼"	75.6
#4	72.5
#8	65.2
#16	59.3
#30	54.2
#50	49.7
#100	45.8
#200	42.7

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Laboratory Test Report

PROJECT: **Laboratory Testing**
Old Upper Mountain Road Site

CLIENT: **EA Science & Technology**

DATE: **September 24, 2020**

PROJECT NO.: BT-20-123
REPORT NO.: LTR-3

SJB Sample Number: 20-1111
Sample Location: B-37, S-1: 0' – 2'

ASTM D-6913: Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

Sieve Size	*Percent Passing*
¾"	100.0
½"	97.8
3/8"	95.8
¼"	92.2
#4	89.3
#8	83.0
#16	77.0
#30	71.3
#50	65.9
#100	60.0
#200	54.2

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Laboratory Test Report

PROJECT: **Laboratory Testing**
Old Upper Mountain Road Site

CLIENT: **EA Science & Technology**

DATE: **September 24, 2020**

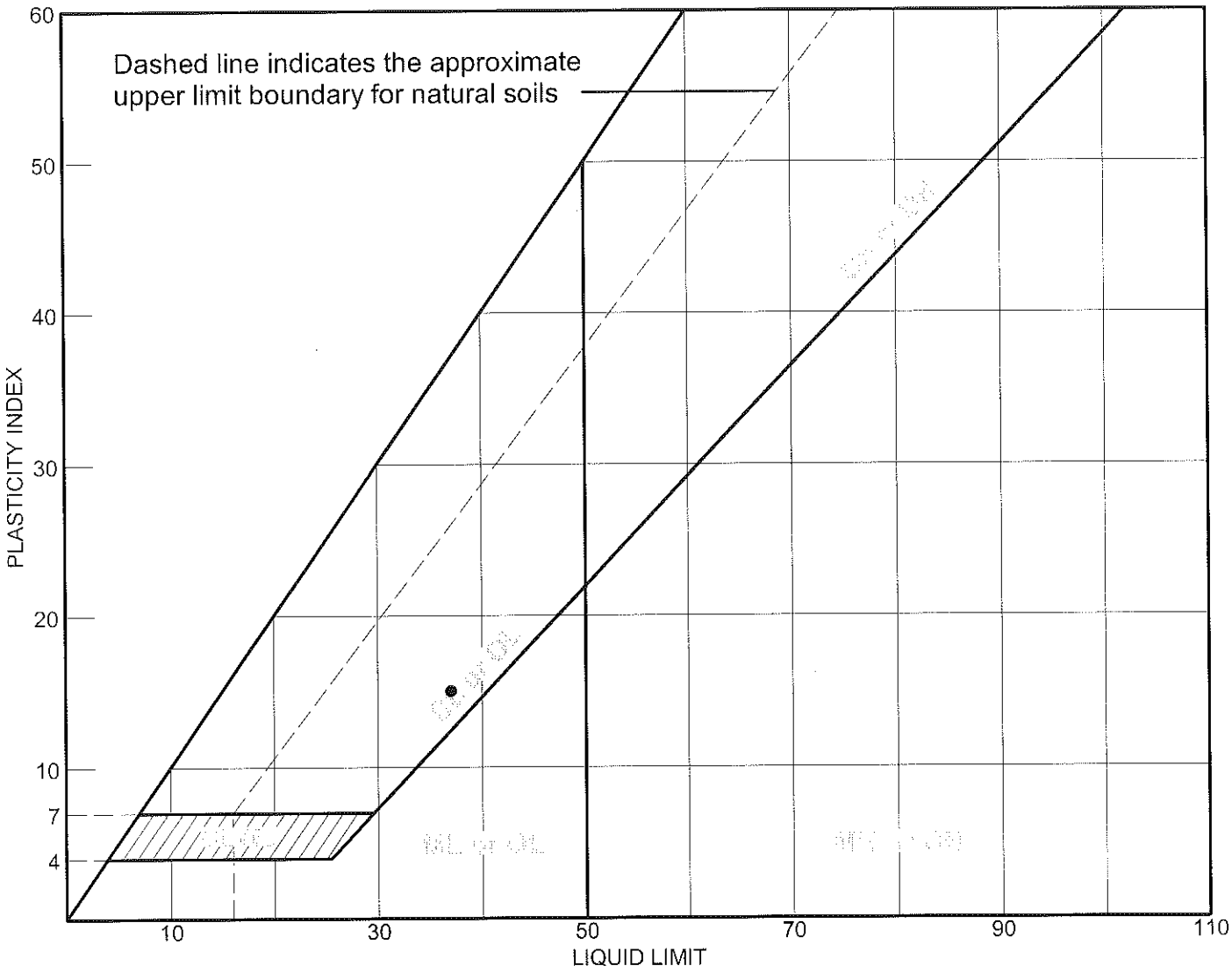
PROJECT NO.: BT-20-123
REPORT NO.: LTR-3

ASTM D-5731
Determination of the Uniaxial Compressive Strength of Rock
Using the Point Load Test

Sample Number	Sample Location	Rock Type	Sample Diameter inches	Failure Load lbs.	Uncorrected Point Load Strength Index psi	Uniaxial Compressive Strength psi
20-1112	B-11, C-3: 14.0'	Limestone	1.98	2387	609	14,000
20-1113	B-33, C-1: 11.0'	Limestone	1.98	2387	609	14,000
20-1114	B-35, C-1: 8.0'	Limestone	1.98	2864	731	16,800
20-1115	B-36, C-1: 8.0'	Limestone	1.97	1719	443	10,190
20-1116	B-37, C-2: 9.0'	Limestone	1.98	1623	414	9,520

REMARKS: Diametral testing was utilized to obtain results

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	B-33	S-3	4' - 6'	19.8 %	22	37	15	

LIQUID AND PLASTIC LIMITS TEST REPORT

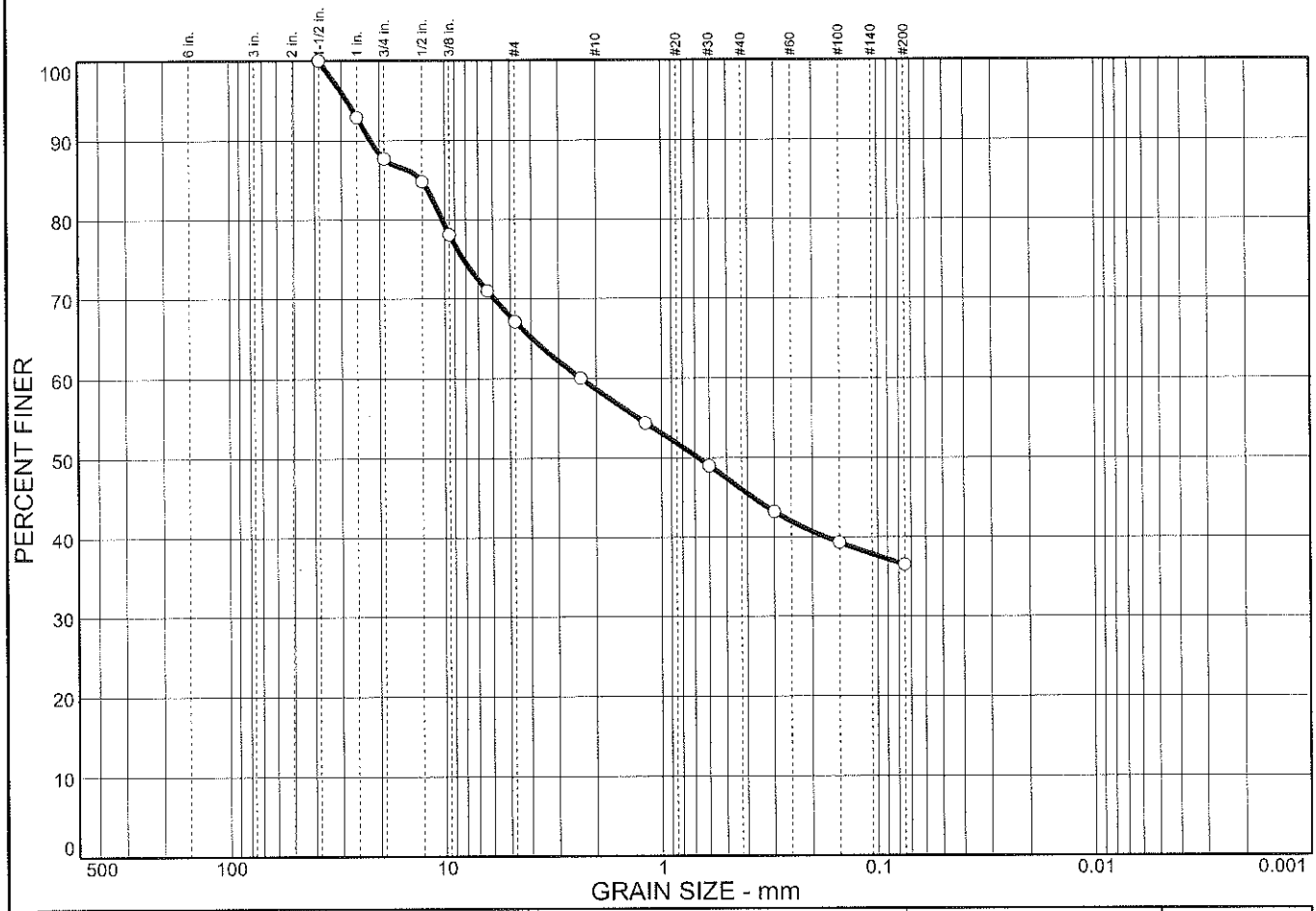
SJB SERVICES, INC.

Client: EA SCIENCE & TECHNOLOGY

Project: LABORATORY TESTING
OLD UPPER MOUNTAIN ROAD PROJECT

Project No.: BT-20-123 **Plate**

Particle Size Distribution Report ASTM D-6913



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	32.9	30.6	36.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5 in.	100.0		
1 in.	92.9		
.75 in.	87.7		
.5 in.	84.8		
.375 in.	78.1		
.25 in.	71.0		
#4	67.1		
#8	60.0		
#16	54.4		
#30	49.0		
#50	43.2		
#100	39.3		
#200	36.5		

* (no specification provided)

Soil Description

B-11, S-1: 0' - 2'

MOISTURE CONTENT = 7.4 %

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 12.9 D_{60}= 2.36 D_{50}= 0.676
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

