Hudson River-Black River Regulating District

OLD FORGE DAM

Geotechnical Data Report

September 2021

OLD FORGE DAM

Geotechnical Data Report

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Our Ref:
30001381

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Senior Project Engineer

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[Title]

_____
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[Title]

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Acronyms and Abbreviations

ASTM	American Society for Testing and Materials
ATV	All-Terrain Vehicle
EA	Engineering Assessment
HRBRRD	Hudson River-Black River Regulatory District
NYSDEC	New York State Department of Environmental Conservation
OD	Outer Diameter
RQD	Rock Quality Designation
SPT	Standard Penetration Test
USCS	Unified Soil Classification System

1 INTRODUCTION AND BACKGROUND

1.1 General

Arcadis of New York, Inc (Arcadis) has prepared this Geotechnical Data Report for the Old Forge Dam to supplement the existing geotechnical information and fill information gaps identified as part of the initial data review for the site. This work was prepared in general accordance with our authorized scope of work under our September 25, 2017 proposal and describes the findings of the geotechnical investigation. This Geotechnical Report includes:

- A summary of the site background,
- A description of the geotechnical investigation conducted between July 8, 2019, and July 10, 2019,
- The completed boring logs; and
- The soil test results.

1.2 Background

The Old Forge Dam, owned and operated by the Hudson River-Black River Regulatory District (HRBRRD), is a spillway section structure located in the Old Forge hamlet in the Town of Webb, NY at the western edge of First Lake. The dam impounds First through Fifth Lakes, which are part of the Fulton Chain of Lakes which discharge into the middle branch of Moose River. Refer to **Figure 1-1** for a location map of the dam.

The purpose of the dam is primarily for river regulation and recreation. Old Forge Dam was reportedly built as a timber crib dam in 1881 and replaced with a concrete dam in 1905. The dam has received several upgrades and repairs during its lifetime with the most recent in 1953, when the concrete ogee spillway was repaired. The 1953 engineering design drawings indicate that the concrete Old Forge Dam is founded on rock. The dam is presently equipped with an ogee shaped spillway and two operational low-level outlets.

The dam is classified as a Hazard Class B dam. A Class B dam is of intermediate hazard, the failure of the dam would likely cause flooding and damage to residential properties and interrupt utility operations but would likely not result in loss of life.

2 SUBSURFACE INVESTIGATION AND SITE GEOLOGY

2.1 Geologic Setting

Old Forge Dam is located within the Central Highland portion of the Greenville Physiographic Province. The rocks that make up this area are Middle Proterozoic age, metamorphosed basement rocks that have been uplifted and had the overlying sedimentary rock eroded away. The region is characterized by long, straight valleys running in a

roughly north-northeast direction, gently curved ridges and valleys, and radial drainage patterns. The bedrock has been folded and sheared and has an abundance of joints.

The dam is located at a boundary between two geologic units, however, appears to lay within an intrusion of a geologic unit consisting of biotite and hornblende granitic gneiss commonly with leucogranitic gneiss, biotite-quartz-plagioclase gneiss, other meta sedimentary rocks, amphibolite, and migmatite. West of the dam is a geologic contact with a geologic region consisting of undivided metasedimentary and related rocks. Due to the proximity of the dam to both geologic units and the similarity between the rock types, the geologic unit of bedrock at the dam cannot be definitively determined via mapping.

Geologic mapping shows the dam is situated in an area of glacial outwash sand and gravel that comprises coarse to fine gravel with sand, with variable thickness, resulting from proglacial fluvial deposition. This material tends to be well rounded, stratified, and permeable. Immediately surrounding the area is mapped Adirondack till, which is rich with sand and metamorphic in origin.

2.2 Subsurface Conditions

2.2.1 Geotechnical Investigation

Between July 8, 2019, and July 10, 2019, Arcadis observed a geotechnical investigation completed under the direction of the HRBRRD, that consisted of advancing geotechnical borings at two locations and collecting concrete cores at three locations. Boring B-1 was located in the right upstream abutment, immediately upstream of the dam. Boring B-2 was located in the left abutment, immediately downstream of the concrete wall. Concrete Core C-1 was located in the right concrete cutoff wall. Concrete Core C-2 was located in the downstream concrete apron, and Concrete Core C-3 was located in the left concrete cutoff wall. Borings and cores were performed by Aztech Technologies, Inc., (Aztech), based in Ballston Spa, New York. Boring and core locations were established and staked out by Arcadis staff prior to the geotechnical investigation and the locations were surveyed following completion of the field work. An ATV-mounted drill rig was used to access the boring locations on and around the dam. The advancement and sampling of the borings and collection of concrete cores were performed by Aztech under continuous inspection by Arcadis. The representative on-site for Arcadis maintained written records of each boring and recorded the daily progress of site activities. Final boring logs and laboratory test results are included in **Appendices A** and **B** of this report, respectively.

2.2.2 Borings

2.2.2.1 General

The locations where the soil borings were advanced and where the concrete cores were collected are shown on **Figure 2-1**. The borings were designated as Borings B-1 and B-2 and the concrete cores were designated C-1, C-2, and C-3. Split-spoon soil samples were recovered from each boring, along with rock core samples to the target depth.

2.2.2.2 Drilling Procedures

Borings were advanced using a GeoProbe 7822DT track-mounted combination direct-push drill rig. The drill rig was equipped with a 140-pound, hydraulically operated, automatic hammer. Steel, flush-jointed casing, 3.75-inch inner diameter, was used throughout the entire drilling program and a full head of water was maintained at the top of each borehole throughout the drilling and sampling activities. A tri-cone roller bit was used to clean out the inside of the casing prior to sampling. Data on the drilling procedures used at each boring location are included on the final boring logs.

Rock cores were collected using an NX-size, 5-foot-long double barrel core with a solid inner tube, and a diamond core bit. Once the borehole was cleaned of debris, the core barrel was lowered to the rock surface, the water circulation was started, and the driller began the core barrel rotation. During the coring, the driller maintained uniform downward pressure on the core barrel, while observing the rotation of the core barrel and return wash fluid from the boring. One-foot marks were made on the drill rod to provide reference points during the visual monitoring of the advancement of the core barrel into the bedrock. The time necessary to advance the core barrel over the 5-foot run was recorded and variations in coring difficulty were noted. Downward pressure on the core barrel was lessened when reductions in the rate of return water were noted and the cuttings were flushed until the return water cleared.

When advancement was halted due to excessive downward pressure or lack of core advancement and plugging was suspected, the drill rod was removed from the borehole along with the core barrel, the core barrel was removed from the drill rod, the inner tube of the core barrel was removed, and the recovered rock sample was removed and logged. The core barrel was then reassembled and lowered into the borehole and the remainder of the core completed. The recovered rock samples were placed in individual sections of a wooden core box and logged. The end of the rock core was designated with a wooden block secured to the box and the lid secured in the closed position when transporting or handling the core box.

2.2.2.3 Concrete Cores

Concrete cores were collected using a concrete core drill, with a 5-1/2 inch diameter, diamond core barrel, fourteen inches in interior length. The core drill was powered using a portable electric generator, which was also used to power a sump pump, which supplied water to the core drill to cool the core barrel and flush the void space around the concrete core. The area to be cored, was wetted, which allowed the core drill's suction pump better suction against the concrete and allow for down pressure to be applied for coring. The water flow was started prior to the start of coring to keep the bit cool and clean. At the completion of coring the completed core was removed from the location, marked with identification and orientation, and placed in a container for transportation back to Aztech's lab for testing. The following tests were performed:

- Two (2) Unconfined Compression Strength Determinations in accordance with ASTM C-42.

The results of these tests can be found in **Appendix B**.

2.2.2.4 Soil Sampling Procedures

Representative split-spoon soil samples were collected, and the blow counts recorded in accordance with ASTM D 1586 to determine the Standard Penetration Test (SPT) resistance (N-value). The number of blows required to drive a standard 2-inch outside diameter (O.D.) split-spoon sampler with a 140-pound hammer falling freely 30-

inches is recorded for each 6-inch increment of the length driven. The sum of the second and third increments is taken as the N-value blows per foot. In general split-spoon samples were taken continuously to refusal on bedrock. Sample jars were provided by Aztech and transported and stored at Aztech's office in Schuylerville, New York. Soil samples were field classified according to the Unified Soil Classification System (USCS) using ASTM D 2487 and ASTM D 2488. Individual soil sample descriptions (based on both laboratory and field visual classifications) are provided on the final boring logs in **Appendix A**. Laboratory Test Results on representative soil samples, obtained during the geotechnical investigation, were selected for laboratory testing by Arcadis. The following tests were performed:

- Two (2) Moisture Content Determinations in accordance with ASTM D 2216 and
- Two (2) Grain Size Analyses (mechanical without hydrometer) in accordance with ASTM D 6913.

The results of these tests can be found in **Appendix B**. The final laboratory test report for the tests performed by Aztech was received by Arcadis on August 10, 2020.

2.2.3 Generalized Stratigraphy

Based on field observations, the boring logs, and geotechnical laboratory test results, the soils immediately around the dam are Poorly-Graded Sands with some gravels and fines which typically have USCS Group Symbol SP. The soil layer is likely reworked or native glacial outwash material that overlies the bedrock. The thickness of this soil layer will vary around the dam due to past regrading and deposition. The underlying bedrock is a light gray, granitic gneiss, with fracture angles between horizontal and vertical. The boring logs do not show a notable increase in rock core recovery or Rock Quality Designation (RQD) with depth, suggesting that the explored portion of the bedrock has a consistent structure.

3 LIMITATIONS

Arcadis' professional services have been performed using the degree and standard of care and skill ordinarily exercised under similar circumstances by reputable civil engineers, geotechnical engineers and geologists practicing in this or similar situations. The data, information, and records presented in the appendices should not be separated from the body of this report as they form the basis for our recommendations and conclusions.

The basis for the information and analyses provided in this Geotechnical Data Report are based upon Site visits, a review of available historic documents pertaining to Old Forge Dam, Site investigations and Topographic surveys performed to supplment available information, and documents that were obtained from the District and NYSDEC. In the event that additional historic documents are discovered and/or changes or additions to the information provided in this Geotechnical Data Report are discovered, the information should be brought to the attention of the District and Arcadis so that appropriate changes can be made.

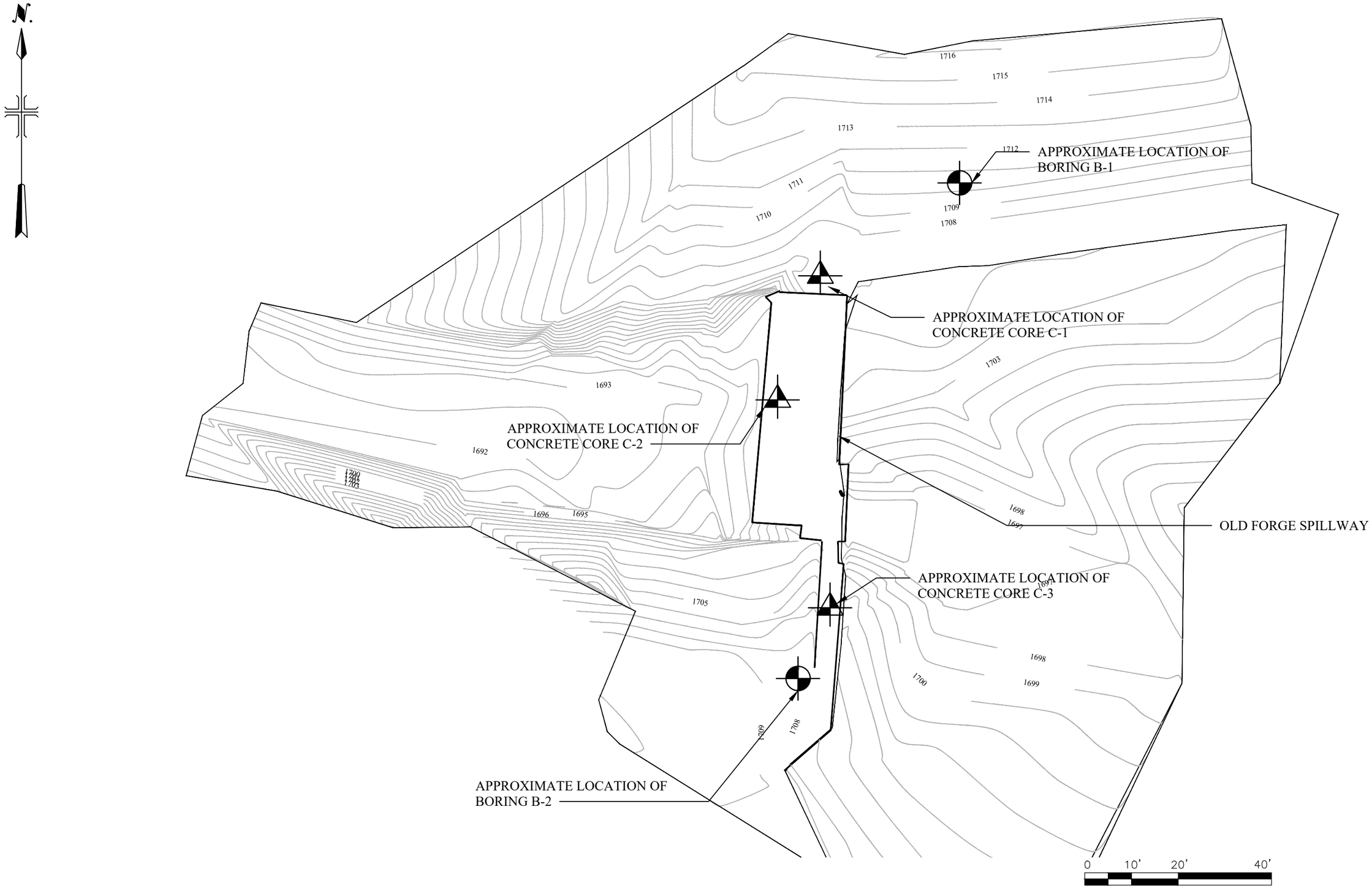
Figures

OLD FORGE DAM GEOTECHNICAL DATA REPORT

LOCATION OF OLD FORGE DAM

ARCADIS

FIGURE
1-1



ARCADIS Design & Consultancy for natural and built assets

HUDSON RIVER BLACK RIVER REGULATING DISTRICT

GEOTECHNICAL DATA REPORT
30001381

OLD FORGE DAM
BORING LOCATION PLAN

SCALE: AS NOTED

SEPTEMBER 2021

FIGURE 2-1

Appendix A

Boring Logs

Aztech Environmental
Technologies
Woman Owned Business
5 McCrea Hill Road, Ballston Spa, NY 12020
518.885-5383 | aztechenv.com

Boring Log: B-1

Client: HRBRRD
Project: Old Forge Dam
Street Address: NY-28
City / State: Old Forge, New York
Drilling Co.: Aztech Environmental Technologies
Address: 5 McCrea Hill Rd. Ballston Spa, NY
Driller: Ray Hammond

Drilling Method: 3.75" Casing, Split-spoon, NX Core
Hammer Weight: 140 lbs
Drilled Borehole Dia: 3.75"
Total Drilled Depth: 20.38'
Ground Elevation: NA
Depth to water: NA