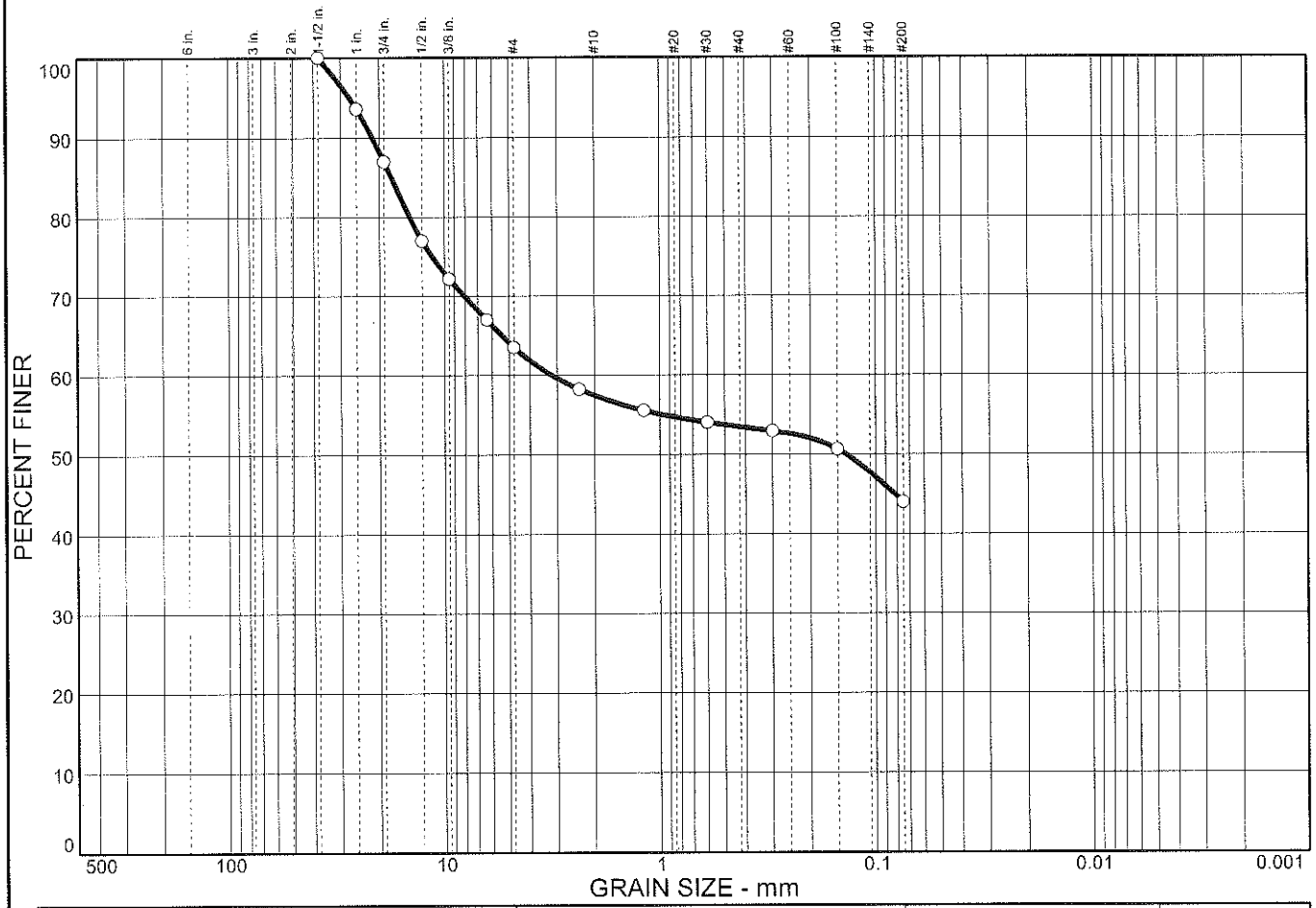
LTR-3
SAMPLE NUMBER: 20-1103

Sample No.: S-1 **Source of Sample:** B-11 **Date:** 9-23-2020
Location: B-11, S-1: 0' - 2' **Elev./Depth:** 0' - '2

SJB SERVICES, INC.

Client: EA SCIENCE & TECHNOLOGY
Project: LABORATORY TESTING
OLD UPPER MOUNTAIN ROAD PROJECT
Project No: BT-20-123 **Plate**

Particle Size Distribution Report ASTM D-6913



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	36.5	19.5	44.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5 in.	100.0		
1 in.	93.6		
.75 in.	87.0		
.5 in.	77.0		
.375 in.	72.2		
.25 in.	67.0		
#4	63.5		
#8	58.2		
#16	55.5		
#30	54.0		
#50	52.9		
#100	50.6		
#200	44.0		

* (no specification provided)

Soil Description

B-16A, S-3: 4' - 6'

MOISTURE CONTENT = 11.4 %

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 17.6 D_{60}= 3.19 D_{50}= 0.138
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

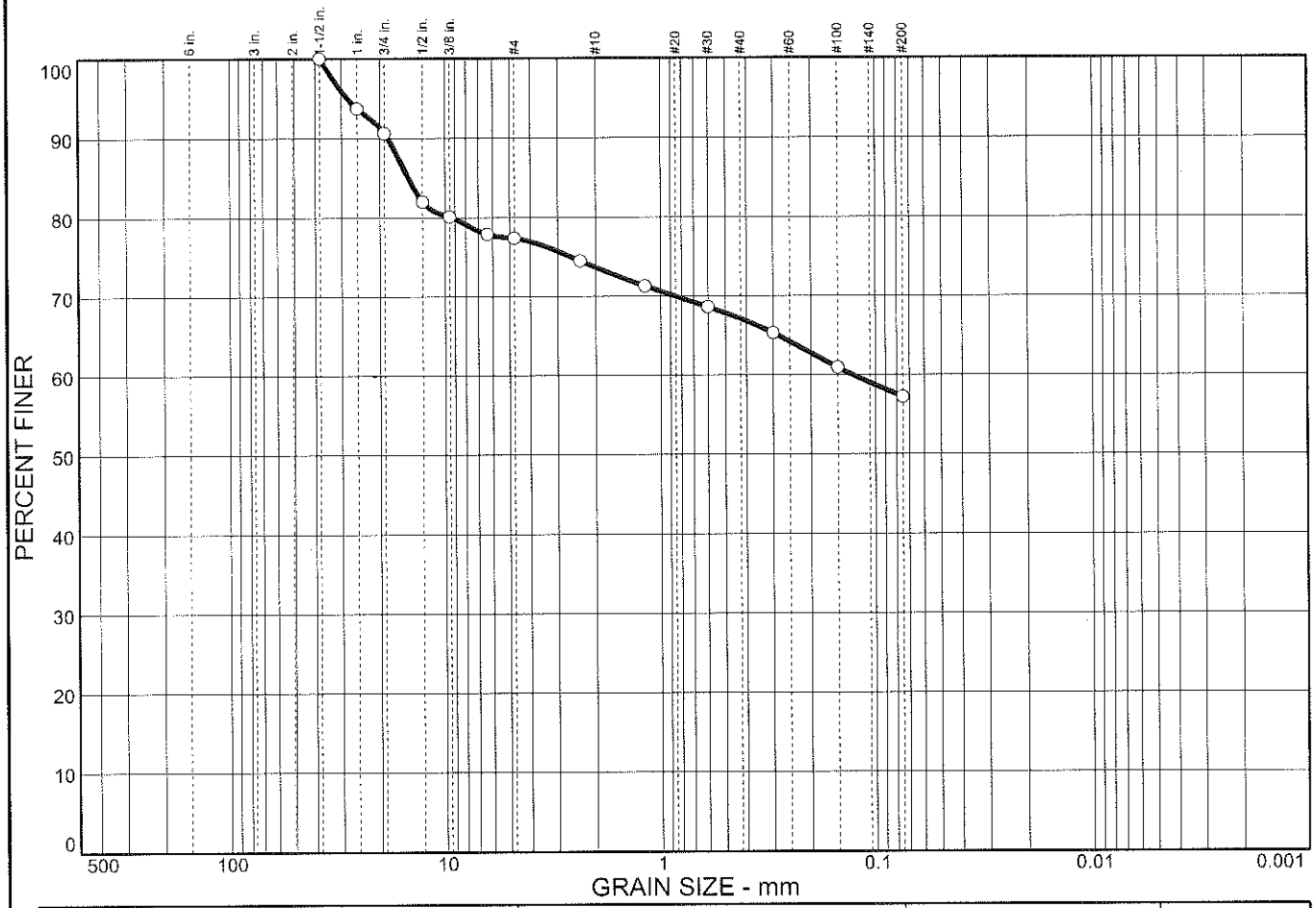
LTR-3
SAMPLE NUMBER: 20-1104

Sample No.: S-3 **Source of Sample:** B-16A **Date:** 9-23-2020
Location: B-16A, S-3: 4' - 6' **Elev./Depth:** 4' - 6'

SJB SERVICES, INC.

Client: EA SCIENCE & TECHNOLOGY
Project: LABORATORY TESTING
OLD UPPER MOUNTAIN ROAD PROJECT
Project No: BT-20-123 **Plate**

Particle Size Distribution Report ASTM D-6913



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	22.6	20.2	57.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5 in.	100.0		
1 in.	93.7		
.75 in.	90.6		
.5 in.	82.0		
.375 in.	80.1		
.25 in.	77.9		
#4	77.4		
#8	74.5		
#16	71.3		
#30	68.6		
#50	65.3		
#100	60.9		
#200	57.2		

* (no specification provided)

Soil Description

B-32, S-3: 4' - 6'

MOISTURE CONTENT = 17.7 %

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 14.8 D_{60}= 0.129 D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

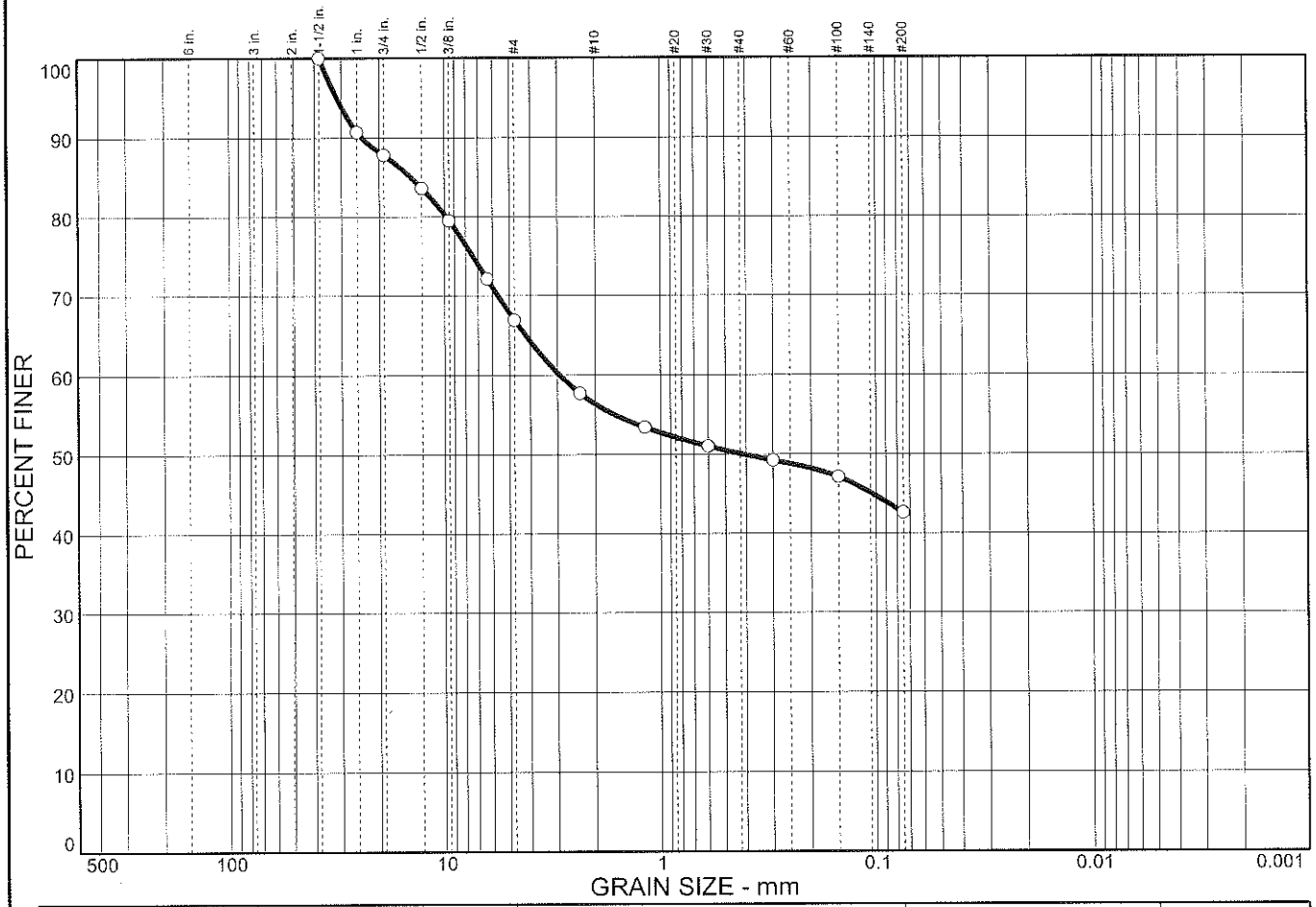
LTR-3
SAMPLE NUMBER: 20-1105

Sample No.: S-3 **Source of Sample:** B-32 **Date:** 9-23-2020
Location: B-32, S-3: 4' - 6' **Elev./Depth:** 4' - 6'

SJB SERVICES, INC.

Client: EA SCIENCE & TECHNOLOGY
Project: LABORATORY TESTING
OLD UPPER MOUNTAIN ROAD PROJECT
Project No: BT-20-123 **Plate**

Particle Size Distribution Report ASTM D-6913



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	33.1	24.3	42.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5 in.	100.0		
1 in.	90.7		
.75 in.	87.8		
.5 in.	83.6		
.375 in.	79.5		
.25 in.	72.1		
#4	66.9		
#8	57.7		
#16	53.4		
#30	51.0		
#50	49.2		
#100	47.1		
#200	42.6		

* (no specification provided)

Soil Description

B-32, S-5: 8' - 10'

MOISTURE CONTENT = 13.3 %

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 14.3 D_{60}= 2.94 D_{50}= 0.418
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

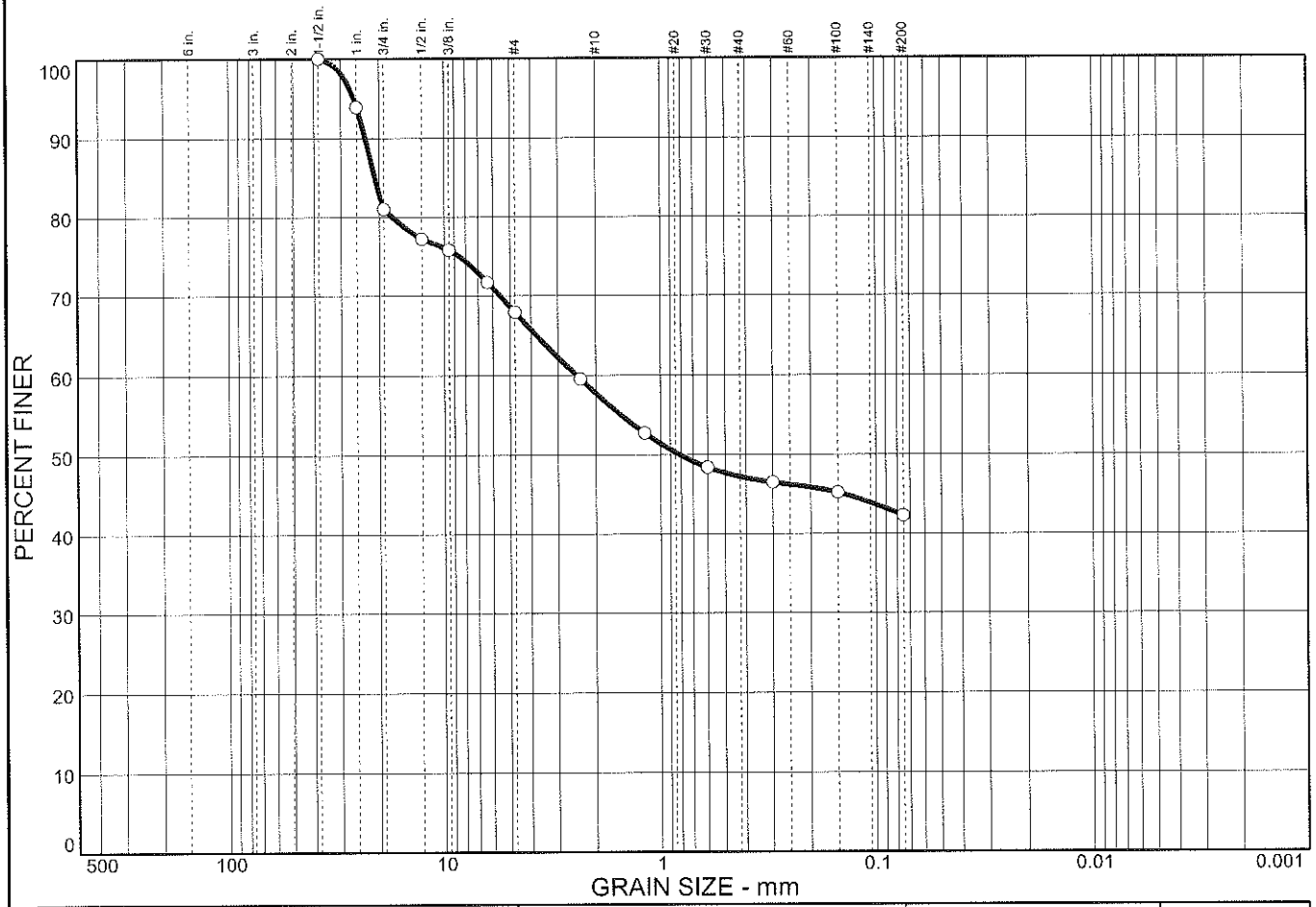
LTR-3
SAMPLE NUMBER: 20-1106

Sample No.: S-5 **Source of Sample:** B-32 **Date:** 9-23-2020
Location: B-32, S-5: 8' - 10' **Elev./Depth:** 8' - 10'

SJB SERVICES, INC.

Client: EA SCIENCE & TECHNOLOGY
Project: LABORATORY TESTING
OLD UPPER MOUNTAIN ROAD PROJECT
Project No: BT-20-123 **Plate**

Particle Size Distribution Report ASTM D-6913



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	32.1	25.6	42.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5 in.	100.0		
1 in.	93.9		
.75 in.	81.0		
.5 in.	77.2		
.375 in.	75.8		
.25 in.	71.7		
#4	67.9		
#8	59.5		
#16	52.7		
#30	48.4		
#50	46.5		
#100	45.2		
#200	42.3		

* (no specification provided)

Soil Description

B-32, S-7: 12' - 14'

MOISTURE CONTENT = 17.9 %

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 21.0 D_{60}= 2.47 D_{50}= 0.813
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

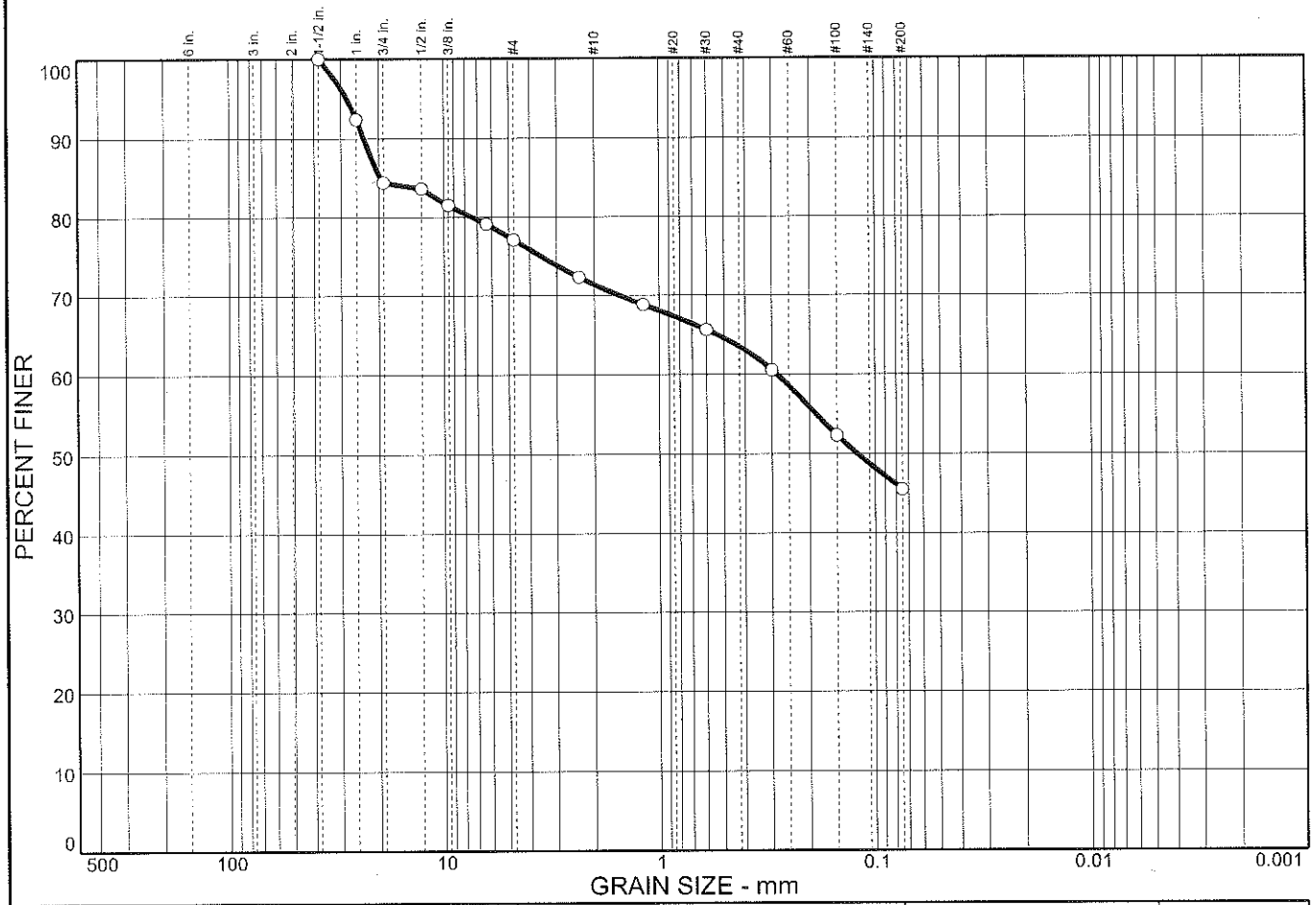
LTR-3
SAMPLE NUMBER: 20-1107

Sample No.: S-7 **Source of Sample:** B-32 **Date:** 9-23-2020
Location: B-32, S-7: 12' - 14' **Elev./Depth:** 12' - 14'

SJB SERVICES, INC.

Client: EA SCIENCE & TECHNOLOGY
Project: LABORATORY TESTING
OLD UPPER MOUNTAIN ROAD PROJECT
Project No: BT-20-123 **Plate**

Particle Size Distribution Report ASTM D-6913



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	22.9	31.6	45.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5 in.	100.0		
1 in.	92.4		
.75 in.	84.4		
.5 in.	83.6		
.375 in.	81.5		
.25 in.	79.1		
#4	77.1		
#8	72.3		
#16	68.8		
#30	65.6		
#50	60.5		
#100	52.3		
#200	45.5		

* (no specification provided)

Soil Description

B-33, S-1: 0' - 2'

MOISTURE CONTENT = 12.6 %

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 19.7 D_{60}= 0.286 D_{50}= 0.121
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

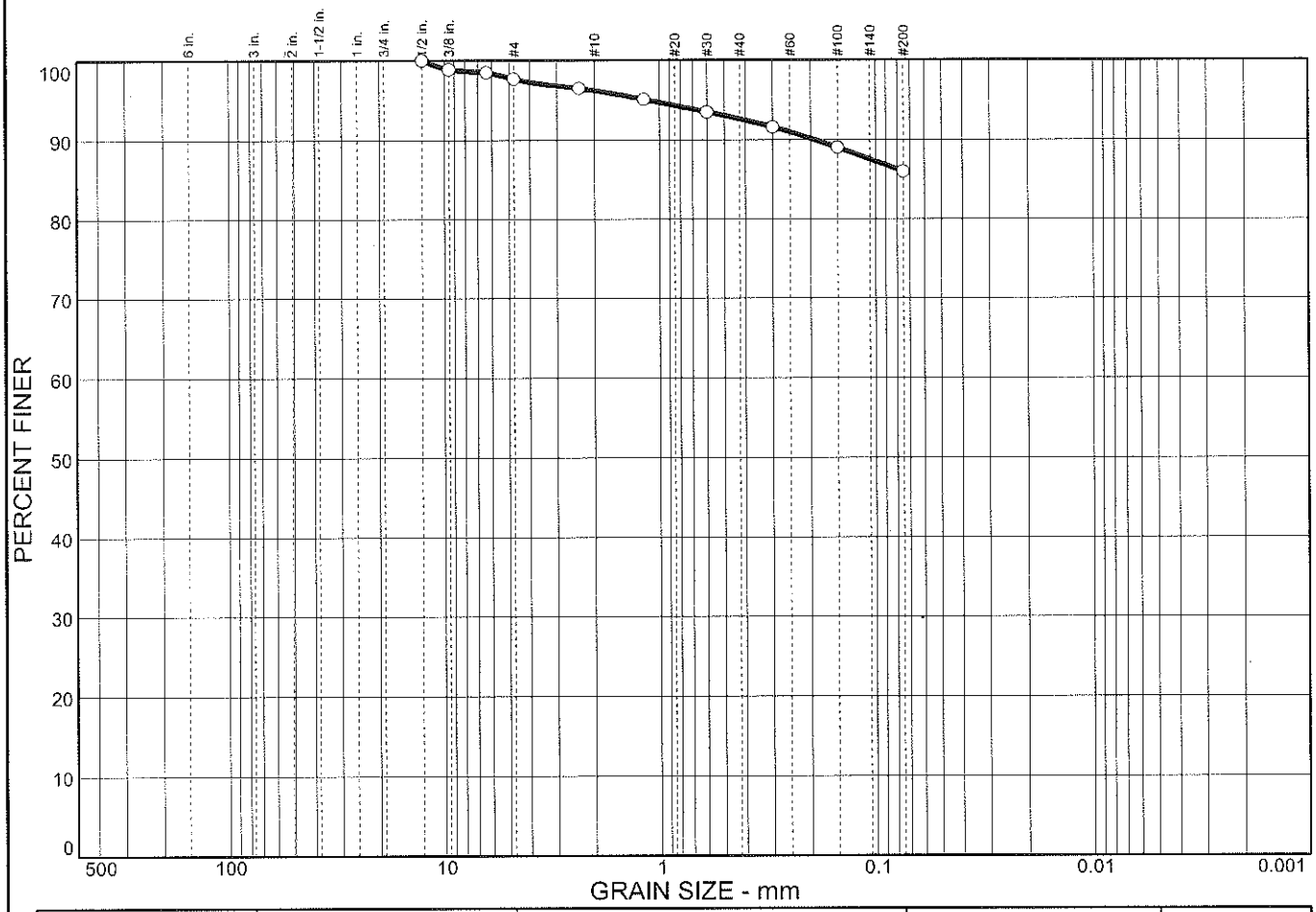
LTR-3
SAMPLE NUMBER: 20-1108

Sample No.: S-1 **Source of Sample:** B-33 **Date:** 9-23-2020
Location: B-33, S-1: 0' - 2' **Elev./Depth:** 0' - 2'

SJB SERVICES, INC.