Start date: 7/9/2019
Finish date: 7/9/2019

Depth (Feet)	Sample ID	Sample Interval (feet)	Recovery	Blow Counts	Headspace PID (ppm)	Description	Depth (Feet)
1	S-1	0' - 2'	12"	WOH-1-2-1	NA	Medium SAND, wet.	1
2							2
3	S-2	2' - 4'	16"	2-3-12-15		Medium SAND and GRAVEL, wet.	3
4							4
5	S-3	4' - 6'	24"	12-50/0.3		Fine SAND and medium GRAVEL, wet. Refusal encountered at 5.38'	5
6						Light gray, Granitic Gneiss, some orange oxidation present around fracture areas. Numerous horizontal to high angle fractures.	6
7							7
8	NX-1	5.38'-10.38'	55" (91%)	NA		RQD = 51%	8
9							9
10						Fractures: 5.75', 5.9', 6.1', 6.6' to 7.0', 7.5', 8.3, 8.6' to 9.0'	10
11						Light gray, Granitic Gneiss. Numerous horizontal to high angle fractures.	11
12							12
13	NX-2	10.38'-15.38'	60" (100%)	NA		RQD = 51%	13
14							14
15						Fractures: 10.6', 10.95', 11.45' to 11.7', 12.5', 13' to 13.4', 13.95', 14.5', 14.7 to 15.1'	15
16						Light gray, Granitic Gneiss. Numerous horizontal to vertical fractures.	16
17							17
18	NX-2	15.38-20.38'	59" (98%)	NA		RQD = 36%	18
19							19
20						Fractures: 15.38' to 15.9', 16.6' to 17', 17.3' to 17.5', 18.7', 19.6' to 20.2'	20
21							21

Notes:
NA - Not Available
fbg - feet below grade
" - inches
PID - Photoionization Detector
ppm - parts per million
' -feet

Geologist: None

Aztech Environmental
Technologies
Woman Owned Business
5 McCrea Hill Road, Ballston Spa, NY 12020
518.885-5383 | aztechenv.com

Boring Log: B-2

Client: HRBRRD
Project: Old Forge Dam
Street Address: NY-28
City / State: Old Forge, New York
Drilling Co.: Aztech Environmental Technologies
Address: 5 McCrea Hill Rd. Ballston Spa, NY
Driller: Ray Hammond

Drilling Method: 3.75" Casing, Split-spoon, NX Core
Hammer Weight: 140 lbs
Drilled Borehole Dia: 3.75"
Total Drilled Depth: 21.20'
Ground Elevation: NA
Depth to water: NA

Start date: 7/10/2019
Finish date: 7/10/2019

Depth (Feet)	Sample ID	Sample Interval (feet)	Recovery	Blow Counts	Headspace PID (ppm)	Description	Depth (Feet)
1	S-1	0' - 2'	8"	WOH-2-2-2	NA	Medium SAND, wet.	1
2							2
3	S-2	2' - 4'	16"	2-2-1-2		Medium SAND and GRAVEL, wet.	3
4							4
5	S-3	4' 6.2'	8"	NA		Fine SAND and medium GRAVEL, wet. Refusal encountered at 5.38'	5
6							6
7	NX-1	6.2' - 8.9'	32" (99%)	NA		Light gray, Granitic Gneiss, some orange oxidation present around fracture areas. Numerous horizontal to low angle fractures. RQD = 51% Fractures: 6.8', 8.0', 8.5'	7
8							8
9							9
10							10
11	NX-2	8.9' - 14'	60" (100%)	NA		Light gray, Granitic Gneiss. Numerous horizontal to low angle fractures. RQD = 72% Fractures: 9' to 9.4', 10.3', 11.1', 11.9', 12.9'	11
12							12
13							13
14							14
15	NX-2	14' - 19'	60" (100%)	NA		Light gray, Granitic Gneiss. Numerous horizontal to vertical fractures. RQD = 51% Fractures: 14 to 14.8', 15.8', 16.2', 16.9'. 17.2 to 18', 18.2'	15
16							16
17							17
18							18
19	NX-3	19' - 21.2'	24.6" (93%)	NA		Light gray, Granitic Gneiss. Numerous horizontal to high angle fractures. RQD = 53% Fractures: 19.3', 20.8', 21'	19
20							20
21							21
22							22
23							23

Notes:
NA - Not Available
fbg - feet below grade
" - inches
PID - Photoionization Detector
ppm - parts per million
' -feet

Geologist: None

Aztech Environmental
TECHNOLOGIES
A LaBella Company
5 McCrea Hill Road, Ballston Spa, New York , 518-885-

Boring Log: C-1

Client: HRBRRD
Project: Old Forge Dam
Street Address: NY-28
City / State: Old Forge, New York
Drilling Co.: Aztech Environmental Technologies
Address: 5 McCrea Hill Rd. Ballston Spa, NY
Driller: Ray Hammond

Drilling Method: Core Drill
Hammer Weight: NA
Drilled Borehole Dia: 5.5"
Total Drilled Depth: 12"
Ground Elevation: NA
Depth to water: NA

Start date: 7/10/2019
Finish date: 7/10/2019

Depth (Feet)	Sample ID	Sample Interval (feet)	Recovery	Blow Counts	Description	Depth (Feet)
	C-1	0' - 1'	12"	NA	Light gray concrete, solid, no fractures. - 5.5" diameter core. Aggregate Diameter Range: 0.062" to 0.375" Wire mesh at ~3.75" End Core.	
1						1

Notes:
NA - Not Available
fbg - feet below grade
" - inches

PID - Photoionization Detector
ppm - parts per million
' -feet

Aztech Environmental
TECHNOLOGIES
A LaBella Company
5 McCrea Hill Road, Ballston Spa, New York , 518-885-

Boring Log: C-2

Client: HRBRRD
Project: Old Forge Dam
Street Address: NY-28
City / State: Old Forge, New York
Drilling Co.: Aztech Environmental Technologies
Address: 5 McCrea Hill Rd. Ballston Spa, NY
Driller: Ray Hammond

Drilling Method: Core Drill
Hammer Weight: NA
Drilled Borehole Dia: 5.5"
Total Drilled Depth: 12"
Ground Elevation: NA
Depth to water: NA

Start date: 7/10/2019
Finish date: 7/10/2019

Depth (Feet)	Sample ID	Sample Interval (feet)	Recovery	Blow Counts	Description	Depth (Feet)
	C-1	0' - 1'	10.5"	NA	Light gray concrete wiht Granite aggregate, solid, no fractures. - 5.5" diameter core. Aggregate Diameter Range: 0.062" to 1.5" End Core.	
1						1

Notes:
NA - Not Available
fbg - feet below grade
" - inches

PID - Photoionization Detector
ppm - parts per million
' -feet

Aztech Environmental
TECHNOLOGIES
A LaBella Company
5 McCrea Hill Road, Ballston Spa, New York , 518-885-

Boring Log: C-3

Client: HRBRRD
Project: Old Forge Dam
Street Address: NY-28
City / State: Old Forge, New York
Drilling Co.: Aztech Environmental Technologies
Address: 5 McCrea Hill Rd. Ballston Spa, NY
Driller: Ray Hammond

Drilling Method: Core Drill
Hammer Weight: NA
Drilled Borehole Dia: 5.5"
Total Drilled Depth: 12"
Ground Elevation: NA
Depth to water: NA

Start date: 7/10/2019
Finish date: 7/10/2019

Depth (Feet)	Sample ID	Sample Interval (feet)	Recovery	Blow Counts	Description	Depth (Feet)
	C-1	0' - 1'	11"	NA	Light gray concrete, fractured at 3.75", transitions to Granite bedrock. - 5.5" diameter core. Aggregate Diameter Range: 0.062" to 0.5" Wire mesh at ~2.5"	
					Light pink to gray Granitic Gneiss.	
1					End Core	1

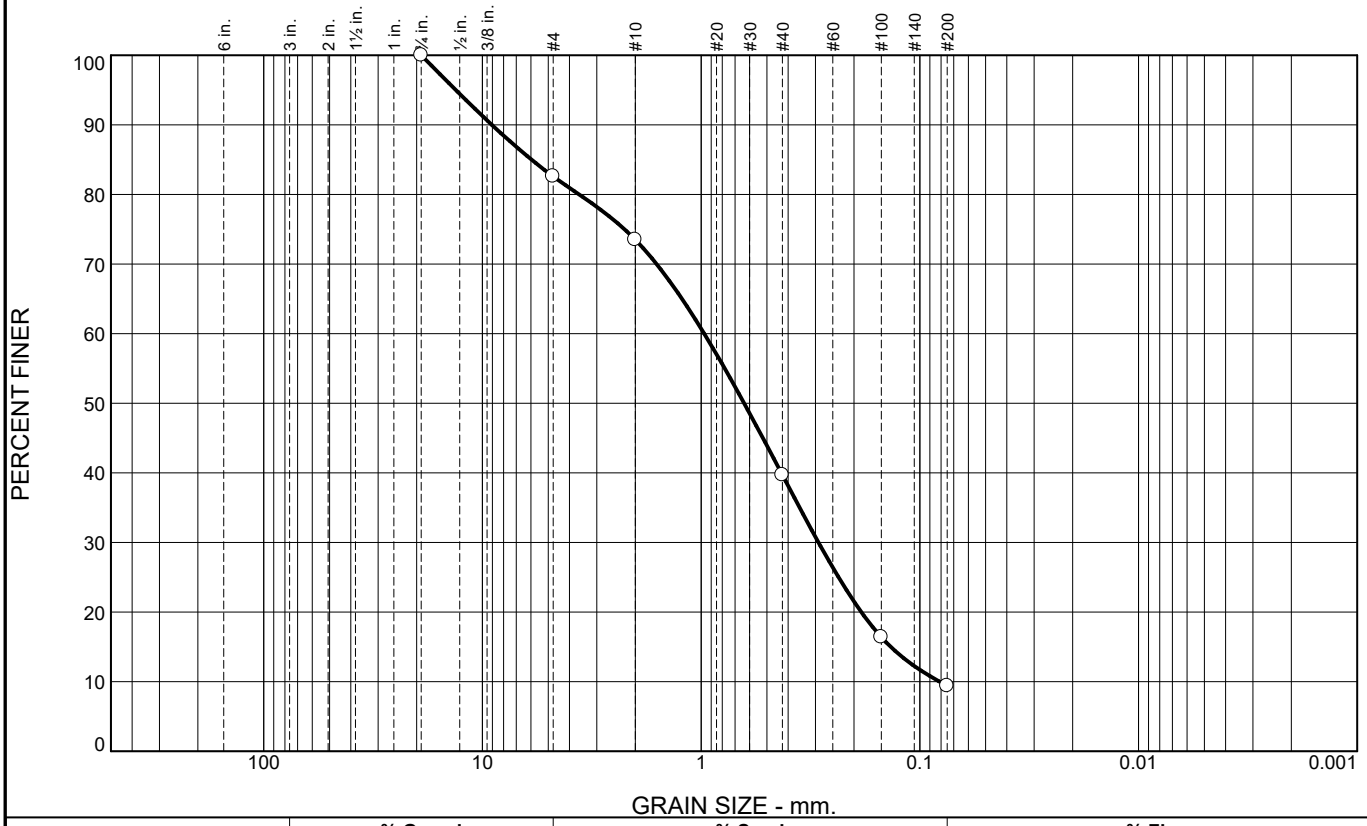
Notes:
NA - Not Available
fbg - feet below grade
" - inches

PID - Photoionization Detector
ppm - parts per million
' -feet

Appendix B

Laboratory Reports

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	17.4	9.1	33.8	30.3	9.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
#4	82.6		
#10	73.5		
#40	39.7		
#100	16.4		
#200	9.4		

* (no specification provided)

Soil Description

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 9.0524 D_{85}= 5.9618 D_{60}= 0.9679
D_{50}= 0.6359 D_{30}= 0.2905 D_{15}= 0.1357
D_{10}= 0.0811 C_u= 11.93 C_c= 1.08

Classification

USCS= AASHTO=

Remarks

Water Content: 19.7 %

Location: Old Forge B-1
Sample Number: SS-2 **Depth:** 2 - 4' **Date:** 8/6/20

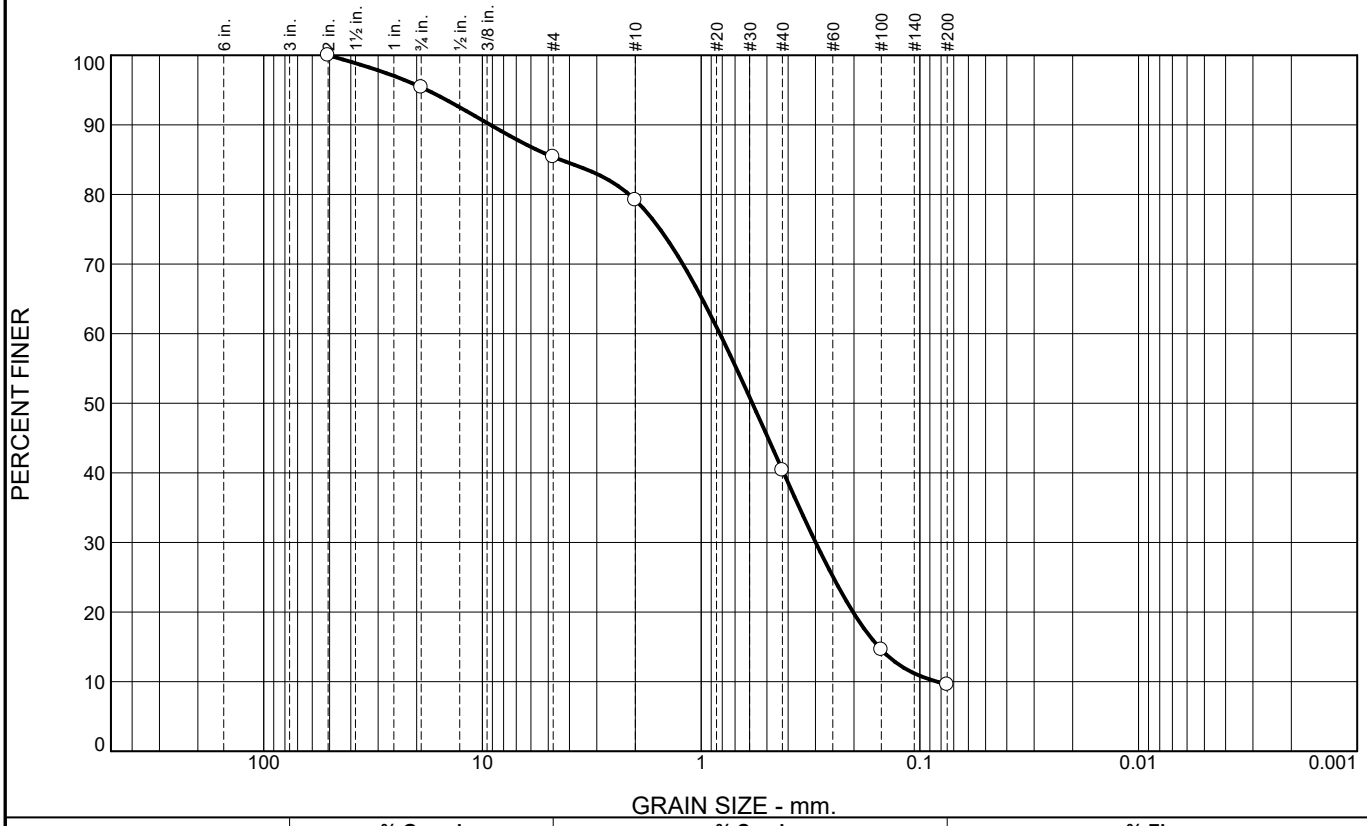
QCQA Laboratories, Inc.

Schuylerville, NY

Client: Axtech Environmental
Project: Old Forge and Sixth Lake

Project No: ST20-071 **Figure** B1SS2

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	4.6	10.0	6.2	38.8	30.8	9.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2	100.0		
.75	95.4		
#4	85.4		
#10	79.2		
#40	40.4		
#100	14.6		
#200	9.6		

* (no specification provided)

Soil Description

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 9.2021 D_{85}= 4.4054 D_{60}= 0.8213
D_{50}= 0.5827 D_{30}= 0.2993 D_{15}= 0.1542
D_{10}= 0.0833 C_u= 9.87 C_c= 1.31

Classification

USCS= AASHTO=

Remarks

Water Content: 15.7 %

Location: Old Forge B-2
Sample Number: SS-2 **Depth:** 2 - 4' **Date:** 8/6/20

QCQA Laboratories, Inc.

Schuylerville, NY

Client: Axtech Environmental
Project: Old Forge and Sixth Lake

Project No: ST20-071 **Figure** B2SS2

QCQA Labs
QC/QA LABORATORIES, INC.
DRILLING & TESTING SERVICES

877 Route 4 S
Schuylerville, NY 12871
Phone: (518) 372-4067
Fax: (518) 507-6113

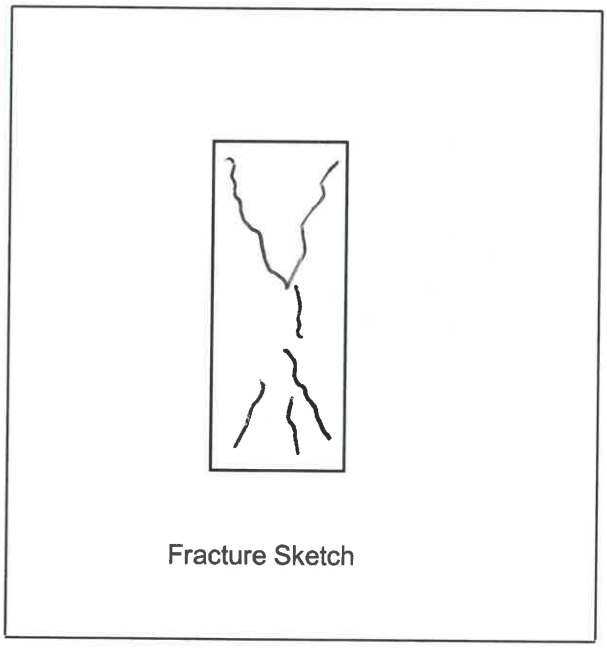
REPORT OF COMPRESSIVE STRENGTH OF CONCRETE CORES ASTM C-42

Project: Old Forge | QCQA Proj. No. ST20-071

Client: Aztech Environmental | Test Method: ASTM C42/ACI 318

CORE IDENTIFICATION NO.

C-1



Fracture Sketch

DATE OF CONCRETE PLACEMENT	Unknown	
LOCATION	C-1	
DATE CORE REMOVED	Unknown	
CORE LOCATION	C-1	
DATE OF TESTING	8/5/2020	
AGE	Unkown	Days
MOISTURE CONDITION WHEN TESTING	As received	
ORIGINAL CORE LENGTH	12	inches
TRIMMED CORE LENGTH	9.89	inches
CAPPED CORE LENGTH	10.10	inches
AVERAGE CORE DIAMETER	5.56	inches
CROSS SECTIONAL AREA	24.28	in^2
MAXIMUM LOAD	353,040	lbs
COMPRESSIVE STRENGTH	14,540	psi
CORRECTED COMPRESSIVE STRENGTH	**14,340**	**psi**

Length/Diameter: 1.82

Apparent Maximum Aggregate Size

Direction of Test Load With Respect to Horizontal Surface of Member as Cast

Unknown

Additional Remarks:

Tested By W. Stanton

Calculated By W. Stanton

Submitted By W. Stanton

QCQA Labs
QC/QA LABORATORIES, INC.
DRILLING & TESTING SERVICES

877 Route 4 S
Schuylerville, NY 12871
Phone: (518) 372-4067
Fax: (518) 507-6113

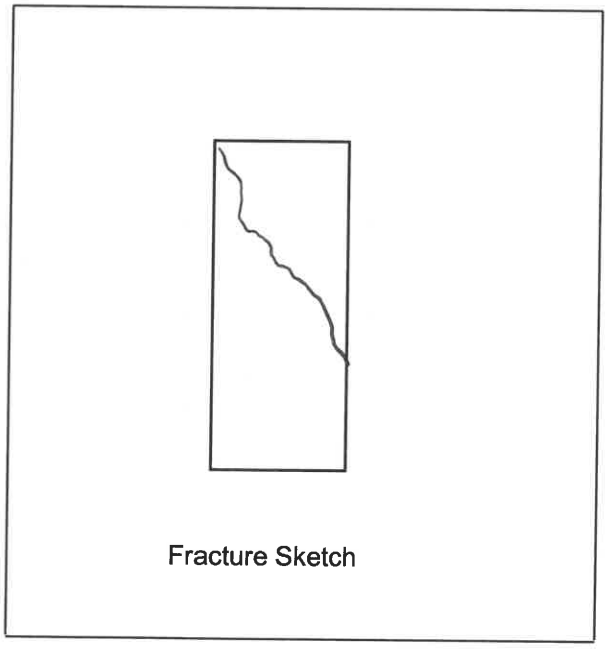
REPORT OF COMPRESSIVE STRENGTH OF CONCRETE CORES ASTM C-42

Project: Old Forge | QCQA Proj. No. ST20-071

Client: Aztech Environmental | Test Method: ASTM C42/ACI 318

CORE IDENTIFICATION NO.

C-2



Fracture Sketch

DATE OF CONCRETE PLACEMENT	Unknown	
LOCATION	C-2	
DATE CORE REMOVED	Unknown	
CORE LOCATION	C-2	
DATE OF TESTING	8/5/2020	
AGE	Unkown	Days
MOISTURE CONDITION WHEN TESTING	As received	
ORIGINAL CORE LENGTH	10	inches
TRIMMED CORE LENGTH	8.99	inches
CAPPED CORE LENGTH	9.21	inches
AVERAGE CORE DIAMETER	5.55	inches
CROSS SECTIONAL AREA	24.19	in^2
MAXIMUM LOAD	118,360	lbs
COMPRESSIVE STRENGTH	4,890	psi
CORRECTED COMPRESSIVE STRENGTH	**4,760**	**psi**

Length/Diameter: 1.66

Apparent Maximum Aggregate Size

Direction of Test Load With Respect to Horizontal Surface of Member as Cast

Unknown

Additional Remarks:

Tested By W. Stanton

Calculated By W. Stanton

Submitted By W. Stanton

Arcadis of New York., Inc.
855 Route 146, Suite 210
Clifton Park
New York 12056
Phone: 518 250 7300
Fax: 518 371 2757
www.arcadis.com

Hudson River-Black River Regulating District

SIXTH LAKE DAM

Geotechnical Data Report

September 2021

SIXTH LAKE DAM

Geotechnical Data Report

September 2021

Prepared By:
Arcadis of New York, Inc.
855 Route 146, Suite 210
Clifton Park
New York 12065
Phone: 518 250 7300
Fax: 518 371 2757

Prepared For:
Robert S. Foltan, PE
Chief Engineer
Hudson River-Black River Regulating District
350 Norther Blvd, Suite 307
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Our Ref:
30001381

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Acronyms and Abbreviations

ASTM	American Society for Testing and Materials
ATV	All-Terrain Vehicle
EA	Engineering Assessment
HRBRRD	Hudson River-Black River Regulatory District
ID	Inner Diameter
NYCRR	New York State Codes, Rules, and Regulations
NYSDEC	New York State Department of Environmental Conservation
OD	Outer Diameter
RQD	Rock Quality Designation
SPT	Standard Penetration Test
USCS	Unified Soil Classification System

1 INTRODUCTION AND BACKGROUND

1.1 General

Arcadis of New York, Inc. (Arcadis) has prepared this Geotechnical Data Report for the Sixth Lake Dam to supplement the existing geotechnical information and fill information gaps identified as part of the initial data review for the site. This work was prepared in general accordance with our authorized scope of work under our September 25, 2017 proposal and describes the findings of the geotechnical investigation. This Geotechnical Report includes:

- A summary of the site background,
- A description of the geotechnical investigation conducted between July 8, 2019, and July 10, 2019,
- The completed boring logs; and
- The soil test results.

1.2 Background

The Sixth Lake Dam, owned and operated by Hudson River-Black River Regulatory District (HRBRRD), is located in the Town of Inlet, NY at the western edge of Sixth Lake, which is part of the Fulton Chain of Lakes and the middle branch of Moose River. Refer to **Figure 1-1** for a location map of the dam. It was originally a timber crib and concrete structure built in 1904 with several upgrades and repairs over its lifespan. The current dam is an earth embankment structure with a gated spillway section. The spillway is an ogee shaped spillway with two low-level outlets which are controlled by sluice gates. It is currently classified as a Hazard Class C dam. A Class C dam is a high hazard dam, the failure of which may result in one or more of the following:

- damage to homes, highways, industrial/commercial buildings, railroads, and/or utilities;
- environmental damage or contamination;
- loss of human life; and
- widespread economic loss.

2 SUBSURFACE INVESTIGATION AND SITE GEOLOGY

2.1 Geologic Setting

Sixth Lake Dam is located within the Central Highland portion of the Greenville Physiographic Province. The rocks that make up this area are Middle Proterozoic age, metamorphosed basement rocks that have been uplifted and had the overlying sedimentary rock eroded away. The region is characterized by long, straight valleys running in a roughly north-northeast direction, gently curved ridges and valleys, and radial drainage patterns. The bedrock has been folded and sheared and has an abundance of joints.

The dam is located in a formation consisting of undivided metasedimentary and related rocks, such as gneiss.

Geologic mapping shows the dam situated in an area of Adirondack Till, which is sand rich and metamorphic in origin. The overburden soils have variable permeability, related to compaction, and a variable thickness depending on location, typically between 3 and 150 feet thick.

2.2 Subsurface Conditions

2.2.1 Geotechnical Investigation

Between 7/10/2019 and 7/17/2019, and again between 6/26/20 and /29/2020, Arcadis oversaw a geotechnical investigation that consisted of advancing geotechnical borings at eight locations, collecting rock cores, installing two piezometers, and collecting a concrete core at one location. The concrete core was designated as C-4. The borings were located at the locations shown in **Figure 2-1**. Aztech Technologies, Inc., (Aztech), based in Ballston Spa, New York performed the geotechnical drilling services. Boring and core locations were established and staked out by Arcadis staff prior to the geotechnical investigation and the locations were surveyed following completion of the field work. An ATV-mounted drill rig was used to access the boring locations on and around the dam. The advancement and sampling of the borings and collection of concrete cores were performed by Aztech under continuous inspection of Arcadis. The representative on-site for Arcadis maintained written records of each boring and recorded the daily progress of all site activities. Final typed boring logs and laboratory test results are included in **Appendices A** and **B** of this report, respectively.

2.2.2 Borings

2.2.2.1 General

The locations where the soil borings were advanced and where the concrete cores collected are shown on **Figure 2-1**. The borings were designated as Borings B-1 though B-10 and the concrete cores was designated as C-4. Split-spoon soil samples were recovered from each boring, along with rock core samples as noted in the boring logs until the target depth was reached.

2.2.2.2 Drilling Procedures

Borings were advanced using a GeoProbe 7822DT track-mounted combination direct-push drill rig. The drill rig was equipped with a 140-pound, hydraulically operated, automatic hammer. Steel, flush-jointed casing, 3.75-inch inner diameter, was used throughout the entire drilling program and a full head of water was maintained at the top of each borehole throughout the drilling and sampling activities. A tri-cone roller bit was used to clean out the inside of the casing prior to sampling. Data on the drilling procedures used at each boring location are included on the final boring logs.

Rock cores were collected using an NX-size, 5-foot-long double barrel core with a solid inner tube, and a diamond core bit. Once the borehole was cleaned of debris, the core barrel was lowered to the rock surface, the water circulation was begun, and the driller began the core barrel rotation. During the coring, the driller maintained uniform down pressure on the core barrel, while observing the rotation of the core barrel and return wash fluid from the boring. One-foot marks were made on the drill rod to provide reference points during the visual

monitoring of the advancement of the core barrel into the bedrock. The core time necessary to advance the core barrel over the 5-foot run, was recorded and variations in coring difficulty during coring were noted. Down pressure on the core barrel was lessened when reductions in the rate of return water were noted and the cuttings were flushed until the return water cleared.

When advancement was halted due to excessive down pressure or lack of core advancement and plugging was suspected, the drill rod was removed from the borehole along with the core barrel, the core barrel was removed from the drill rod, the inner tube of the core barrel was removed, and the recovered rock sample was removed and logged. The core barrel was then reassembled and lower into the borehole and the remainder of the core completed. The recovered rock samples were placed in individual sections of a wooden core box and logged. The end of the rock core was designated with a wooden block secured to the box and the lid secured in the closed position when transporting or handling the core box.

2.2.2.3 Concrete Core

The concrete core was collected using a concrete core drill, with a 5-1/2 inch diameter, diamond core barrel, fourteen inches in interior length. The core drill was powered using a portable electric generator, which was also used to power a sump pump, which supplied water to the core drill to cool the core barrel and flush the void space around the concrete core. The area to be cored, was wetted, which allowed the core drill's suction pump better suction against the concrete and allow for down pressure to be applied for coring. The water flow was started prior to the start of coring to keep the bit cool and clean. At the completion of coring the completed core was removed from the location, marked with identification and orientation, and placed in a container for transportation back to Aztech's lab for testing. The following tests were performed:

- One (1) Unconfined Compression Strength Determinations in accordance with ASTM C-42.

The results of this tests can be found in **Appendix B**. The final laboratory test report for the tests performed by Aztech was received by Arcadis on August 10, 2020.

2.2.2.4 Soil Sampling Procedures

Representative split-spoon soil samples were collected and the blow counts recorded in accordance with ASTM D 1586 to determine the Standard Penetration Test (SPT) resistance (N-value). The number of blows required to drive a standard 2-inch outside diameter (O.D.) split-spoon sampler with a 140-pound hammer falling freely 30-inches is recorded for each 6-inch increment of the length driven. The sum of the second and third increments is taken as the N-value blows per foot. In general split-spoon samples were taken continuously to refusal on bedrock. Sample jars were provided by Aztech and transported and stored at Aztech's office in Schuylerville, New York. Soil samples were field classified according to the Unified Soil Classification System (USCS) using ASTM D 2487 and ASTM D 2488. Individual soil sample descriptions (based on both laboratory and field visual classifications) are provided on the final boring logs in **Appendix A**. Laboratory Test Results on representative soil samples, obtained during the geotechnical investigation, were selected for laboratory testing by Arcadis. The following tests were performed:

- Fifteen (15) Moisture Content Determinations in accordance with ASTM D 2216 and
- Fifteen (15) Grain Size Analyses (mechanical without hydrometer) in accordance with ASTM D 6913.