Client: EA SCIENCE & TECHNOLOGY
Project: LABORATORY TESTING
OLD UPPER MOUNTAIN ROAD PROJECT
Project No: BT-20-123 **Plate**

Particle Size Distribution Report ASTM D-6913



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	2.3	11.7	86.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.5 in.	100.0		
.375 in.	98.9		
.25 in.	98.5		
#4	97.7		
#8	96.5		
#16	95.1		
#30	93.5		
#50	91.6		
#100	89.0		
#200	86.0		

* (no specification provided)

Soil Description

B-35, S-1: 0' - 2'

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= D_{60}= D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

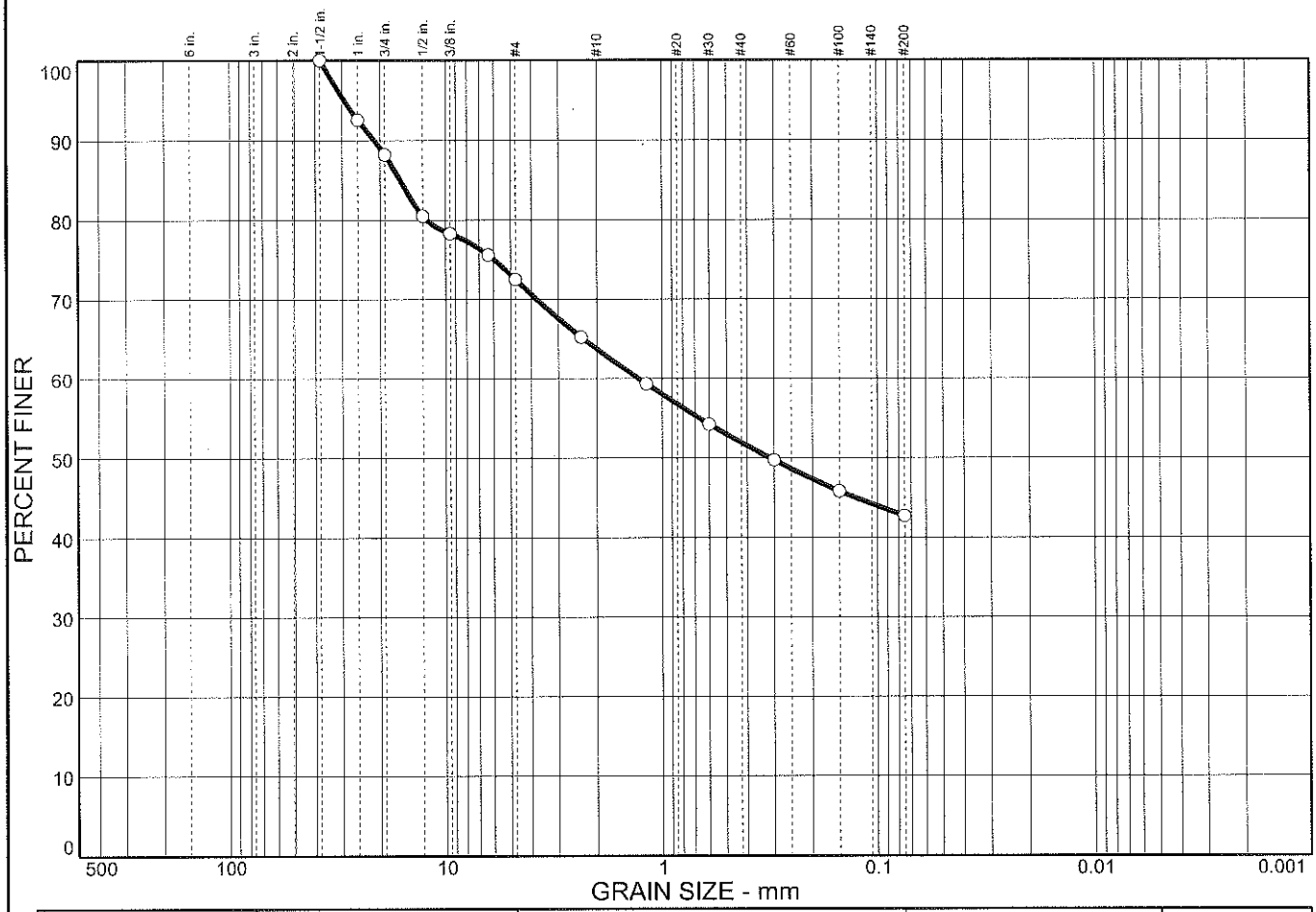
LTR-3
SAMPLE NUMBER: 20-1109

Sample No.: S-1 **Source of Sample:** B-35 **Date:** 9-23-2020
Location: B-35, S-1: 0' - 2' **Elev./Depth:** 0' - 2'

SJB SERVICES, INC.

Client: EA SCIENCE & TECHNOLOGY
Project: LABORATORY TESTING
OLD UPPER MOUNTAIN ROAD PROJECT
Project No: BT-20-123 **Plate**

Particle Size Distribution Report ASTM D-6913



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	27.5	29.8	42.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5 in.	100.0		
1 in.	92.5		
.75 in.	88.2		
.5 in.	80.5		
.375 in.	78.3		
.25 in.	75.6		
#4	72.5		
#8	65.2		
#16	59.3		
#30	54.2		
#50	49.7		
#100	45.8		
#200	42.7		

* (no specification provided)

Soil Description

B-36, S-2: 2' - 4'

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 16.2 D_{60}= 1.29 D_{50}= 0.315
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

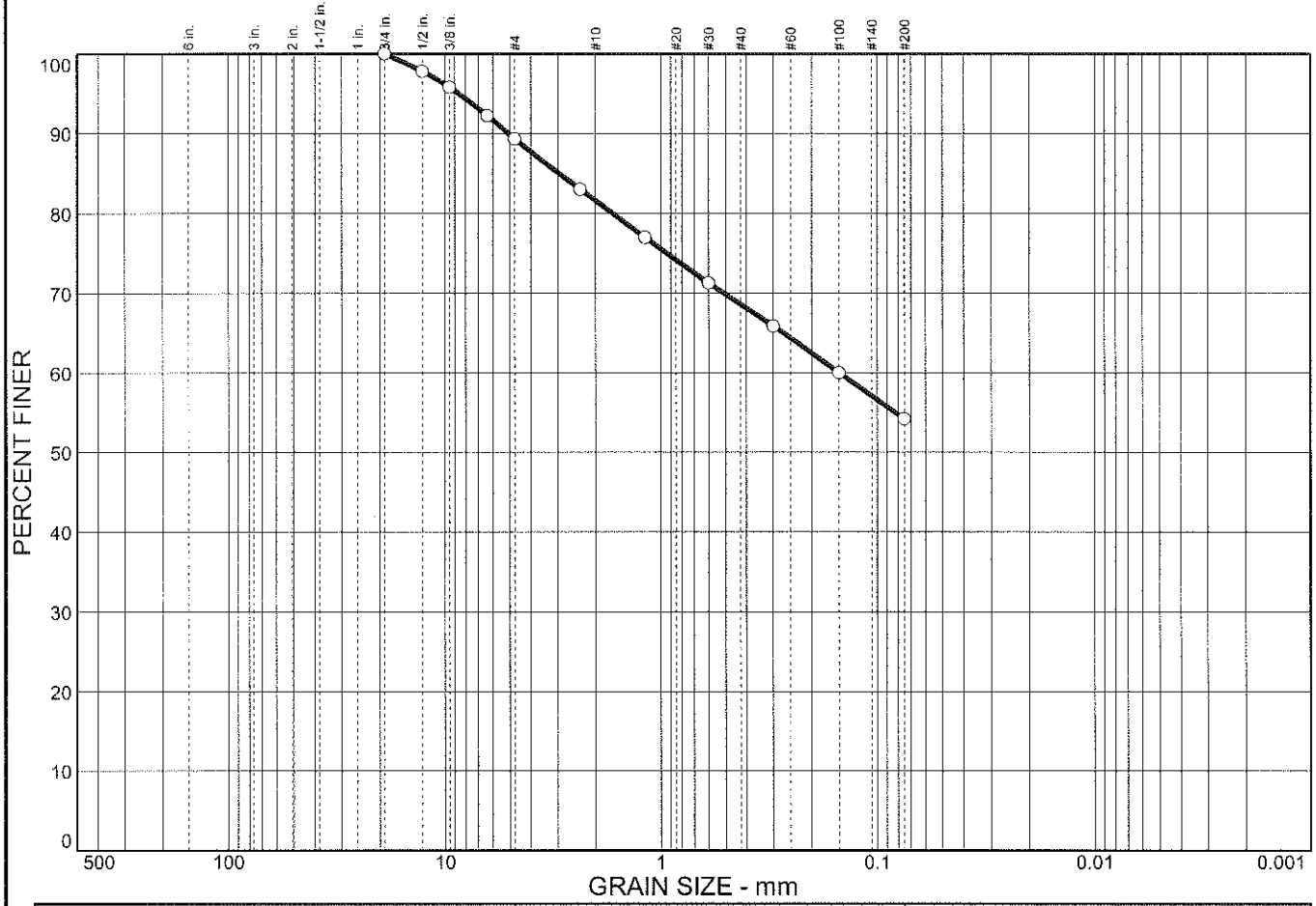
LTR-3
SAMPLE NUMBER: 20-1110

Sample No.: S-2 **Source of Sample:** B-36 **Date:** 9-23-2020
Location: B-36, S-2: 2' - 4' **Elev./Depth:** 2' - 4'

SJB SERVICES, INC.

Client: EA SCIENCE & TECHNOLOGY
Project: LABORATORY TESTING
OLD UPPER MOUNTAIN ROAD PROJECT
Project No: BT-20-123 **Plate**

Particle Size Distribution Report ASTM D-6913



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	10.7	35.1	54.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75 in.	100.0		
.5 in.	97.8		
.375 in.	95.8		
.25 in.	92.2		
#4	89.3		
#8	83.0		
#16	77.0		
#30	71.3		
#50	65.9		
#100	60.0		
#200	54.2		

* (no specification provided)

Soil Description

B-37, S-1: 0' - 2'

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 2.97 D_{60}= 0.150 D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

LTR-3
SAMPLE NUMBER: 20-1111

Sample No.: S-1 **Source of Sample:** B-37 **Date:** 9-23-2020
Location: B-37, S-1: 0' - 2' **Elev./Depth:** 0' - 2'

SJB SERVICES, INC.

Client: EA SCIENCE & TECHNOLOGY
Project: LABORATORY TESTING
OLD UPPER MOUNTAIN ROAD PROJECT
Project No: BT-20-123 **Plate**

SJB SERVICES, INC.

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PROJECT: LABORATORY TESTING
OLD UPPER MOUNTAIN ROAD SITE

CLIENT: EA SCIENCE & TECHNOLOGY

PROJECT NO. BT-20-123

REPORT NO.: LTR-4 amended

DATE: OCTOBER 22, 2020

This report presents the results of laboratory testing performed on a composite sample from B-49 from the above referenced project site. All results contained in this report represent the samples listed in work order #10528 as received from the Client.

The testing conducted was as follows:

ASTM D-2216
Laboratory Determination of Water (Moisture) Content of Soil &Rock

ASTM D-6913
Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

ASTM D-3080
Direct Shear Test of Soils Under Consolidated Drained Conditions

The sample was received at the SJB Services, Inc. laboratory from the Client on August 14, 2020 where they were processed for testing. Testing for ASTM D-3080 was subcontracted to GeoTesing Express in Acton, MA.

The report has been amended to reflect to correct ASTM D-6913 gradation results for the sample on page one. The results of the report relate only to the items inspected or tested. The report shall not be reproduced, except in full, without the written approval of SJB Services, Inc. If you have any questions regarding the report, please do not hesitate to contact our office.

Sincerely,
SJB SERVICES, INC.

Paul Gregorczyk
Laboratory Manager

Buffalo Office
5167 South Park Avenue
Hamburg, NY 14075
Phone: (716) 649-8110
Fax: (716) 649-8051

Laboratory Test Report

PROJECT: **Laboratory Testing**
Old Upper Mountain Road Site

CLIENT: **EA Science & Technology**

DATE: **October 22, 2020**

PROJECT NO.: BT-20-123
REPORT NO.: LTR-4 amended

SJB Sample Number: 20-1083
Sample Location: B-49: composite sample

ASTM D-2216:Laboratory Determination of Water (Moisture) Content of Soil &Rock

Moisture Content = 16.0 %

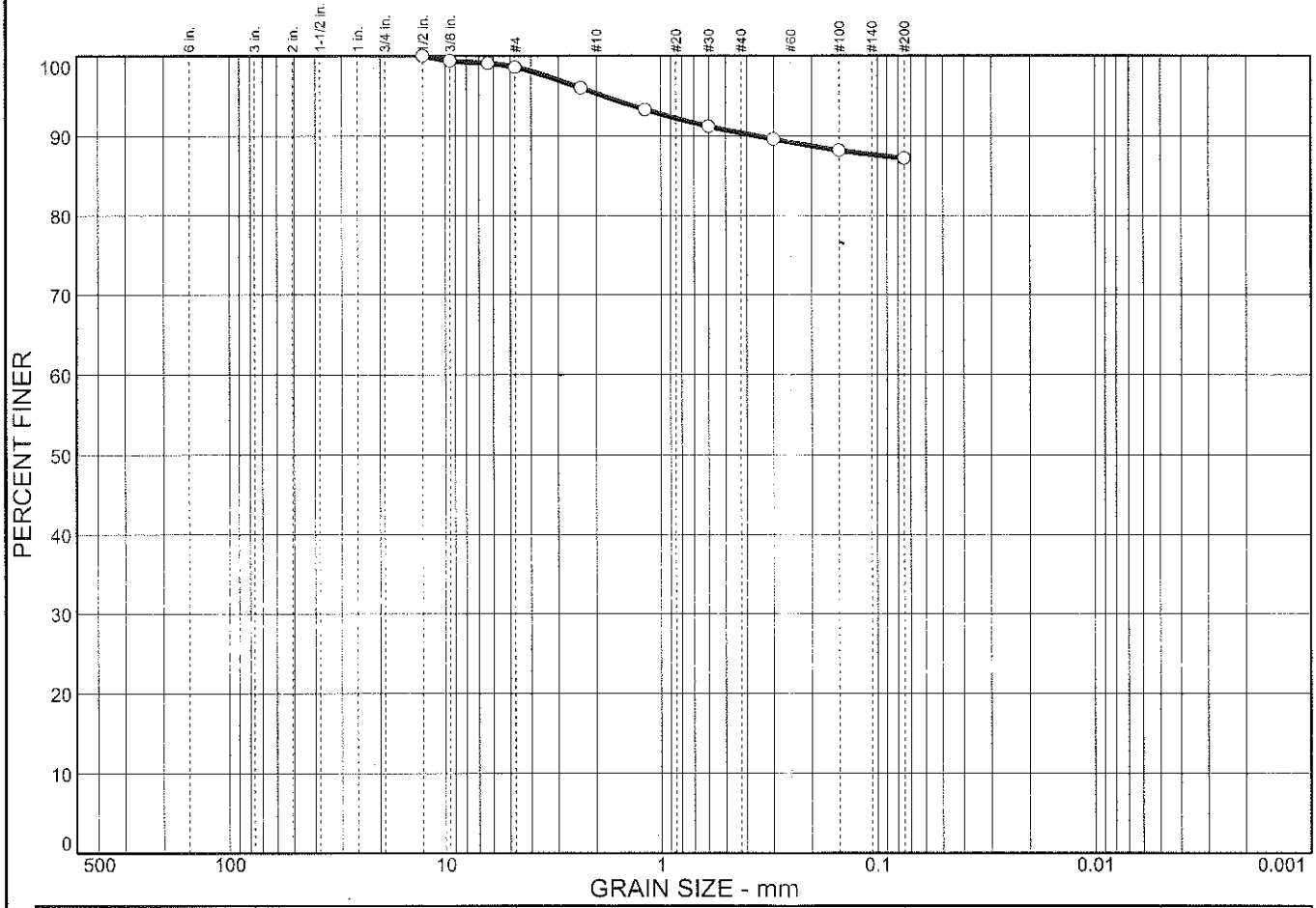
ASTM D-6913: Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

Sieve Size	*Percent Passing*
½"	100.0
3/8"	99.4
¼"	99.1
#4	98.6
#8	96.0
#16	93.3
#30	91.2
#50	89.6
#100	88.2
#200	87.2

ASTM D-3080: Direct Shear Test of Soils Under Consolidated Drained Conditions

Refer to attached sheet for test results

Particle Size Distribution Report ASTM D-6913



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	1.4	11.4	87.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.5 in.	100.0		
.375 in.	99.4		
.25 in.	99.1		
#4	98.6		
#8	96.0		
#16	93.3		
#30	91.2		
#50	89.6		
#100	88.2		
#200	87.2		

* (no specification provided)

Soil Description

B-49: COMPOSITE SAMPLE

MOISTURE CONTENT = 16.0 %

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= D_{60}= D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

LTR-4
SAMPLE NUMBER: 20-1083

Sample No.: 20-1083 **Source of Sample:** B-49 **Date:** 9-18-2020
Location: B-49: SAMPLE SAMPLE **Elev./Depth:** COMPOSITE

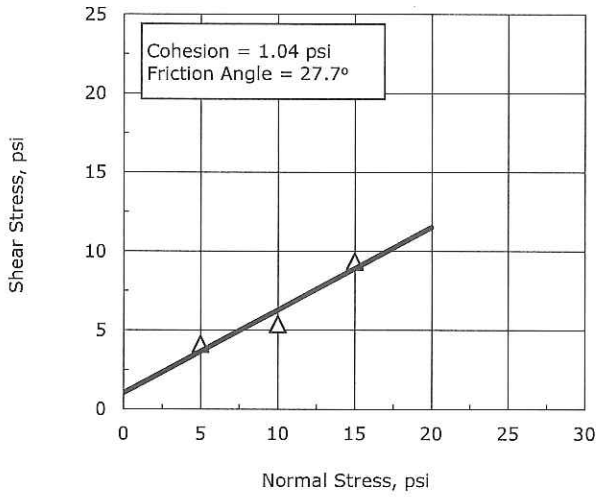
SJB SERVICES, INC.

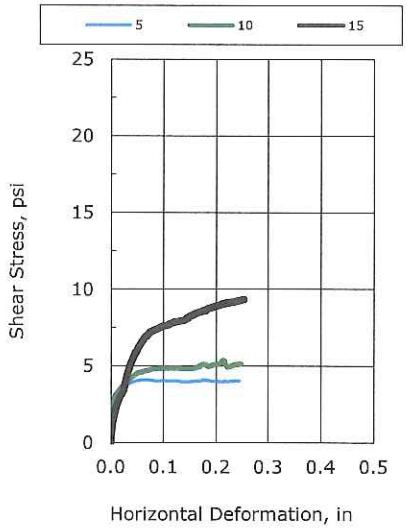
Client: EA SCIENCE & TECHNOLOGY
Project: LABORATORY TESTING
OLD UPPER MOUNTAIN ROAD PROJECT
Project No: BT-20-123 **Plate**

GeoTesting EXPRESS

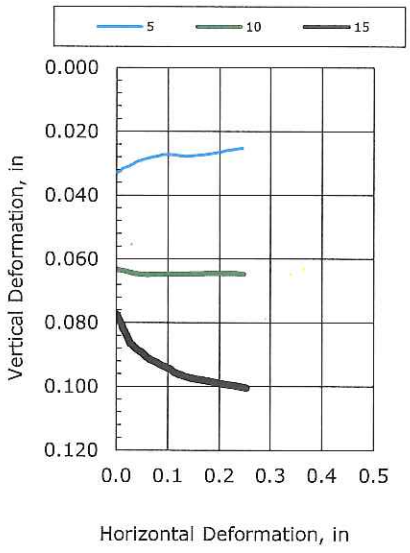
Client:	SJB Services, Inc.
Project Name:	Old Upper Mountain Rd
Project Location:	---
GTX #:	312371
Test Date:	09/26/20
Tested By:	md
Checked By:	njh
Boring ID:	B-49
Sample ID:	20-1083
Depth, ft:	COMPOSITE
Visual Description:	Moist, brown clay with sand

Direct Shear Test of Soils Under Consolidated Drained Conditions by ASTM D3080





Test No.:	DS-1	DS-2	DS-3
Initial Diameter, in:	2.5	2.5	2.5
Initial Height, in:	1.0	1.0	1.0
Initial Mass, grams:	155	155	155
Initial Dry Density, pcf:	103.5	103.5	103.5
Initial Moisture Content, %:	16.0	16.0	16.0
Initial Bulk Density, pcf:	120.1	120.1	120.1
Initial Degree of Saturation:	68.6	68.6	68.6
Initial Void Ratio:	0.63	0.63	0.63
Final Dry Density, pcf:	106.1	110.6	115.0
Final Moisture Content, %:	24.7	23.7	23.7
Final Bulk Density, pcf:	132.3	136.8	142.2
Normal Stress, psi:	5.0	10	15
Maximum Shear Stress, psi:	4.1	5.4	9.4
Shear Rate, in/min:	0.001	0.001	0.001



Sample Type:	compacted
Estimated Specific Gravity:	2.70
Liquid Limit:	---
Plastic Limit:	---
Plasticity Index:	---
% Passing #200 sieve:	---
Soil Classification:	---
Group Symbol:	---

Notes:
- Material greater than #5 sieve screened out of sample prior to testing
- Moisture content obtained before shear from sample trimmings
- Moisture Content determined by ASTM D2216
- Target Compaction: 120 pcf at the as received moisture content. Values specified by client.
- Values for cohesion and friction angle determined from best-fit straight line to the data for the specific test conditions. Actual strength parameters may vary and should be determined by an engineer for site-specific conditions.
- "---" indicates testing required to determine these values was not requested.

Contract
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PROJECT: LABORATORY TESTING
OLD UPPER MOUNTAIN ROAD SITE

CLIENT: EA SCIENCE & TECHNOLOGY

PROJECT NO. BT-20-123

REPORT NO.: LTR-5

DATE: NOVEMBER 24, 2020

This report presents the results of laboratory testing performed on various soils & rock samples collected from the above referenced project site. All results contained in this report represent the samples listed in work order #10528.01 as received from the Client on November 16, 2020.

The testing conducted was as follows:

ASTM D-2216
Laboratory Determination of Water (Moisture) Content of Soil &Rock

ASTM D-4318
Liquid Limit, Plastic Limit, and Plasticity Index of Soil

ASTM D-6913
Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

ASTM D-5731
Determination of the Uniaxial Compressive Strength of Rock
Using the Point Load Test

Samples were received at the SJB Services, Inc. laboratory from the Client on November 4, 2020 where they were processed for testing.

The results of the report relate only to the items inspected or tested. The report shall not be reproduced, except in full, without the written approval of SJB Services, Inc. If you have any questions regarding the report, please do not hesitate to contact our office.

Sincerely,
SJB SERVICES, INC.