The results of these tests can be found in **Appendix B**. The final laboratory test report for the tests performed by Aztech was received by Arcadis on August 10, 2020.

2.2.2.5 Piezometers

Two new open standpipe-type piezometers were installed and are designated as Piezometers B-4 and B-5 at the approximate locations shown on **Figure 2-1**. Piezometer construction consisted of a 1.5-inch inside diameter (I.D.) Schedule 80 PVC riser pipe, a 1.5-inch diameter by 5-foot long well screen, and a 1.5-inch diameter expandable plug cap. Each 5-foot piezometer screen section consists of 0.010-inch slotted PVC placed within a filter sand pack that started at the base of the screen and extended a minimum of 2-feet above the top elevation of the screen. Above the filter sand pack an approximately 2-foot thick layer of bentonite was placed as a seal and the remaining portion of the boring was backfilled with sand. At the ground surface, a 4-inch diameter, water-tight, PVC protective well enclosure, set in a concrete pad was constructed around each new piezometer. Record details of the new piezometers are presented in **Appendix C**.

2.2.2.6 Seepage Conditions

Sixth Lake Dam has had documented seepage discharge along the toe of the downstream embankment slope. Previously dam safety inspections have observed seepage discharge at the toe of the embankment and adjacent to the left spillway training wall. During drilling at Boring B-4, recirculation water was lost, and turbid water was observed in the seep at the toe of the embankment and at the left spillway training wall, indicating hydraulic connectivity to the zone encountered during drilling. Portions of the toe areas are fully saturated due to discharge from the spillway bypass.

Standpipe piezometers installed at boring locations B-4 and B-5 are within the dam downstream embankment and at the toe, respectively. Piezometric levels measured between June 30, 2020 and January 28, 2021 were used to develop the phreatic surface range within the embankment throughout the year.

2.2.3 Generalized Stratigraphy

Arcadis reviewed the boring logs and geotechnical laboratory test results from geotechnical investigation and has made the following generalized interpretation of the soil stratigraphy. More detailed information is presented on the final typed boring logs and the laboratory test results in **Appendices A** and **B**, respectively.

Embankment – Based on the soil samples obtained from Borings B-2 and B-4, the Embankment is composed of materials generally described as follows: Gray Silt Sand, typically has a USCS Group Symbol of SM. The blow counts for this layer are consistent with a loose consistency. Some samples in this layer noted organics in the sample.

Dense Embankment - Based on the soil samples obtained from Borings B-2 and B-4, the Dense Embankment is composed of materials generally described as follows: Gray Silt Sand, typically has a USCS Group Symbol of SM. Some samples in this layer noted organics in the sample. The blow counts for this layer are consistent with a dense consistency. In boring B-4 this layer was not consistently sampled due to difficulties advancing the drilling and sampling equipment.

Native Material - Based on the soil samples obtained from Borings B-2, B-3, B-4, B-5, B-6, B-7, B-8, B-9, and B-10. the Native Material is composed of materials generally described as follows: Brown or Gray, Well-Graded to Silty Sand with or without gravel. which typically have USCS Group Symbols SW and SM respectively. The blow counts for this layer are consistent with a dense consistency.

Glacial Till – Based on boring logs from Borings B-2, B-3, B-4, B-5, B-9, and B-10, the Glacial Till generally consists of materials described as Well-Graded Sand with Gravel, which typically have USCS Group Symbols SW to SM. The Glacial Till grades gravel in many cases which instances of heavily weathered bedrock. This layer is very difficult to sample with refusal on the split spoon typically within the first interval, or having blow counts greater than 40 blows per six inches.

Bedrock - Based on the rock samples obtained from Borings B-3, B-4, B-5, B-8, and B-9, the underlying bedrock is a light gray to pink Granite with numerous horizontal fracturing.

in many cases the distinction between the soil layers is based on the soil consistency recorded by the recorded N-values taken during the Standard Penetration Testing performed during borehole advancement. The N-values corrected for overburden and hammer energy for the embankment soils were typically less than 50 indicating dense to very dense soil. The soil N-values for the native soil and glacial till typically started at 56 indicating very dense soil.

3 Limitations

Arcadis' professional services have been performed using the degree and standard of care and skill ordinarily exercised under similar circumstances by reputable civil engineers, geotechnical engineers and geologists practicing in this or similar situations. The data, information, and records presented in the appendices should not be separated from the body of this report as they form the basis for our recommendations and conclusions.

The basis for the information and analyses provided in this Geotechnical Data Report are based upon Site visits, a review of available historic documents pertaining to Old Forge Dam, Site investigations and Topographic surveys performed to supplment available information, and documents that were obtained from the District and NYSDEC. In the event that additional historic documents are discovered and/or changes or additions to the information provided in this Geotechnical Data Report are discovered, the information should be brought to the attention of the District and Arcadis so that appropriate changes can be made.

Figures

1:36,112

0 0.33 0.65 1.3 mi

0 0.5 1 2 km

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

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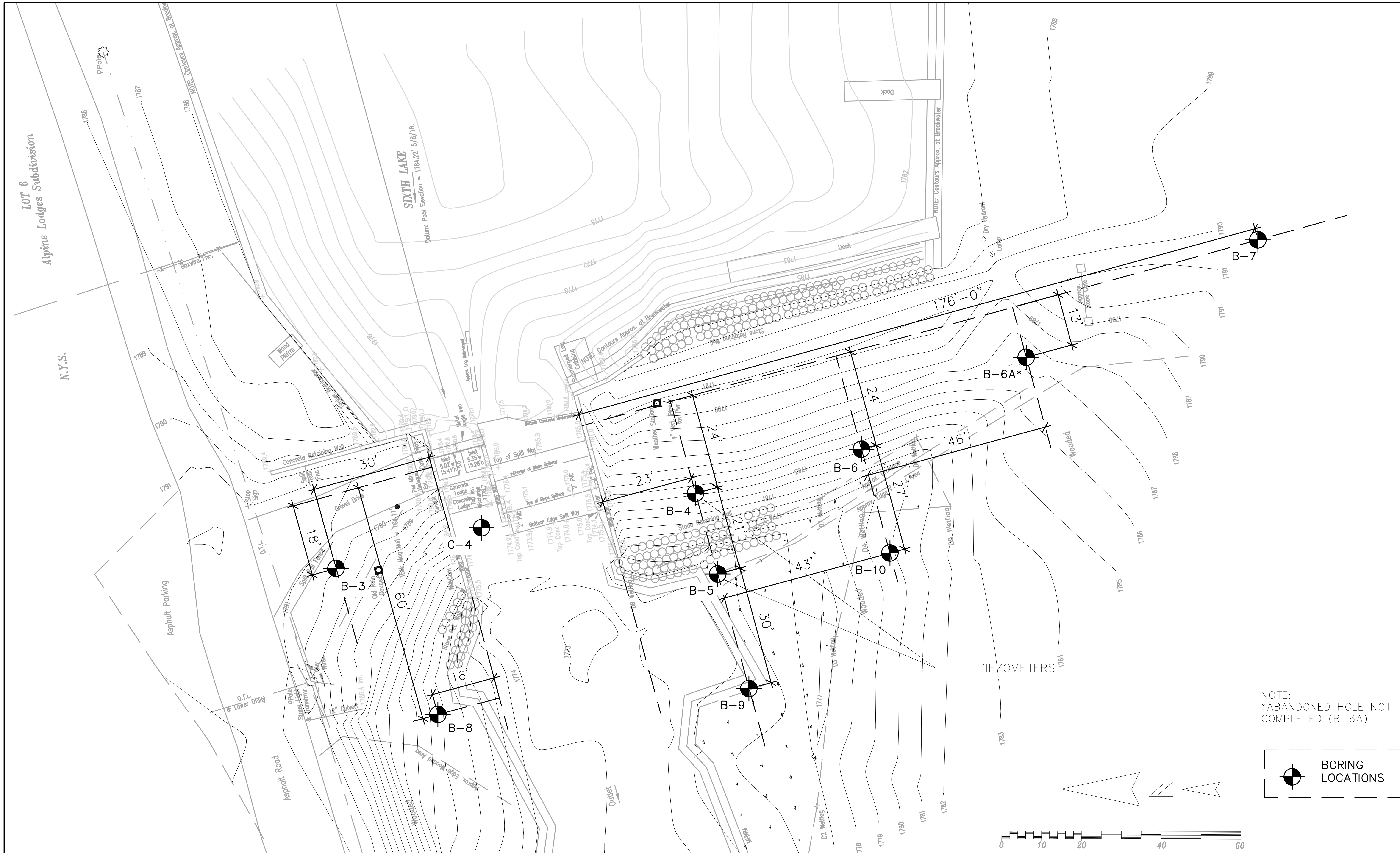
OLD FORGE DAM GEOTECHNICAL DATA REPORT

LOCATION OF SIXTH LAKE DAM

ARCADIS

FIGURE 1-1



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ARCADIS Design & Consultancy for natural and built assets

HUDSON RIVER BLACK RIVER REGULATING DISTRICT

GEOTECHNICAL DATA REPORT

SIXTH LAKE DAM

BORING AND PIEZOMETER LOCATIONS

SEPTEMBER 2021

FIGURE 2-1

Appendix A

Boring Logs

Aztech Environmental
TECHNOLOGIES
A LaBella Company
5 McCrea Hill Road, Ballston Spa, New York , 518-885-

Boring Log: B-1

Client: HRBRRD
Project: Old Forge Dam
Street Address: NY-28
City / State: Old Forge, New York
Drilling Co.: Aztech Environmental Technologies
Address: 5 McCrea Hill Rd. Ballston Spa, NY
Driller: Ray Hammond

Drilling Method: 3.75" Casing, Split-spoon, NX Core
Hammer Weight: 140 lbs
Drilled Borehole Dia: 3.75"
Total Drilled Depth: 20.38'
Ground Elevation: NA
Depth to water: NA

Start date: 7/9/2019
Finish date: 7/9/2019

Depth (Feet)	Sample ID	Sample Interval (feet)	Recovery	Blow Counts	Description	Depth (Feet)
1	S-1	0' - 2'	12"	WOH-1-2-1	Medium SAND, wet.	1
2						2
3	S-2	2' - 4'	16"	2-3-12-15	Medium SAND and GRAVEL, wet.	3
4						4
5	S-3	4' - 6'	24"	12-50/0.3	Fine SAND and medium GRAVEL, wet. Refusal encountered at 5.38'	5
6					Light gray, Granitic Gneiss, some orange oxidation present around fracture areas. Numerous horizontal to high angle fractures.	6
7						7
8	NX-1	5.38'-10.38'	55" (91%)	NA	RQD = 51%	8
9						9
10					Fractures: 5.75', 5.9', 6.1', 6.6' to 7.0', 7.5', 8.3, 8.6' to 9.0'	10
11					Light gray, Granitic Gneiss. Numerous horizontal to high angle fractures.	11
12						12
13	NX-2	10.38'-15.38'	60" (100%)	NA	RQD = 51%	13
14						14
15					Fractures: 10.6', 10.95', 11.45' to 11.7', 12.5', 13' to 13.4', 13.95', 14.5', 14.7 to 15.1'	15
16					Light gray, Granitic Gneiss. Numerous horizontal to vertical fractures.	16
17						17
18	NX-3	15.38-20.38'	59" (98%)	NA	RQD = 36%	18
19						19
20					Fractures: 15.38' to 15.9', 16.6' to 17', 17.3' to 17.5', 18.7', 19.6' to 20.2'	20
21						21

Notes:
NA - Not Available
fbg - feet below grade
" - inches

PID - Photoionization Detector
ppm - parts per million
' -feet

Aztech Environmental
TECHNOLOGIES
A LaBella Company
5 McCrea Hill Road, Ballston Spa, New York , 518-885-

Boring Log: B-2

Client: HRBRRD
Project: Old Forge Dam
Street Address: NY-28
City / State: Old Forge, New York
Drilling Co.: Aztech Environmental Technologies
Address: 5 McCrea Hill Rd. Ballston Spa, NY
Driller: Ray Hammond

Drilling Method: 3.75" Casing, Split-spoon, NX Core
Hammer Weight: 140 lbs
Drilled Borehole Dia: 3.75"
Total Drilled Depth: 21.20'
Ground Elevation: NA
Depth to water: NA

Start date: 7/10/2019
Finish date: 7/10/2019

Depth (Feet)	Sample ID	Sample Interval (feet)	Recovery	Blow Counts	Description	Depth (Feet)
1	S-1	0' - 2'	8"	WOH-2-2-2	Medium SAND, wet.	1
2						2
3	S-2	2' - 4'	16"	2-2-1-2	Medium SAND and GRAVEL, wet.	3
4						4
5	S-3	4' 6.2'	8"	NA	Fine SAND and medium GRAVEL, wet. Refusal encountered at 5.38'	5
6						6
7	NX-1	6.2' - 8.9'	32" (99%)	NA	Light gray, Granitic Gneiss, some orange oxidation present around fracture areas. Numerous horizontal to low angle fractures. RQD = 51% Fractures: 6.8', 8.0', 8.5'	7
8						8
9						9
10	NX-2	8.9' - 14'	60" (100%)	NA	Light gray, Granitic Gneiss. Numerous horizontal to low angle fractures. RQD = 72% Fractures: 9' to 9.4', 10.3', 11.1', 11.9', 12.9'	10
11						11
12						12
13						13
14	NX-3	14' - 19'	60" (100%)	NA	Light gray, Granitic Gneiss. Numerous horizontal to vertical fractures. RQD = 51% Fractures: 14 to 14.8', 15.8', 16.2', 16.9'. 17.2 to 18', 18.2'	14
15						15
16						16
17						17
18						18
19	NX-4	19' - 21.2'	24.6" (93%)	NA	Light gray, Granitic Gneiss. Numerous horizontal to high angle fractures. RQD = 53% Fractures: 19.3', 20.8', 21'	19
20						20
21						21
22						22
23						23

Notes:
NA - Not Available
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PID - Photoionization Detector
ppm - parts per million
' -feet

Aztech Environmental
TECHNOLOGIES
A LaBella Company
5 McCrea Hill Road, Ballston Spa, New York , 518-885-

Boring Log: B-3

Client: HRBRRD
Project: Sixth Lake Dam
Street Address: NY-28
City / State: Inlet, New York
Drilling Co.: Aztech Environmental Technologies
Address: 5 McCrea Hill Rd. Ballston Spa, NY
Driller: Ray Hammond

Drilling Method: 3.75" Casing, Split-spoon, NX Core
Hammer Weight: 140 lbs
Drilled Borehole Dia: 3.75"
Total Drilled Depth: 13.2'
Ground Elevation: NA
Depth to water: NA