Paul Gregorczyk
Laboratory Manager

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Laboratory Test Report

PROJECT: **Laboratory Testing**
Old Upper Mountain Road Site

CLIENT: **EA Science & Technology**

DATE: **November24, 2020**

PROJECT NO.: BT-20-123
REPORT NO.: LTR-5

ASTM D-2216:Laboratory Determination of Water (Moisture) Content of Soil &Rock
ASTM D-4318: Liquid Limit, Plastic Limit, and Plasticity Index of Soil

SJB Sample Number	Sample Location	Moisture Content	Liquid Limit	Plastic Limit	Plasticity Index
20-1335	B-45, S-6: 15' – 17'	13.3 %	36	22	14
20-1336	B-48, S-8: 25' – 27'	15.4 %	35	21	14

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Laboratory Test Report

PROJECT: **Laboratory Testing**
Old Upper Mountain Road Site

CLIENT: **EA Science & Technology**

DATE: **November24, 2020**

PROJECT NO.: BT-20-123
REPORT NO.: LTR-5

SJB Sample Number: 20-1337
Sample Location: B-45, S-3: 6' – 8'

ASTM D-2216:Laboratory Determination of Water (Moisture) Content of Soil &Rock

Moisture Content = 8.8 %

ASTM D-6913: Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

Sieve Size	*Percent Passing*
1"	100.0
¾"	94.7
½"	92.4
⅜"	91.9
¼"	90.8
#4	89.7
#8	86.7
#16	83.8
#30	81.5
#50	79.7
#100	77.7
#200	74.9

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Laboratory Test Report

PROJECT: **Laboratory Testing**
Old Upper Mountain Road Site

CLIENT: **EA Science & Technology**

DATE: **November24, 2020**

PROJECT NO.: BT-20-123
REPORT NO.: LTR-5

SJB Sample Number: 20-1338
Sample Location: B-45, S-8: 25' - 27'

ASTM D-2216:Laboratory Determination of Water (Moisture) Content of Soil &Rock

Moisture Content = 17.6 %

ASTM D-6913: Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

Sieve Size	*Percent Passing*
¾"	100.0
½"	91.7
3/8"	89.5
¼"	88.3
#4	87.8
#8	86.1
#16	84.3
#30	82.4
#50	79.8
#100	75.8
#200	71.3

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DATE: **November24, 2020**

PROJECT NO.: BT-20-123
REPORT NO.: LTR-5

SJB Sample Number: 20-1339
Sample Location: B-47, S-2: 2' – 4'

ASTM D-2216:Laboratory Determination of Water (Moisture) Content of Soil &Rock

Moisture Content = 17.8 %

ASTM D-6913: Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

Sieve Size	*Percent Passing*
1"	100.0
¾"	95.3
½"	89.4
3/8"	88.8
¼"	85.9
#4	85.2
#8	82.0
#16	77.6
#30	72.7
#50	68.2
#100	63.6
#200	57.9

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CLIENT: **EA Science & Technology**

DATE: **November24, 2020**

PROJECT NO.: BT-20-123
REPORT NO.: LTR-5

SJB Sample Number: 20-1340
Sample Location: B-48, S-5: 10' - 12'

ASTM D-2216:Laboratory Determination of Water (Moisture) Content of Soil &Rock

Moisture Content = 9.5 %

ASTM D-6913: Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

Sieve Size	*Percent Passing*
1"	100.0
¾"	88.7
½"	84.3
3/8"	83.4
¼"	82.7
#4	82.0
#8	78.0
#16	72.5
#30	67.2
#50	60.4
#100	55.2
#200	52.0

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Laboratory Test Report

PROJECT: **Laboratory Testing**
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CLIENT: **EA Science & Technology**

DATE: **November24, 2020**

PROJECT NO.: BT-20-123
REPORT NO.: LTR-5

SJB Sample Number: 20-1349
Sample Location: B-48, S-11: 40' – 2'

ASTM D-2216:Laboratory Determination of Water (Moisture) Content of Soil &Rock

Moisture Content = 10.0 %

ASTM D-6913: Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

Sieve Size	*Percent Passing*
1 ½"	100.0
1"	89.3
¾"	78.7
½"	75.6
3/8"	74.3
¼"	70.8
#4	68.1
#8	58.9
#16	51.4
#30	46.0
#50	41.9
#100	38.6
#200	34.2

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Old Upper Mountain Road Site

CLIENT: **EA Science & Technology**

DATE: **November24, 2020**

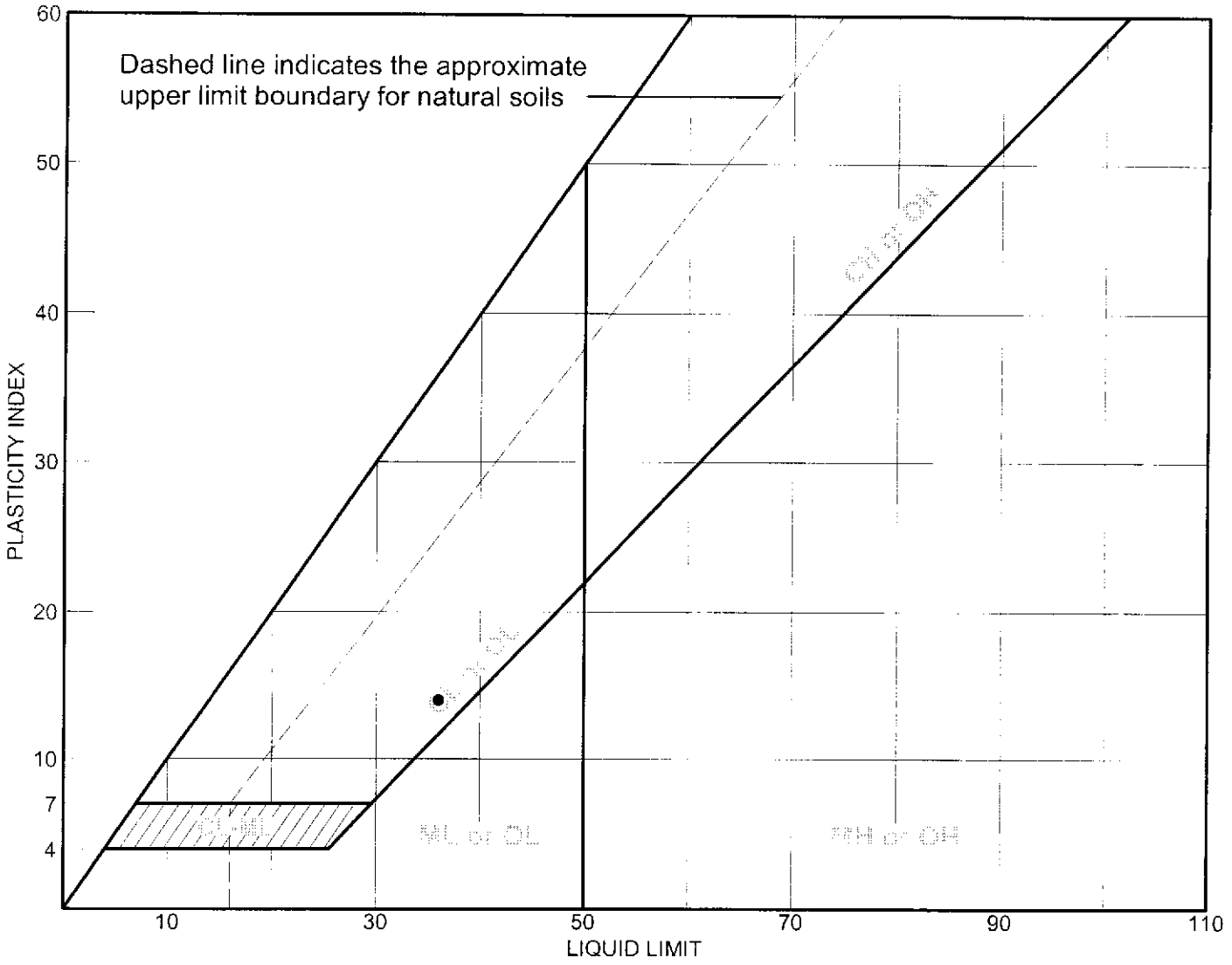
PROJECT NO.: BT-20-123
REPORT NO.: LTR-5

ASTM D-5731
Determination of the Uniaxial Compressive Strength of Rock
Using the Point Load Test

Sample Number	Sample Location	Rock Type	Sample Diameter inches	Failure Load lbs.	Uncorrected Point Load Strength Index psi	Uniaxial Compressive Strength psi
20-1342	B-45, C-1: 34.0'	Limestone with Shale	1.97	286	74	1,770
20-1343	B-47, C-3: 16.0'	Limestone	1.98	1623	414	9,940
20-1344	B-47, C-6: 32.0'	Limestone with Shale	1.98	382	97	2,340
20-1345	B-47, C-11: 57'	Limestone	1.98	1909	487	11,690

REMARKS: Diametral testing was utilized to obtain results

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	B-45	S-6	15' - 17'	13.3 %	22	36	14	

LIQUID AND PLASTIC LIMITS TEST REPORT

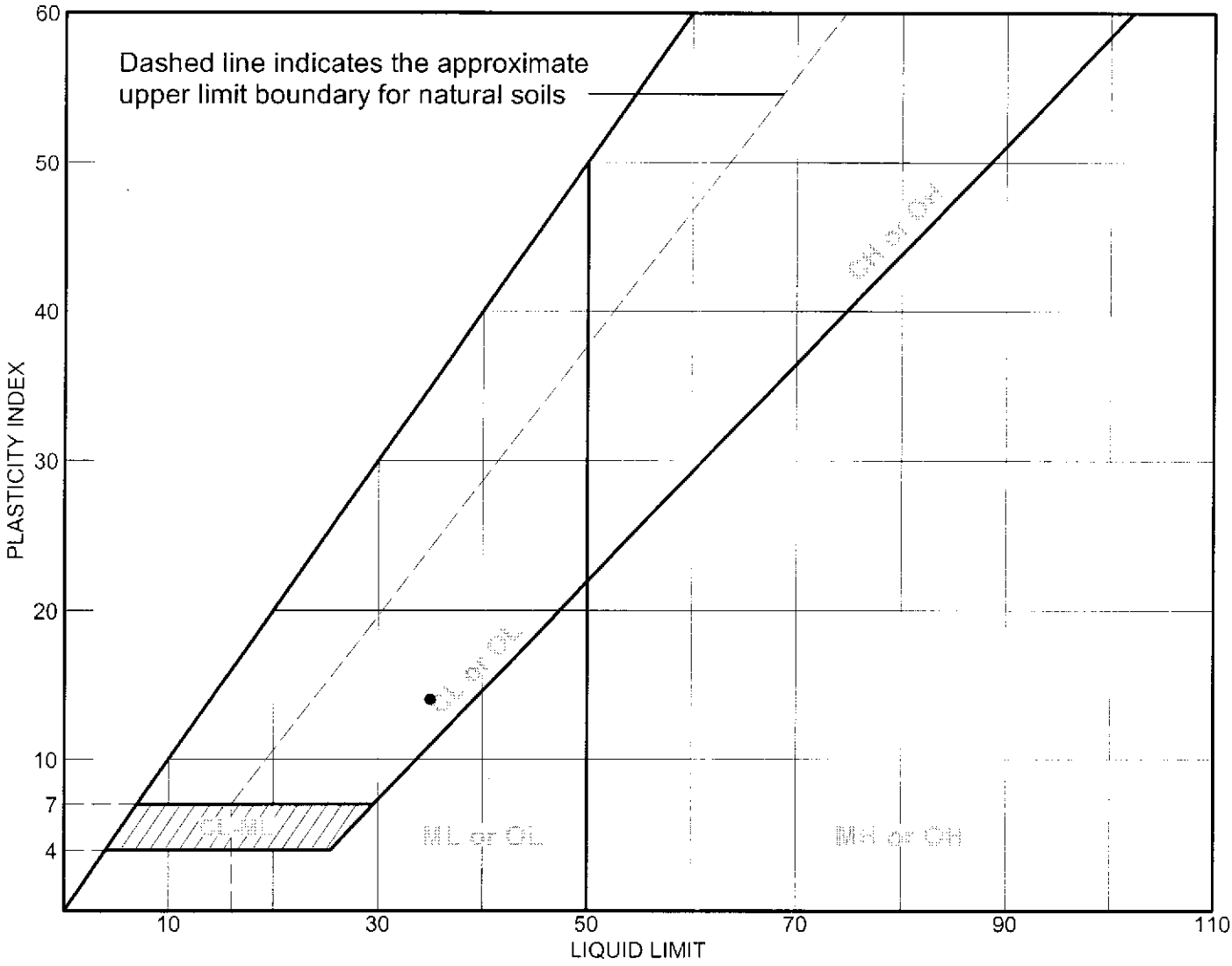
SJB SERVICES, INC.