Start date: 7/12/2019
Finish date: 7/15/2019

Depth (Feet)	Sample ID	Sample Interval (feet)	Recovery	Blow Counts	Description	Well Construction	Depth (Feet)
1	S-1	0' - 2'	10"	WOH-2,1,1	Fine SAND, some Gravel, dry.		1
2							2
3	S-2	2' - 4'	12"	3,4,2,2	Fine SAND, some Gravel, dry.		3
4							4
5	S-3	4' - 6'	12"	2,1,1,1	Fine SAND, some Gravel, Rock fragments in sampler tip. moist.		5
6							6
7	S-4	6' - 8'	1"	WOH,WOH, WOH,2	Fine SAND and GRAVEL, little wood fragments, moist to wet.		7
8							8
9	S-5	8' - 10'	10"	2,4,8,7	Fine SAND, some Gravel, wet.		9
10							10
11	S-6	10' - 12'	3"	23,50/2"	Fine SAND, some Gravel, wet. Refusal encountered at 10.7'		11
12					Roller bit and advanced casing.		12
13	NX-1	12.2' - 13.3'	10" (80%)	NA	Light gray to pink, Granitic Gniess fragments (Boulder). RQD = 0%		13
14							14
15	NX-2	14.2' - 15.6'	5" (36%)	NA	Roller bit through fractured rock and advance casing.		15
16					Light gray to pink, Granitic Gniess fragments (Boulder). RQD = 0%		16
17							17
18					Roller bit through fractured rock and advance casing.		18
19	NX-3	17.2' - 21.2'	46" (98%)	NA	Light gray to pink, Granite. competent rock, few horizontal fractures. RQD = 92.3% Fractures: 17.9', 18.4', 19.3', 20.1'.		19
20							20
21							21

Notes:
NA - Not Available
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" - inches

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ppm - parts per million
' -feet

Aztech Environmental
TECHNOLOGIES
A LaBella Company
5 McCrea Hill Road, Ballston Spa, New York , 518-885-

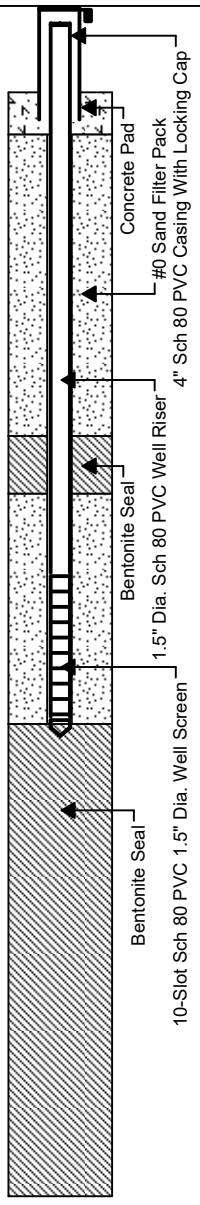
Boring Log: B-4

Client: HRBRRD
Project: Sixth Lake Dam
Street Address: NY-28
City / State: Inlet, New York
Drilling Co.: Aztech Environmental Technologies
Address: 5 McCrea Hill Rd. Ballston Spa, NY
Driller: Ray Hammond

Drilling Method: 3.75" Casing, Split-spoon, NX Core
Hammer Weight: 140 lbs
Drilled Borehole Dia: 3.75"
Total Drilled Depth: 38.5'
Ground Elevation: NA
Depth to water: NA

Start date: 6/26/20
Finish date: 6/29/20

Depth (Feet)	Sample ID	Sample Interval (feet)	Recovery	Blow Counts	Description
0	S-1	0' - 2'	4"	WOH,1,WOHx2	Dark brown SAND, little gravel, moist
2	S-2	2' - 4'	5"	2,17,5,7	Dark brown SAND, some medium Gravel, little silt, moist.
4	S-3	4' - 6'	1"	9,10,14,12	Granite fragment in sampler tip.
6	S-4	6' - 8'	3"	3,3,7,29	No recovery
8	S-5	8' - 10'	NA	18,8,9,5	Granite rock fragments, wet.
10					Roller bit and advance casing through fractured rock.
23	S-6	23' - 25'	6"	3,5,11,4	Gray fine SAND and fine GRAVEL, dense, wet.
25					Roller bit and advanced casing.
34	NX-1	33.5' - 38.5'	53" (88%)	NA	Light gray to pink, Granite, numerous horizontal fractures.. RQD = 67.9% Fractures: 33.7', 34.2', 34.6', 34.9', 35.6', 36.4', 36.8', 37.2', 37.4', 37.7'.



Notes:
NA - Not Available
fbg - feet below grade
" - inches
PID - Photoionization Detector
ppm - parts per million
' -feet

Aztech Environmental
TECHNOLOGIES
A LaBella Company
5 McCrea Hill Road, Ballston Spa, New York , 518-885-

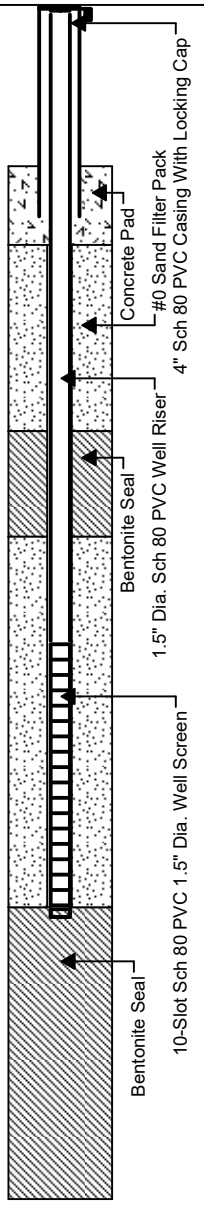
Boring Log: B-5

Client: HRBRRD
Project: Sixth Lake Dam
Street Address: NY-28
City / State: Inlet, New York
Drilling Co.: Aztech Environmental Technologies
Address: 5 McCrea Hill Rd. Ballston Spa, NY
Driller: Ray Hammond

Drilling Method: 3.75" Casing, Split-spoon, NX Core
Hammer Weight: 140 lbs
Drilled Borehole Dia: 3.75"
Total Drilled Depth: 19.5'
Ground Elevation: NA
Depth to water: NA

Start date: 6/23/20
Finish date: 6/23/20

Depth (Feet)	Sample ID	Sample Interval (feet)	Recovery	Blow Counts	Description
0					
1	S-1	0' - 2'	10"	2,4,8,11	Black fine SAND and SIT, some fine Gravel, wet.
3	S-2	2' - 4'	20"	6,9,8,6	Black to dark gray fine SAND and SILT, wet.
5	S-3	4' - 6'	21"	17,12,8,5	Gray fine SAND and SILT, little fine gravel, dense, wet.
7	S-4	6' - 8'	24"	4,11,22,19	Gray fine SAND and SILT, little fine gravel, dense, wet.
9	S-5	8' - 10'	21"	15,16,17,23	Brown fine to medium SAND and GRAVEL, loose, moist.
11	S-6	10' - 12'	21"	10,23,38,42	Gray fine SAND and SILT, little fine gravel, dense, moist.
13	S-7	12' - 14'	21"	34,43,50/4"	Gray fine SAND and SILT, little fine gravel, very dense, moist.
14	S-8	14' - 14.5'	8"	25,50/1"	Gray fine SAND and SILT, granite fragments, dense, moist.
15	NX-1	14.5' - 19.5'	48" (80%)	NA	Refusal encountered at 14.5'. Light gray to pink, Granite, numerous horizontal fractures.. RQD = 81.2% Fractures: 14.5' to 14.7', 15', 15.7', 16.8', 17.7', 18.1', 18.4', 18.6'.
20					



Notes:
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fbg - feet below grade
" - inches
PID - Photoionization Detector
ppm - parts per million
' -feet

Aztech Environmental
TECHNOLOGIES
A LaBella Company
5 McCrea Hill Road, Ballston Spa, New York , 518-885-

Boring Log: B-6

Client: HRBRRD
Project: Sixth Lake Dam
Street Address: NY-28
City / State: Inlet, New York
Drilling Co.: Aztech Environmental Technologies
Address: 5 McCrea Hill Rd. Ballston Spa, NY
Driller: Ray Hammond

Drilling Method: 3.75" Casing, Split-spoon, NX Core
Hammer Weight: 140 lbs
Drilled Borehole Dia: 3.75"
Total Drilled Depth: 14.7'
Ground Elevation: NA
Depth to water: NA

Start date: 6/24/20
Finish date: 6/24/20

Depth (Feet)	Sample ID	Sample Interval (feet)	Recovery	Blow Counts	Description	Depth (Feet)
1	S-1	0' - 2'	3"	WOH	Black topsoil	1
2	S-2	2' - 4'	21"	3,3,4,6	Gray fine SAND and SILT, little fine gravel, dense, moist.	2
4	S-3	4' - 6'	21"	8,11,11,7	Gray to brown fine to coarse SAND and SILT, little fine gravel, loose, moist to wet.	4
6	S-4	6' - 8'	21"	6,6,7,11	Gray fine SAND and SILT, firm, wet.	6
8	S-5	8' - 10'	21"	11,9,8,15	Gray fine SAND and SILT, trace fine gravel, firm, wet.	8
10	S-6	10' - 12'	20"	13,12,11,11	Gray fine SAND and SILT, firm, moist.	10
12	S-7	12' - 14'	18"	14,15,20,22	Gray fine SAND and SILT, firm, moist.	12
14	S-8	14' - 16'	15"	16,22,24,50/1"	Gray fine SAND and SILT, very dense, moist. Refusal encountered at 14.7' No rock core collected per onsite engineer..	14
16						16
17						17
18						18

Notes:
NA - Not Available
fbg - feet below grade
" - inches

PID - Photoionization Detector
ppm - parts per million
' -feet

Aztech Environmental
TECHNOLOGIES
A LaBella Company
5 McCrea Hill Road, Ballston Spa, New York , 518-885-

Boring Log: B-7

Client: HRBRRD
Project: Sixth Lake Dam
Street Address: NY-28
City / State: Inlet, New York
Drilling Co.: Aztech Environmental Technologies
Address: 5 McCrea Hill Rd. Ballston Spa, NY
Driller: Ray Hammond

Drilling Method: 3.75" Casing, Split-spoon, NX Core
Hammer Weight: 140 lbs
Drilled Borehole Dia: 3.75"
Total Drilled Depth: 22'
Ground Elevation: NA
Depth to water: 6.5'

Start date: 7/10/2019
Finish date: 7/11/2019

Depth (Feet)	Sample ID	Sample Interval (feet)	Recovery	Blow Counts	Description	Well Construction	Depth (Feet)
1	S-1	0' - 2'	14"	2,4,3,4	Fine to medium SAND, some Gravel, moist.		1
2							2
3	S-2	2' - 4'	8"	13,47,50/1"	Fine medium SAND and GRAVEL, wet. Refusal encountered at 3.1' Advance casing.		3
4							4
5	S-3	4' - 6'	6"	44,58,18,18	Fine to medium SAND, some Gravel, wet		5
6							6
7	S-4	6' - 8'	16"	13,18,18,11	Fine to medium SAND, some Gravel, wet		7
8							8
9	S-5	8' - 10'	24"	11,10,11,9	Fine to medium SAND, dense, wet.		9
10							10
11	S-6	10' - 12'	24"	14,14,18,22	Fine SAND, dense, wet.		11
12							12
13	S-7	12' - 14'	24"	5,9,23,50/1"	Medium SAND, some Gravel, wet.		13
14							14
15	S-8	14' - 16'	18"	43,29,26,30	Fine SAND		15
16							16
17	S-9	16' - 18'	14"	51,48,50/4"	Fine SAND, dense, wet.		17
18							18
19	S-10	18' - 20'	10"	22,100/4"	Fine SAND and GRAVEL, wet. Refusal encountered at 18.8', advacned casing to 20'.		19
20							20
21	S-11	20' - 22'	20"	31,29,20,31	Fine SAND and GRAVEL. Boring terminated at 22'. No rock core collected per onsite engineer.		21
22							22
23							23

Notes:
NA - Not Available
fbg - feet below grade
" - inches

PID - Photoionization Detector
ppm - parts per million
' -feet

Aztech Environmental
TECHNOLOGIES
A LaBella Company
5 McCrea Hill Road, Ballston Spa, New York , 518-885-

Boring Log: B-8

Client: HRBRRD
Project: Old Forge Dam
Street Address: NY-28
City / State: Old Forge, New York
Drilling Co.: Aztech Environmental Technologies
Address: 5 McCrea Hill Rd. Ballston Spa, NY
Driller: Ray Hammond

Drilling Method: 3.75" Casing, Split-spoon, NX Core
Hammer Weight: 140 lbs
Drilled Borehole Dia: 3.75"
Total Drilled Depth: 9.3'
Ground Elevation: NA
Depth to water: NA

Start date: 7/16/2019
Finish date: 7/16/2016

Depth (Feet)	Sample ID	Sample Interval (feet)	Recovery	Blow Counts	Description	Depth (Feet)
1	S-1	0' - 2'	14"	WOH,2,2,1	Fine SAND and wood debris, dry.	1
2	S-2	2' - 4'	10"	5,8,10,13	Fine SAND and GRAVEL, roack fragments, dry.	2
3						3
4	S-3	4' - 4.3'	1"	50/1"	Fine SAND and medium GRAVEL, wet.	4
5	NX-1	4.3' - 9.3'	55"(91.6%)	NA	Refusal encountered at 4.3' Light gray, competent Granitic Gneiss, few horizontal fractures. RQD = 87.2% Fractures: 6.3', 8.3', 8.6'.	5
6						6
7						7
8						8
9						9
10						10

Notes:
NA - Not Available
fbg - feet below grade
" - inches

PID - Photoionization Detector
ppm - parts per million
' -feet

Aztech Environmental
TECHNOLOGIES
A LaBella Company
5 McCrea Hill Road, Ballston Spa, New York , 518-885-

Boring Log: B-9

Client: HRBRRD
Project: Sixth Lake Dam
Street Address: NY-28
City / State: Inlet, New York
Drilling Co.: Aztech Environmental Technologies
Address: 5 McCrea Hill Rd. Ballston Spa, NY
Driller: Ray Hammond

Drilling Method: 3.75" Casing, Split-spoon, NX Core
Hammer Weight: 140 lbs
Drilled Borehole Dia: 3.75"
Total Drilled Depth: 25.8'
Ground Elevation: NA
Depth to water: NA

Start date: 6/23/2020
Finish date: 6/24/2020

Depth (Feet)	Sample ID	Sample Interval (feet)	Recovery	Blow Counts	Description	Depth (Feet)
1	S-1	0' - 2'	6"	WOH,4,3,2	Black fine to coarse SAND and SILT, some rock fragments in sample tip, wet.	1
3	S-2	2' - 4'	18"	3,4,6,3	Gray to brown fine to medium SAND and SILT, trace fine gravel, firm, wet.	3
5	S-3	4' - 6'	21"	4,4,4,1	Gray fine to medium SAND and SILT, trace fine gravel, firm, wet.	5
7	S-4	6' - 8'	21"		Gray fine to medium SAND and SILT, trace fine gravel, soft, wet.	7
9	S-5	8' - 10'	5"	1,4,7,10	Gray to brown fine to medium SAND, some Silt, little fine gravel, loose, wet.	9
11	S-6	10' - 12'	15"	12,10,15,15	Gray fine SAND and SILT, trace fine gravel, dense, moist.	11
13	S-7	12' - 14'	21"	5,28,40,47	Gray fine SAND and SILT, trace fine gravel, very dense, granite fragments in sampler tip, moist.	13
15	S-8	14' - 16'	3"	50/1"	Similar soil. Refusal encountered at 14.2'.	15
17					Advance roller bit and casing through fractured rock.	17
22	NX-1	20.8' - 22.8'	17"(71%)	NA	Light gray, Granitic Gneiss, tranistion to light pink Granite at 21.5'. few horizontal fractures. RQD = 73.5% Fractures: 21.1', 21,5', 21.7'.	22
24	NX-2	22.8' - 25.8'	23"(64%)	NA	Light pink to gray, Competent Granite, few horizontal fractures. RQD = 80.4% Fractures: 22.2', 22.5', 22.9', 23.7'..	24
27						27

Notes:
NA - Not Available
fbg - feet below grade
" - inches

PID - Photoionization Detector
ppm - parts per million
' -feet

Aztech Environmental
TECHNOLOGIES
A LaBella Company
5 McCrea Hill Road, Ballston Spa, New York , 518-885-

Boring Log: B-10

Client: HRBRRD
Project: Sixth Lake Dam
Street Address: NY-28
City / State: Inlet, New York
Drilling Co.: Aztech Environmental Technologies
Address: 5 McCrea Hill Rd. Ballston Spa, NY
Driller: Ray Hammond

Drilling Method: 3.75" Casing, Split-spoon
Hammer Weight: 140 lbs
Drilled Borehole Dia: 3.75"
Total Drilled Depth: 43.2'
Ground Elevation: NA
Depth to water: 3.5'

Start date: 7/17/2019
Finish date: 7/17/2019

Depth (Feet)	Sample ID	Sample Interval (feet)	Recovery	Blow Counts	Description	Well Construction	Depth (Feet)
1	S-1	0' - 2'	2'	WOH,2,2,2	Fine to medium SAND, some Gravel, little wood, moist.		1
2							2
3	S-2	2' - 4'	16"	6,7,7,10	Fine medium SAND, little wood debris, wet.		3
4							4
5	S-3	4' - 6'	24"	8,9,12,11	Fine to medium SAND, some Gravel, wet		5
6							6
7	S-4	6' - 8'	24"	11,10,9,7	Fine to medium SAND, some Gravel, wet		7
8							8
9	S-5	8' - 10'	24"	7,7,7,8	Fine to medium SAND, wet.		9
10							10
11	S-6	10' - 12'	24"	12,8,19,14	Gray fine SAND, dense, wet.		11
12							12
13	S-7	12' - 14'	24"	12,17,24,32	Gray fine SAND, some Gravel,dense wet.		13
14							14
15	S-8	14' - 16'	24"	26,46,54,56	Gray fine SAND, some Gravel,dense, rock fragments, wet.		15
16							16
17					Roller bit through boulders and advance casing.		17
18							18
19							19
20							20
21	S-9	20' - 22'	24"	22,44,69,64	Gray fine SAND,dense wet.		21
22							22
23					Advance casing.		23
24							24
25							25
26	S-10	25' - 27'	22"	31,46,50/0.5"	Gray fine SAND,dense wet.		26
27							27
28					Advance casing.		28
29							29
30							30
31	S-11	30' - 31'	6"	4,50/1"	Gray fine SAND, some medium Gravel,dense wet.		31
32							32
33					Refusal at 30.8', advance casing.		33
34							34
35					Advance casing.		35
36	S-12	35' - 37'	12"	50/1"			36
37					Gray fine SAND, some medium Gravel,dense wet.		37
38							38
39					Advance casing.		39
40							40
41	S-13	40' - 42'	8"	39,50/1"	Medium GRAVEL and SAND, wet.		41
42							42
43					Advance casing.		43
44	S-14	43' - 45'	3"	50/1"	Gray fine SAND, some medium Gravel,dense wet.		44
45							45
46							46
47					Refusal encountetred at 43.2', Terminate borehole.		47
48					No rock cores collected per onsite engineer.		48
49							49
50							50

Notes:
NA - Not Available
fbg - feet below grade
" - inches

PID - Photoionization Detector
ppm - parts per million
' -feet

Aztech Environmental
TECHNOLOGIES
A LaBella Company
5 McCrea Hill Road, Ballston Spa, New York , 518-885-

Boring Log: C-4

Client: HRBRRD
Project: Sixth Lake Dam
Street Address: NY-28
City / State: Inlet, New York
Drilling Co.: Aztech Environmental Technologies
Address: 5 McCrea Hill Rd. Ballston Spa, NY
Driller: Ray Hammond

Drilling Method: Core Drill
Hammer Weight: NA
Drilled Borehole Dia: 5.5"
Total Drilled Depth: 12"
Ground Elevation: NA
Depth to water: NA

Start date: 7/10/2019
Finish date: 7/10/2019

Depth (Feet)	Sample ID	Sample Interval (feet)	Recovery	Blow Counts	Description	Depth (Feet)
	C-1	0' - 1'	12"	NA	Light gray concrete with granite aggregate, fracture at 1.75". - 5.5" diameter core. Aggregate Diameter Range: 0.025" to 2.75" End Core.	
1						1

Notes:
NA - Not Available
fbg - feet below grade
" - inches

PID - Photoionization Detector
ppm - parts per million
' -feet

Appendix B

Laboratory Reports

QCQA Labs
QC/QA LABORATORIES, INC.
DRILLING & TESTING SERVICES

New York State Certified
Service-Disabled Veteran-Owned Business

SDVOSB

REPORT OF TESTING

Compressive Strength of Intack Rock Core Specimens
ASTM D-7012

Project:	**Old Forge and Sixth Lake**	Report Date:	**Aug. 6, 2020**
Location:		Test Date:	**Aug. 5, 2020**
Client:	**Aztech Environmental**	Project No.:	**ST20-071**

Scope: Rock Core specimens were selected from Core Runs delivered to QCQA Labs by the client. The specimens were saw cut to the required test length and the ends ground smooth to the tolerances required by the test method. The moisture content of the rock specimens when tested was in the "as received" condition.

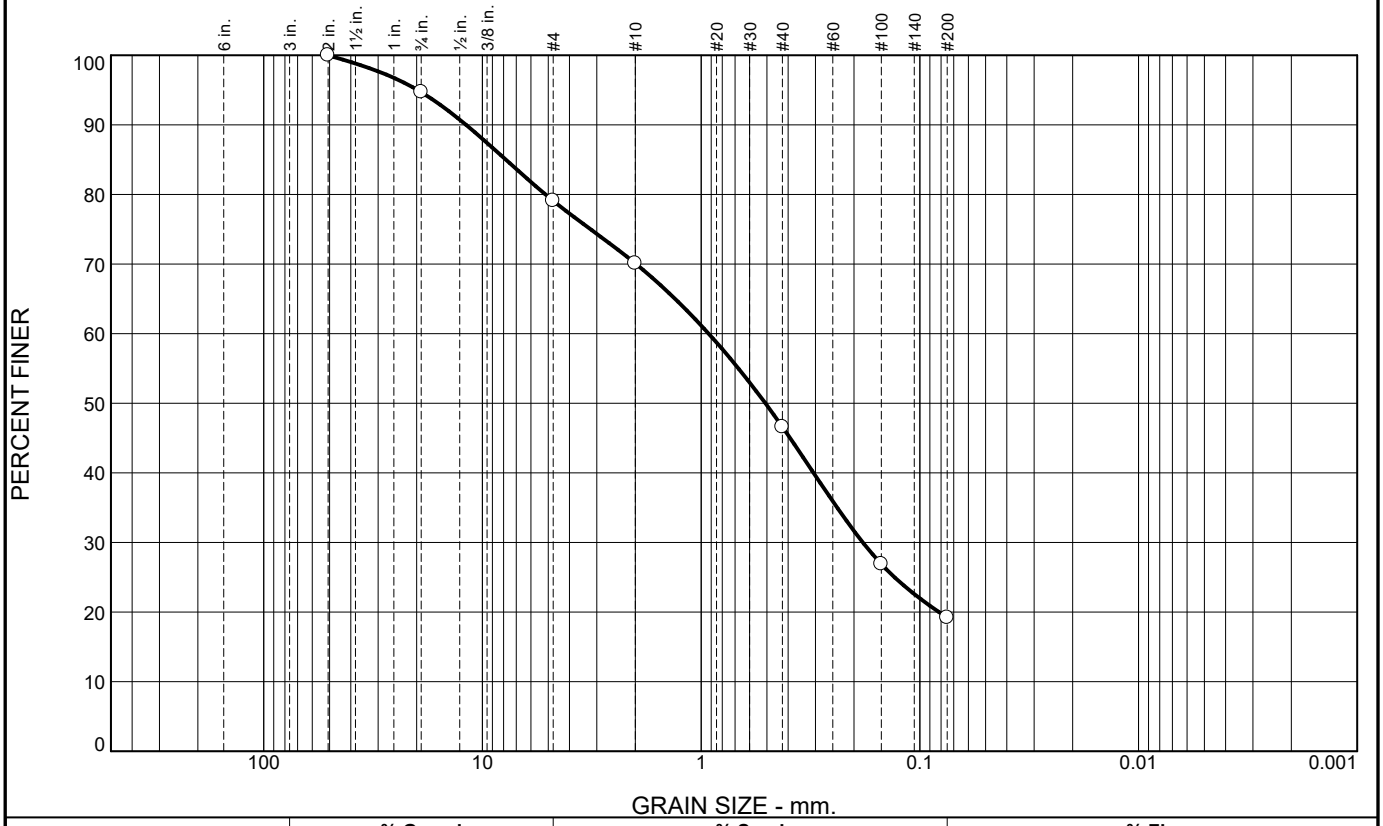
The results of testing are as follows:

Boring	Run #	Core Depth(ft)	Length (in)	Dia. (in)	L/D	Load (lbs)	Compressive Strength (psi)
Old Forge							
B-1	NX-1	6.1 - 6.6	3.46	1.87	1.85	32,510	11,280
B-2	NX-1	8.0 - 8.5	4.03	1.87	2.16	20,700	7,530
Sixth Lake							
B-3	NX-3	18.0 -1 8.5	3.99	1.87	2.13	52,990	19,270
B-5	NX-1	14.3 - 14.7	3.47	1.85	1.88	25,260	9,390
B-9	NX-1	20.8 - 21.3	4.04	1.85	2.18	37,470	13,930

Respectfully Submitted,

William G Stanton
President

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	5.3	15.6	9.0	23.5	27.4	19.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2	100.0		
.75	94.7		
#4	79.1		
#10	70.1		
#40	46.6		
#100	26.9		
#200	19.2		

* (no specification provided)

Soil Description

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 11.8923 D_{85}= 7.8162 D_{60}= 0.9237
D_{50}= 0.5084 D_{30}= 0.1821 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Water Content: 10.9 %

Location: Sixth Lake B-3
Sample Number: S-2 **Depth:** 2 - 4' **Date:** 8/6/20

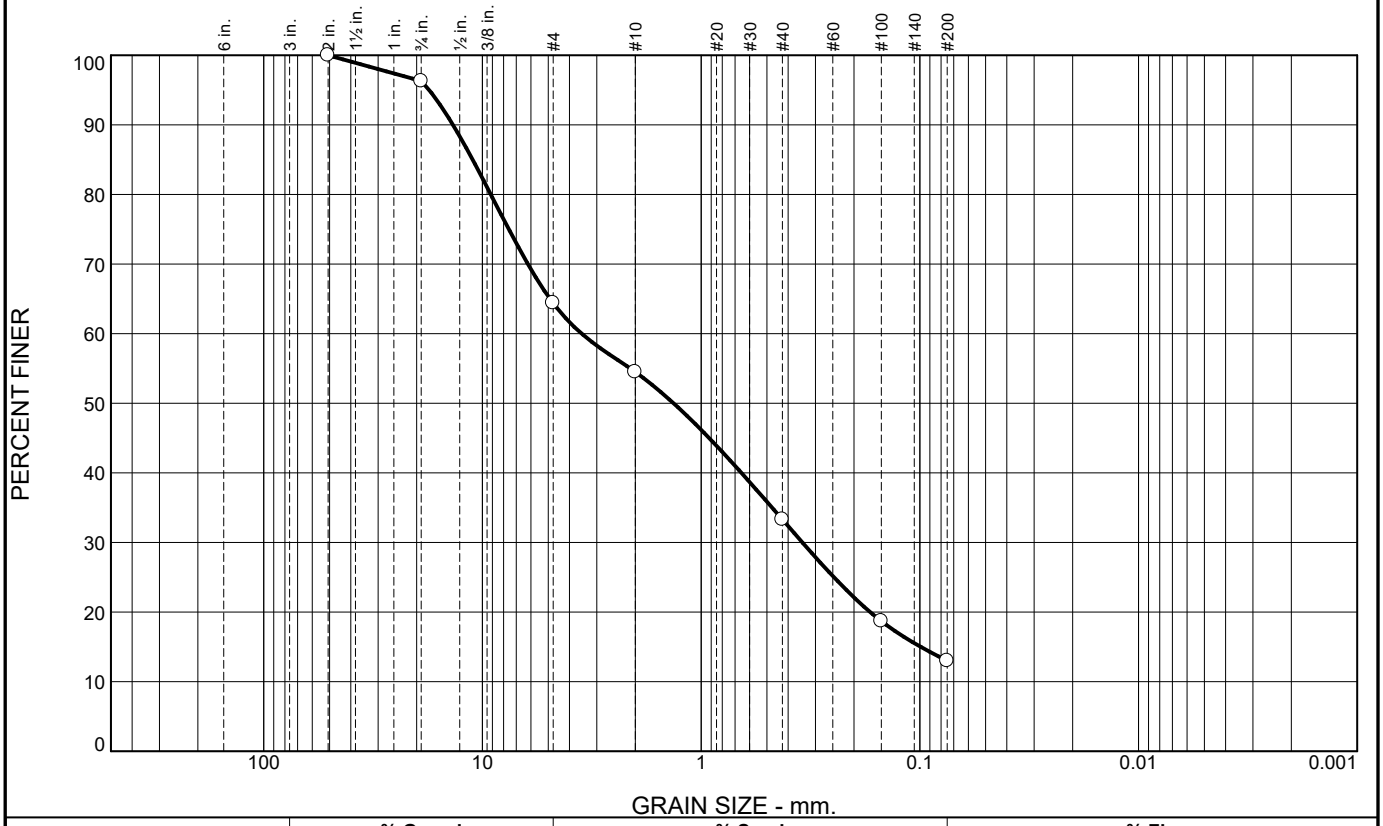
QCQA Laboratories, Inc.

Schuylerville, NY

Client: Axtech Environmental
Project: Old Forge and Sixth Lake

Project No: ST20-071 **Figure** B3S2

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.7	31.9	9.9	21.2	20.3	13.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2	100.0		
.75	96.3		
#4	64.4		
#10	54.5		
#40	33.3		
#100	18.7		
#200	13.0		

* (no specification provided)

Soil Description

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 13.6382 D_{85}= 11.0922 D_{60}= 3.5169
D_{50}= 1.3360 D_{30}= 0.3442 D_{15}= 0.0988
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Water Content: 21.5 %

Location: Sixth Lake B-3
Sample Number: S-5 **Depth:** 8 - 10' **Date:** 8/6/20

QCQA Laboratories, Inc.