Client: EA SCIENCE & TECHNOLOGY

Project: LABORATORY TESTING
OLD UPPER MOUNTAIN ROAD PROJECT

Project No.: BT-20-123 **Plate**

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	B-48	S-8	25' - 27'	15.4	21	35	14	

LIQUID AND PLASTIC LIMITS TEST REPORT

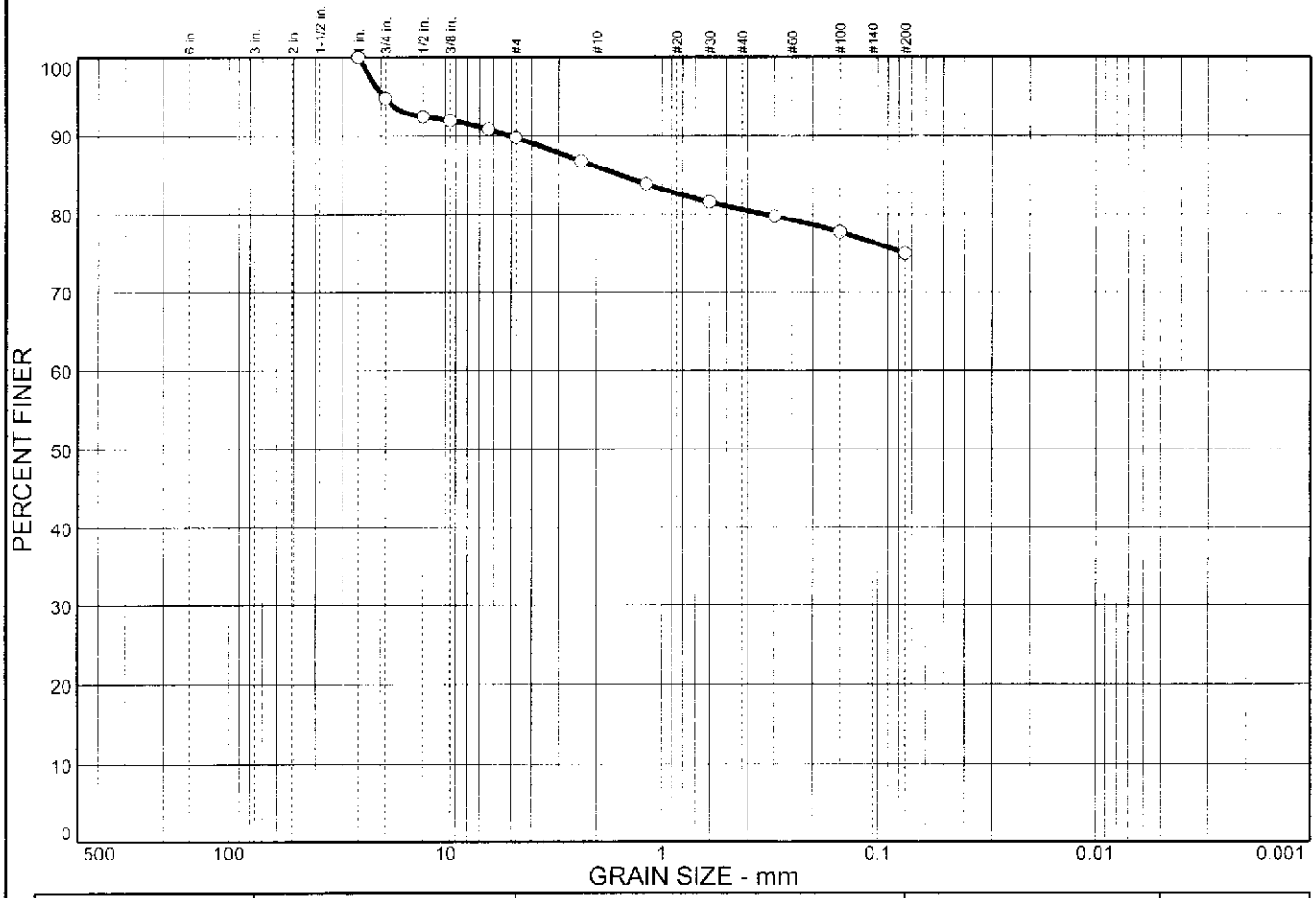
SJB SERVICES, INC.

Client: EA SCIENCE & TECHNOLOGY

Project: LABORATORY TESTING
OLD UPPER MOUNTAIN ROAD PROJECT

Project No.: BT-20-123 **Plate**

Particle Size Distribution Report ASTM D-6913



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	10.3	14.8	74.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 in.	100.0		
.75 in.	94.7		
.5 in.	92.4		
.375 in.	91.9		
.25 in.	90.8		
#4	89.7		
#8	86.7		
#16	83.8		
#30	81.5		
#50	79.7		
#100	77.7		
#200	74.9		

* (no specification provided)

Soil Description

B-45, S-3: 6' - 8'

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 1.59 D_{60}= D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

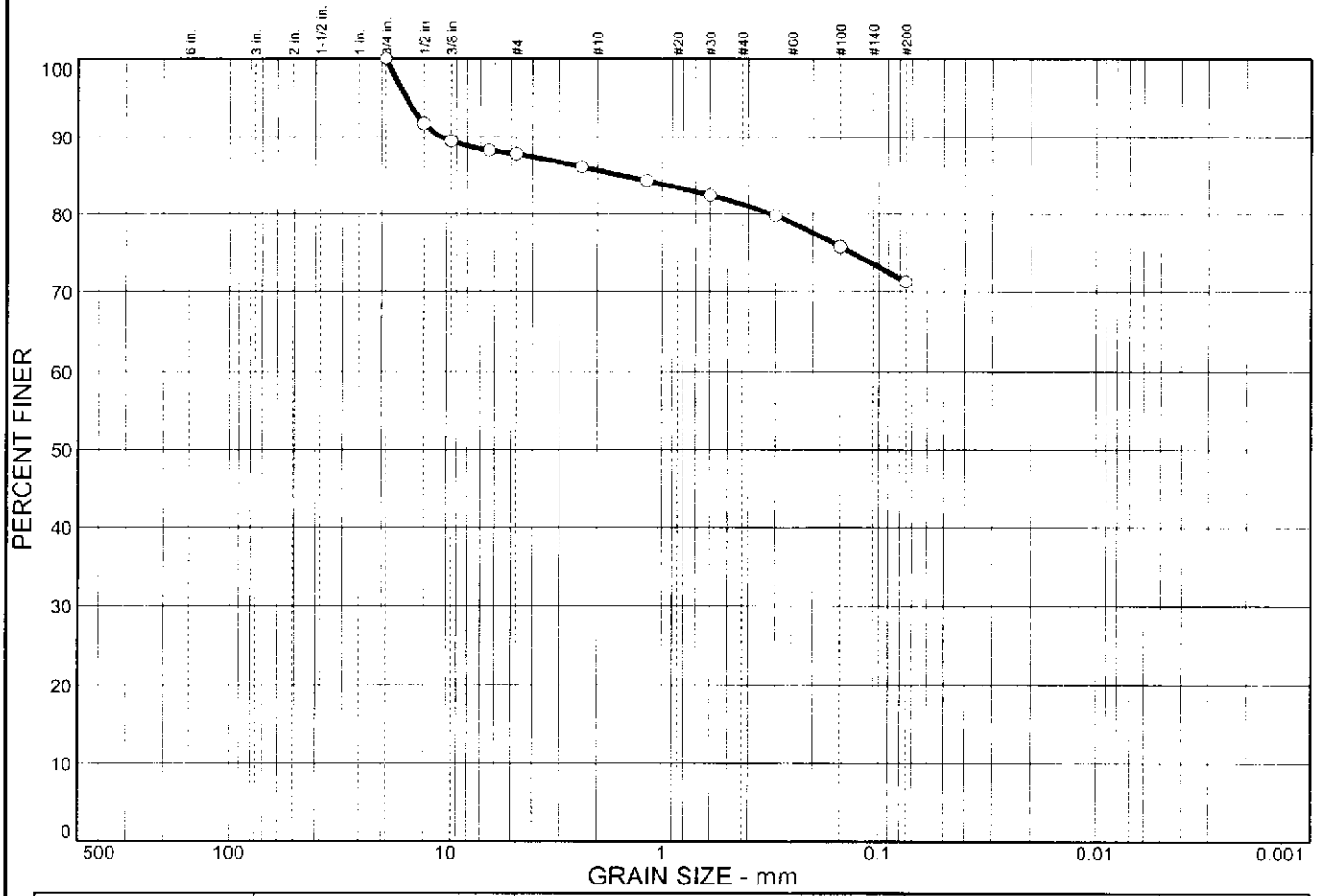
LTR-5
SAMPLE NUMBER: 20-1337

Sample No.: S-3 **Source of Sample:** B-45 **Date:** 11-23-2020
Location: B-45, S-3: 6' - 8' **Elev./Depth:** 6' - 8'

SJB SERVICES, INC.

Client: EA SCIENCE & TECHNOLOGY
Project: LABORATORY TESTING
OLD UPPER MOUNTAIN ROAD PROJECT
Project No: BT-20-123 **Plate**

Particle Size Distribution Report ASTM D-6913



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	12.2	16.5	71.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75 in.	100.0		
.5 in.	91.7		
.375 in.	89.5		
.25 in.	88.3		
#4	87.8		
#8	86.1		
#16	84.3		
#30	82.4		
#50	79.8		
#100	75.8		
#200	71.3		

* (no specification provided)

Soil Description

B-45, S-8: 25' - 27'

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 1.55 D_{60}= D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

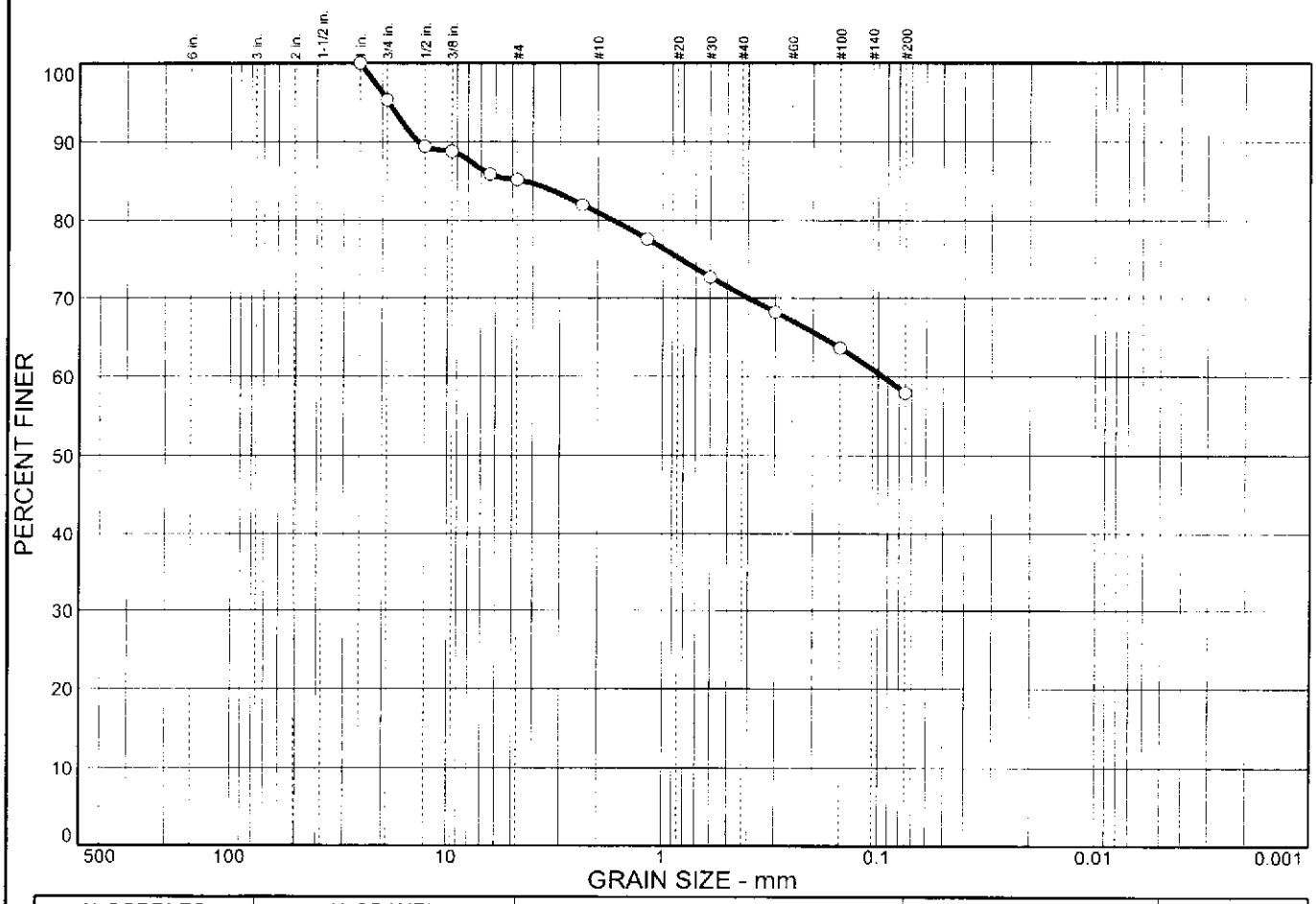
LTR-5
SAMPLE NUMBER: 20-1338

Sample No.: S-8 **Source of Sample:** B-45 **Date:** 11-23-2020
Location: B-45, S-8: 25' - 27' **Elev./Depth:** 25' - 27

SJB SERVICES, INC.