Schuylerville, NY

Client: Axtech Environmental
Project: Old Forge and Sixth Lake

Project No: ST20-071 **Figure** B3S5

Particle Size Distribution Report

% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	10.7	8.0	26.8	36.3	18.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
#4	89.3		
#10	81.3		
#40	54.5		
#100	28.7		
#200	18.2		

* (no specification provided)

Soil Description

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 5.1815 D_{85}= 2.8750 D_{60}= 0.5384
D_{50}= 0.3557 D_{30}= 0.1599 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Water Content: 13.8 %

Location: Sixth Lake B-4
Sample Number: SS-2 **Depth:** 2 - 4' **Date:** 8/6/20

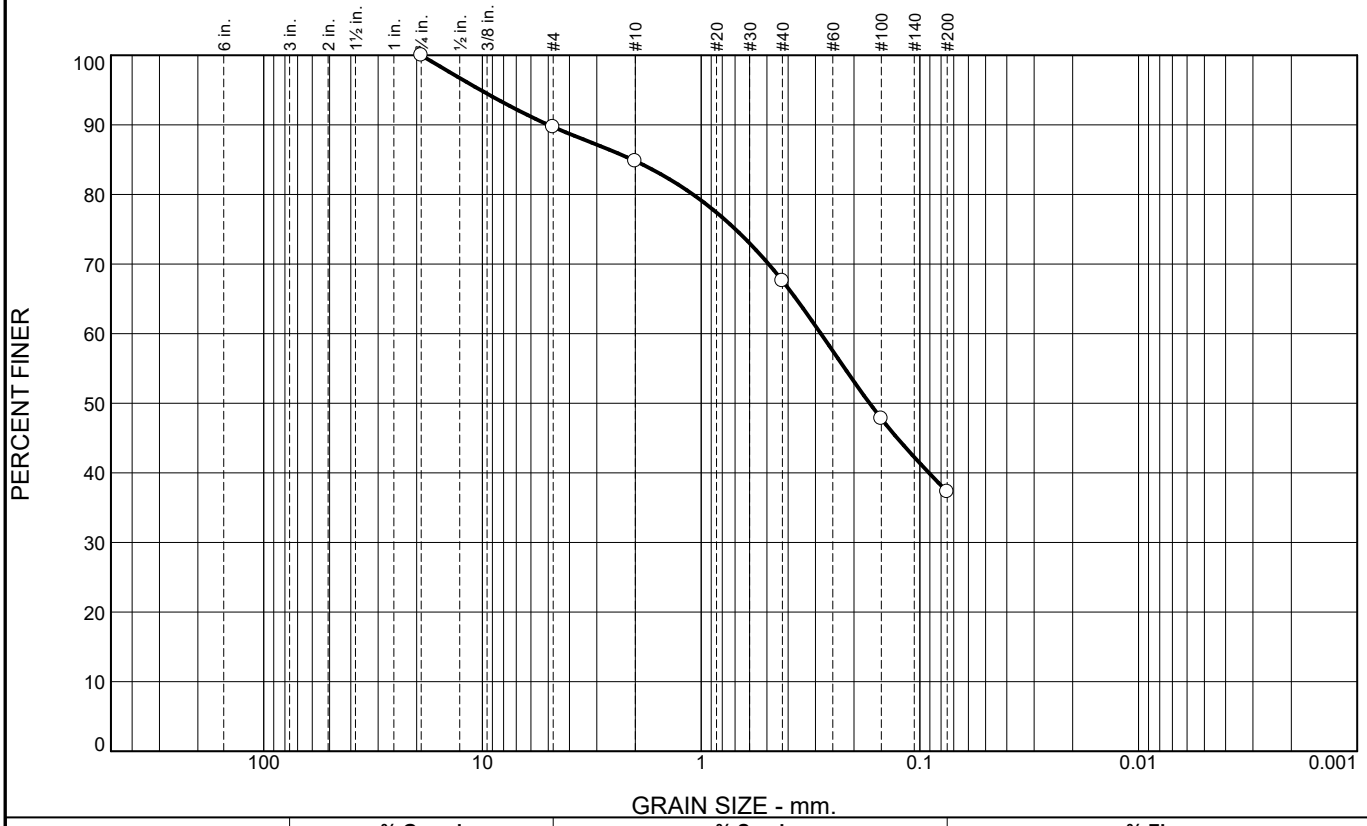
QCQA Laboratories, Inc.

Schuylerville, NY

Client: Axtech Environmental
Project: Old Forge and Sixth Lake

Project No: ST20-071 **Figure** B4SS2

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	10.3	4.9	17.2	30.3	37.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
#4	89.7		
#10	84.8		
#40	67.6		
#100	47.8		
#200	37.3		

* (no specification provided)

Soil Description

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 4.9917 D_{85}= 2.0640 D_{60}= 0.2834
D_{50}= 0.1696 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Water Content: 10.4 %

Location: Sixth Lake B-5
Sample Number: SS-3 **Depth:** 4 - 6' **Date:** 8/6/20

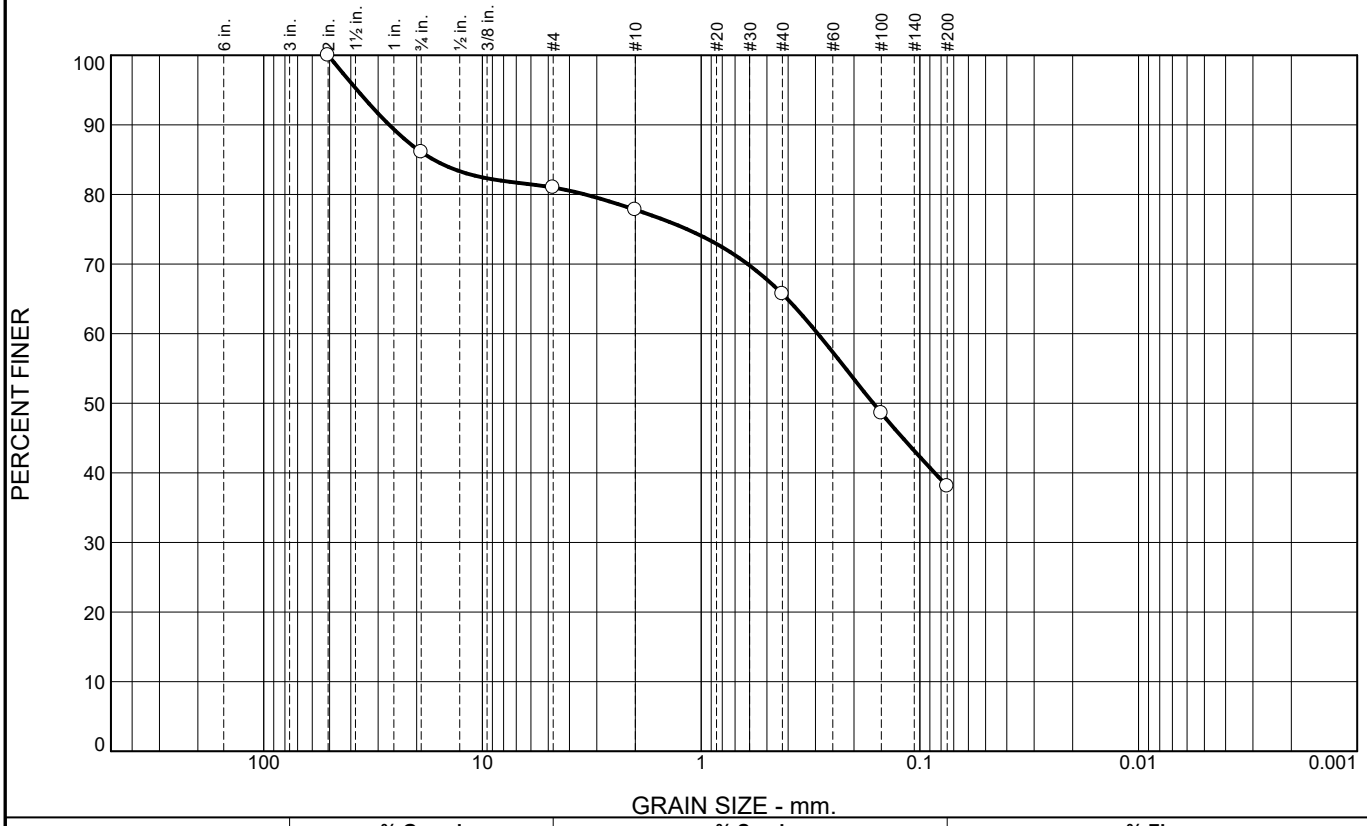
QCQA Laboratories, Inc.

Schuylerville, NY

Client: Axtech Environmental
Project: Old Forge and Sixth Lake

Project No: ST20-071 **Figure** B5SS3

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	13.9	5.1	3.2	12.1	27.6	38.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2	100.0		
.75	86.1		
#4	81.0		
#10	77.8		
#40	65.7		
#100	48.6		
#200	38.1		

* (no specification provided)

Soil Description

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 26.6779 D_{85}= 16.7385 D_{60}= 0.2926
D_{50}= 0.1632 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Water Content: 8.5 %

Location: Sixth Lake B-5
Sample Number: SS-6 **Depth:** 10 - 12' **Date:** 8/6/20

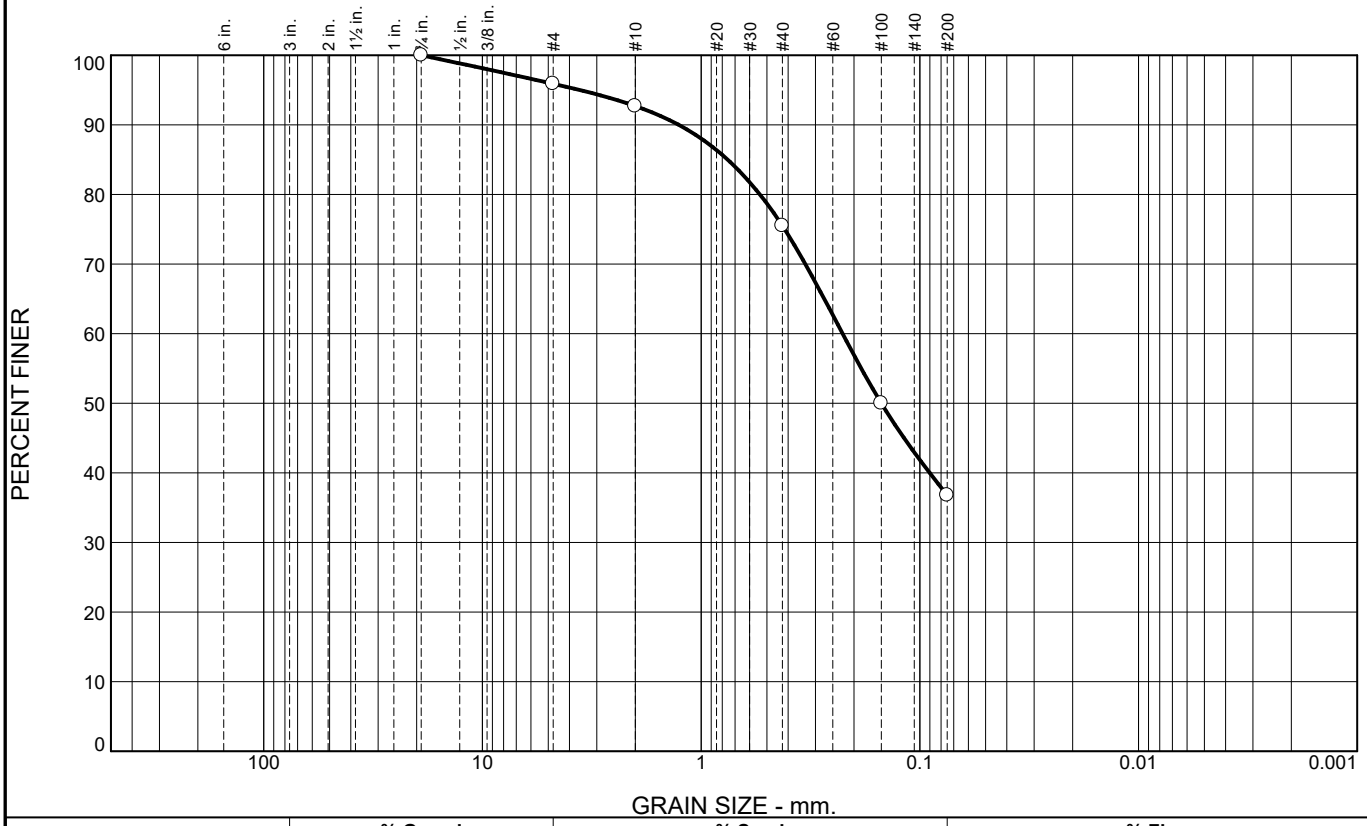
QCQA Laboratories, Inc.

Schuylerville, NY

Client: Axtech Environmental
Project: Old Forge and Sixth Lake

Project No: ST20-071 **Figure** B5SS6

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	4.1	3.2	17.2	38.7	36.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
#4	95.9		
#10	92.7		
#40	75.5		
#100	50.0		
#200	36.8		

* (no specification provided)

Soil Description

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 1.2659 D_{85}= 0.7563 D_{60}= 0.2254
D_{50}= 0.1500 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Water Content: 12.5 %

Location: Sixth Lake B-6
Sample Number: SS-2 **Depth:** 2 - 4' **Date:** 8/6/20

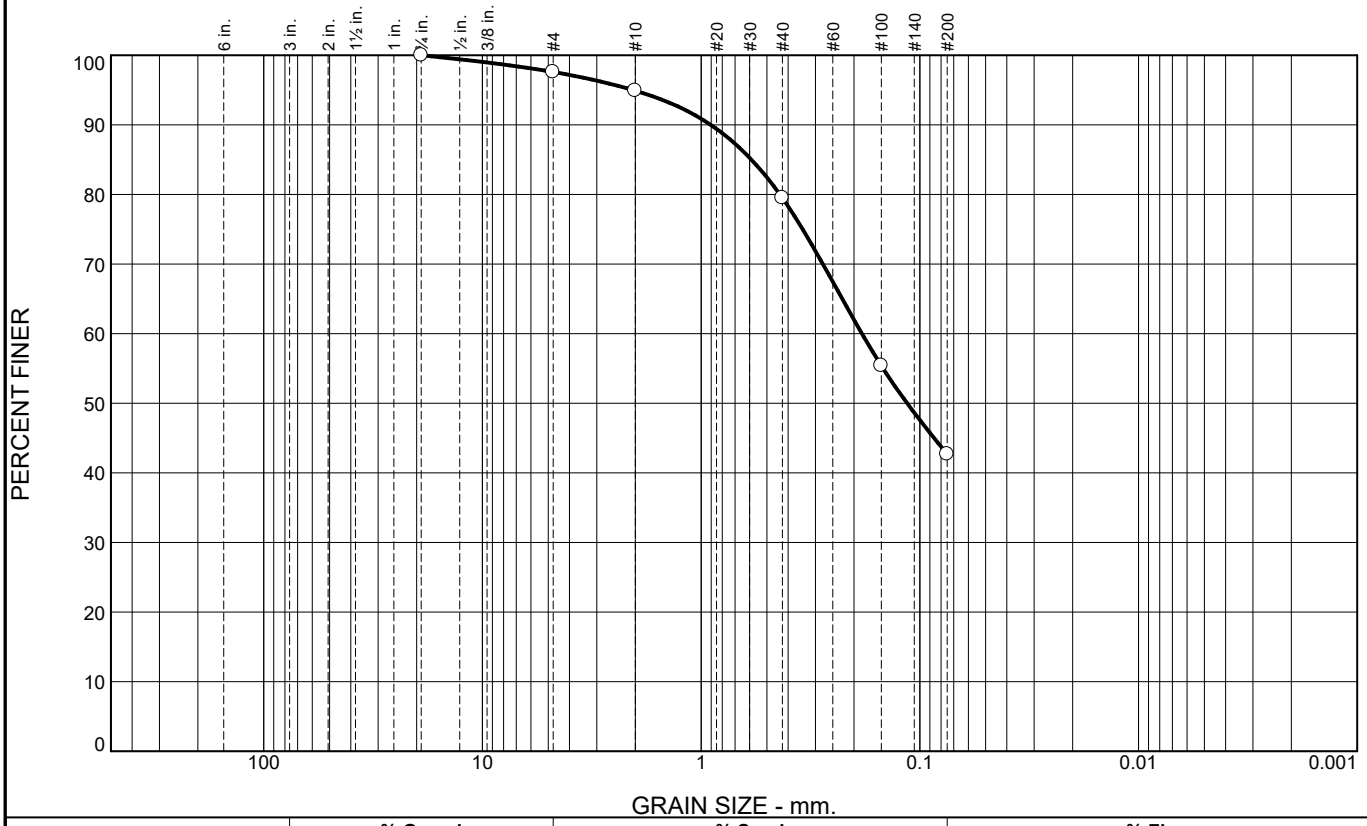
QCQA Laboratories, Inc.