Client: EA SCIENCE & TECHNOLOGY
Project: LABORATORY TESTING
OLD UPPER MOUNTAIN ROAD PROJECT
Project No: BT-20-123 **Plate**

Particle Size Distribution Report ASTM D-6913



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	14.8	27.3	57.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 in.	100.0		
.75 in.	95.3		
.5 in.	89.4		
.375 in.	88.8		
.25 in.	85.9		
#4	85.2		
#8	82.0		
#16	77.6		
#30	72.7		
#50	68.2		
#100	63.6		
#200	57.9		

* (no specification provided)

Soil Description

B-47, S-2: 2' - 4'

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 4.35 D_{60}= 0.0958 D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

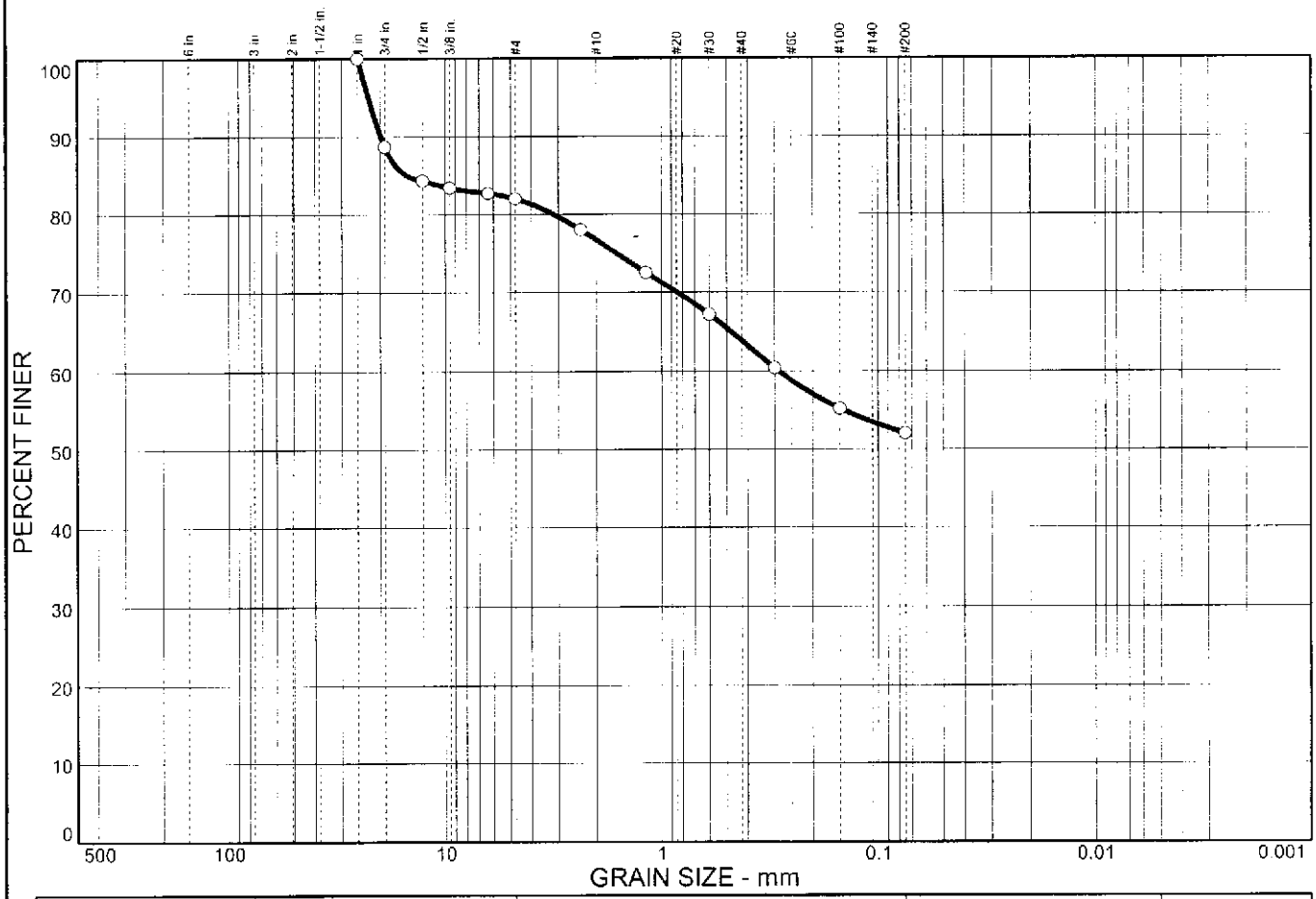
LTR-5
SAMPLE NUMBER: 20-1339

Sample No.: S-2 **Source of Sample:** B-47 **Date:** 11-23-2020
Location: B-47, S-2: 2' - 4' **Elev./Depth:** 2' - 4'

SJB SERVICES, INC.

Client: EA SCIENCE & TECHNOLOGY
Project: LABORATORY TESTING
OLD UPPER MOUNTAIN ROAD PROJECT
Project No: BT-20-123 **Plate**

Particle Size Distribution Report ASTM D-6913



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	18.0	30.0	52.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 in.	100.0		
.75 in.	88.7		
.5 in.	84.3		
.375 in.	83.4		
.25 in.	82.7		
#4	82.0		
#8	78.0		
#16	72.5		
#30	67.2		
#50	60.4		
#100	55.2		
#200	52.0		

* (no specification provided)

Soil Description

B-48, S-5: 10' - 12'

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 15.0 D_{60}= 0.287 D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

LTR-5
SAMPLE NUMBER: 20-1340

Sample No.: S-5 **Source of Sample:** B-48 **Date:** 11-23-2020
Location: B-48, S-5: 10' - 12' **Elev./Depth:** 10' - 12'

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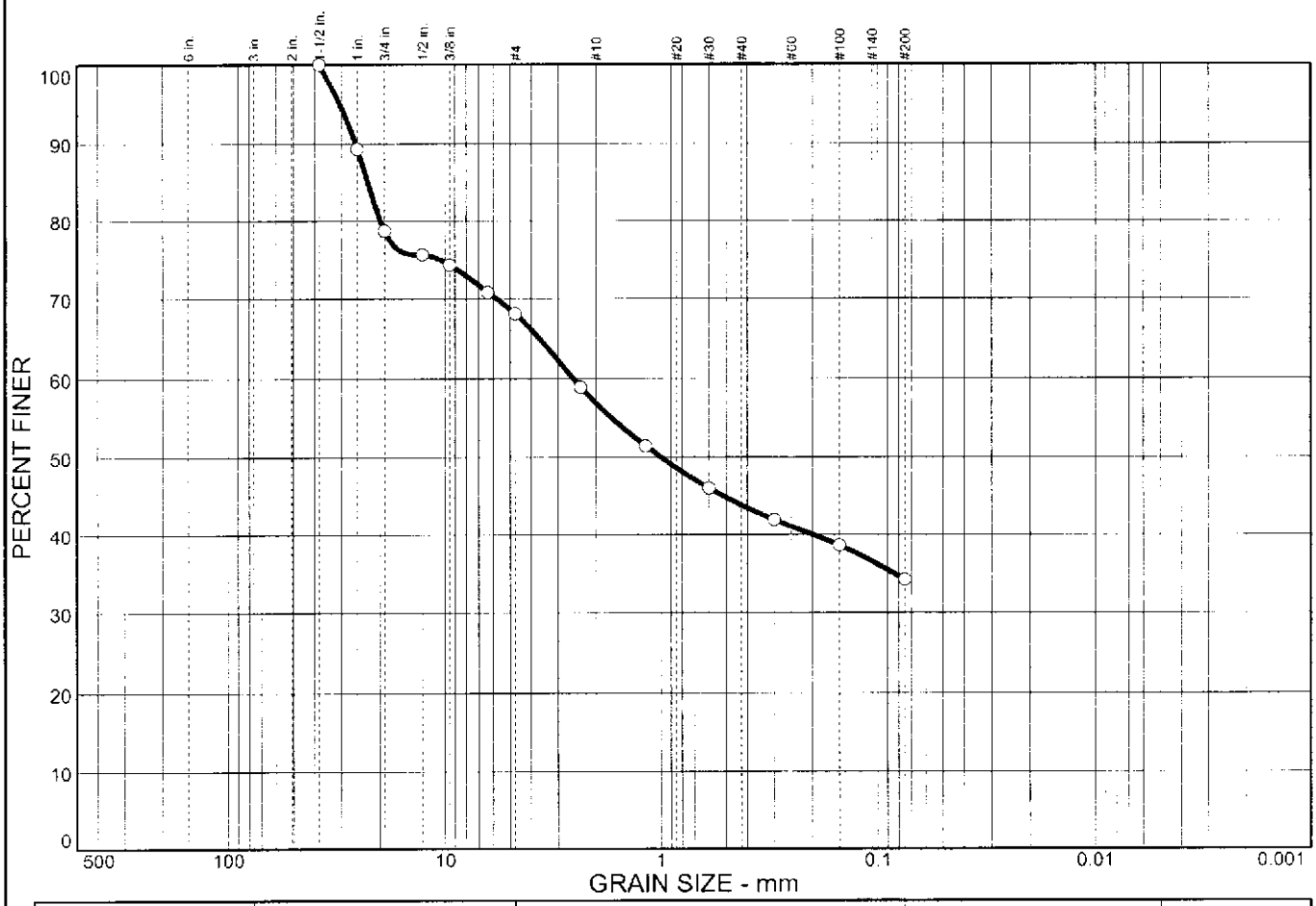
Client: EA SCIENCE & TECHNOLOGY
Project: LABORATORY TESTING
OLD UPPER MOUNTAIN ROAD PROJECT
Project No: BT-20-123 **Plate**

Particle Size Distribution Report ASTM D-6913



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	31.9	33.9	34.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5 in.	100.0		
1 in.	89.3		
.75 in.	78.7		
.5 in.	75.6		
.375 in.	74.3		
.25 in.	70.8		
#4	68.1		
#8	58.9		
#16	51.4		
#30	46.0		
#50	41.9		
#100	38.6		
#200	34.2		

* (no specification provided)

Soil Description

B-48, S-11: 40' - 42'

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 22.8 D_{60}= 2.56 D_{50}= 1.01
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

LTR-5
SAMPLE NUMBER: 20-1349

Sample No.: S-11 **Source of Sample:** B-48 **Date:** 11-23-2020
Location: B-48, S-11: 40' - 42' **Elev./Depth:** 40' - 42'

SJB SERVICES, INC.

Client: EA SCIENCE & TECHNOLOGY
Project: LABORATORY TESTING
OLD UPPER MOUNTAIN ROAD PROJECT
Project No: BT-20-123 **Plate**

Our Story

For the past 30 years, Tectonic has delivered quality professional services in a timely and cost effective manner by pooling its talented staff into project teams that think, act, and perform as one integral unit. By carefully listening and collaborating with its clients, the firm is able to identify the key issues and assure stakeholder objectives are met in the final deliverables. Through innovating and adopting technological advances, the firm is able to generate unique solutions to improve our nation's deteriorating infrastructure and build safe sustainable communities.

As the world evolves, and its challenges grow more complex, Tectonic continues to innovate and provide the practical solutions and exceptional customer service its clients have trusted since its founding.

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