Schuylerville, NY

Client: Axtech Environmental
Project: Old Forge and Sixth Lake

Project No: ST20-071 **Figure** B6SS2

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.4	2.7	15.4	36.8	42.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
#4	97.6		
#10	94.9		
#40	79.5		
#100	55.4		
#200	42.7		

* (no specification provided)

Soil Description

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.9034 D_{85}= 0.5887 D_{60}= 0.1838
D_{50}= 0.1143 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Water Content: 13.2 %

Location: Sixth Lake B-6
Sample Number: SS-4 **Depth:** 6 - 8' **Date:** 8/6/20

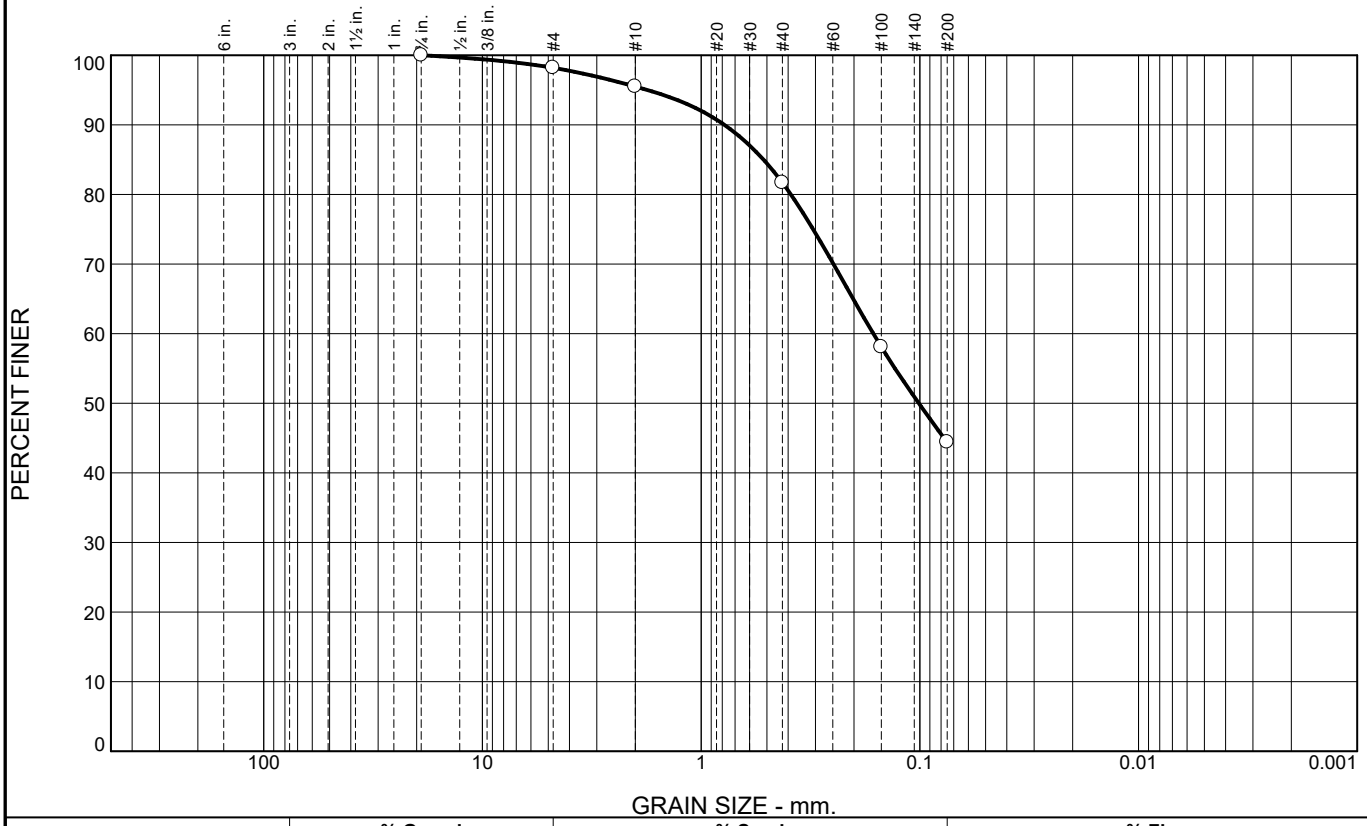
QCQA Laboratories, Inc.

Schuylerville, NY

Client: Axtech Environmental
Project: Old Forge and Sixth Lake

Project No: ST20-071 **Figure** B6SS4

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.8	2.7	13.8	37.3	44.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
#4	98.2		
#10	95.5		
#40	81.7		
#100	58.1		
#200	44.4		

* (no specification provided)

Soil Description

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.7828 D_{85}= 0.5182 D_{60}= 0.1632
D_{50}= 0.1010 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Water Content: 9.4 %

Location: Sixth Lake B-6
Sample Number: SS-8 **Depth:** 14 - 15.7' **Date:** 8/6/20

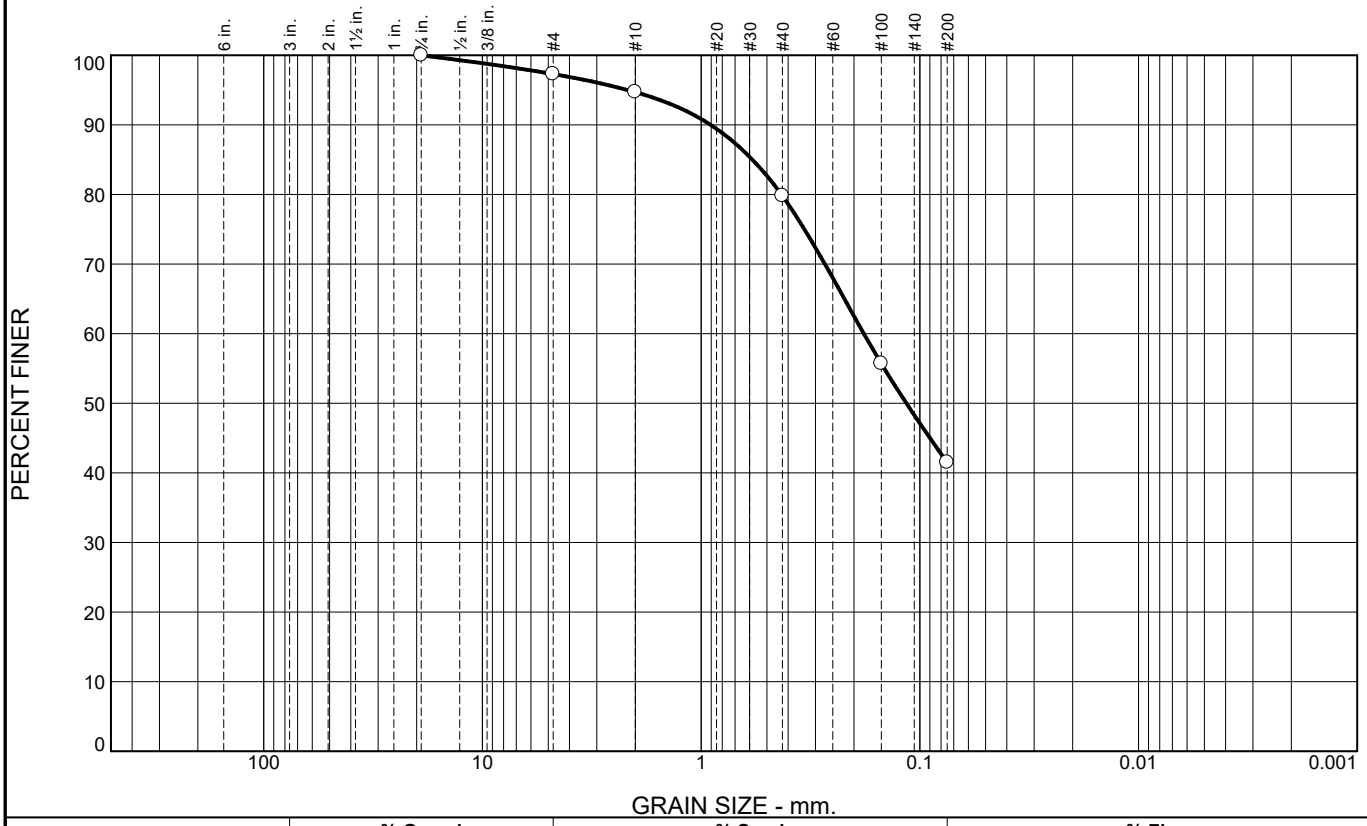
QCQA Laboratories, Inc.

Schuylerville, NY

Client: Axtech Environmental
Project: Old Forge and Sixth Lake

Project No: ST20-071 **Figure** B6SS8

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.7	2.6	14.9	38.3	41.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
#4	97.3		
#10	94.7		
#40	79.8		
#100	55.7		
#200	41.5		

* (no specification provided)

Soil Description

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.9044 D_{85}= 0.5826 D_{60}= 0.1802
D_{50}= 0.1152 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Water Content: 13.2 %

Location: Sixth Lake B-9
Sample Number: SS-3 **Depth:** 4 - 6' **Date:** 8/6/20

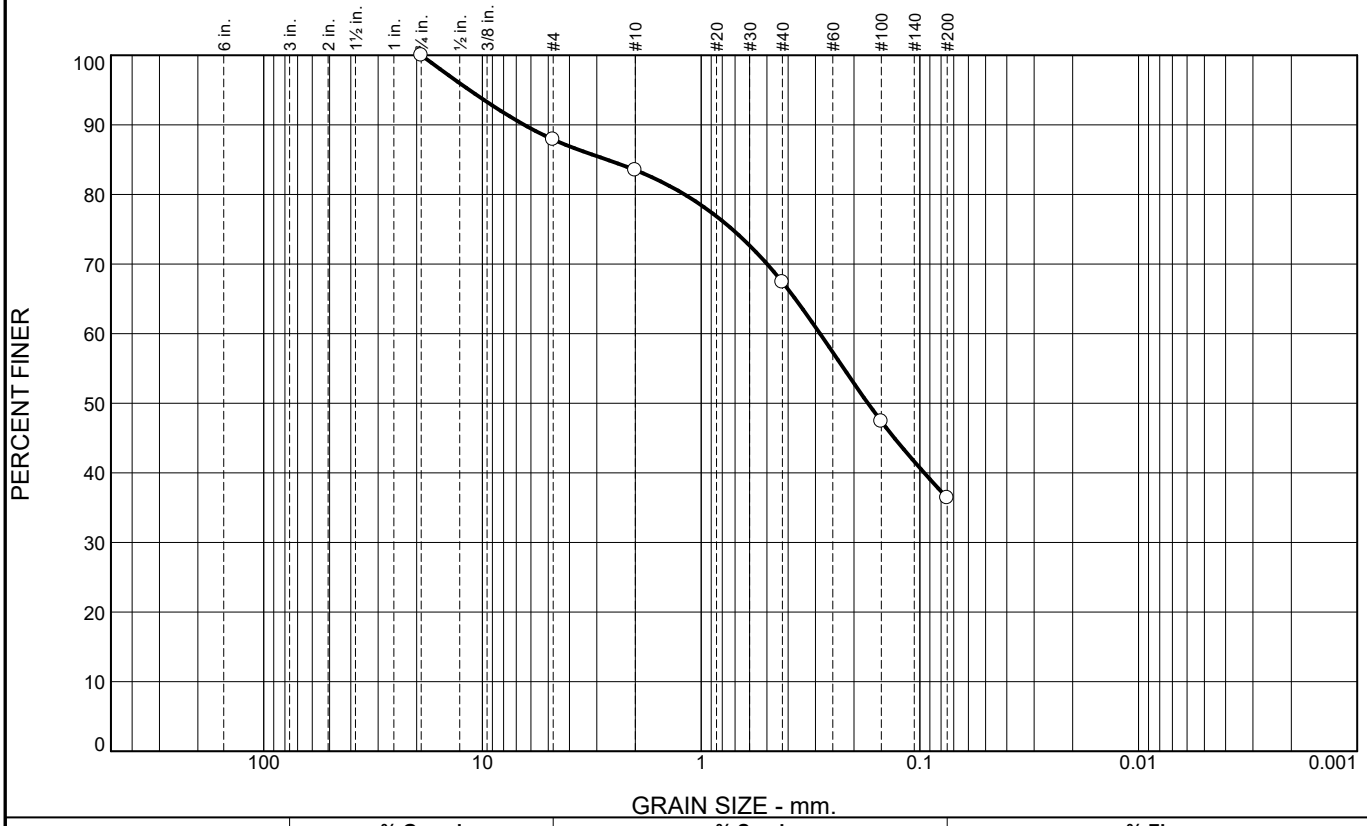
QCQA Laboratories, Inc.

Schuylerville, NY

Client: Axtech Environmental
Project: Old Forge and Sixth Lake

Project No: ST20-071 **Figure** B9SS3

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	12.1	4.4	16.1	31.0	36.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
#4	87.9		
#10	83.5		
#40	67.4		
#100	47.4		
#200	36.4		

* (no specification provided)

Soil Description

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 6.4392 D_{85}= 2.6964 D_{60}= 0.2859
D_{50}= 0.1726 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Water Content: 16.3 %

Location: Sixth Lake B-9
Sample Number: SS-5 **Depth:** 8 - 10' **Date:** 8/6/20

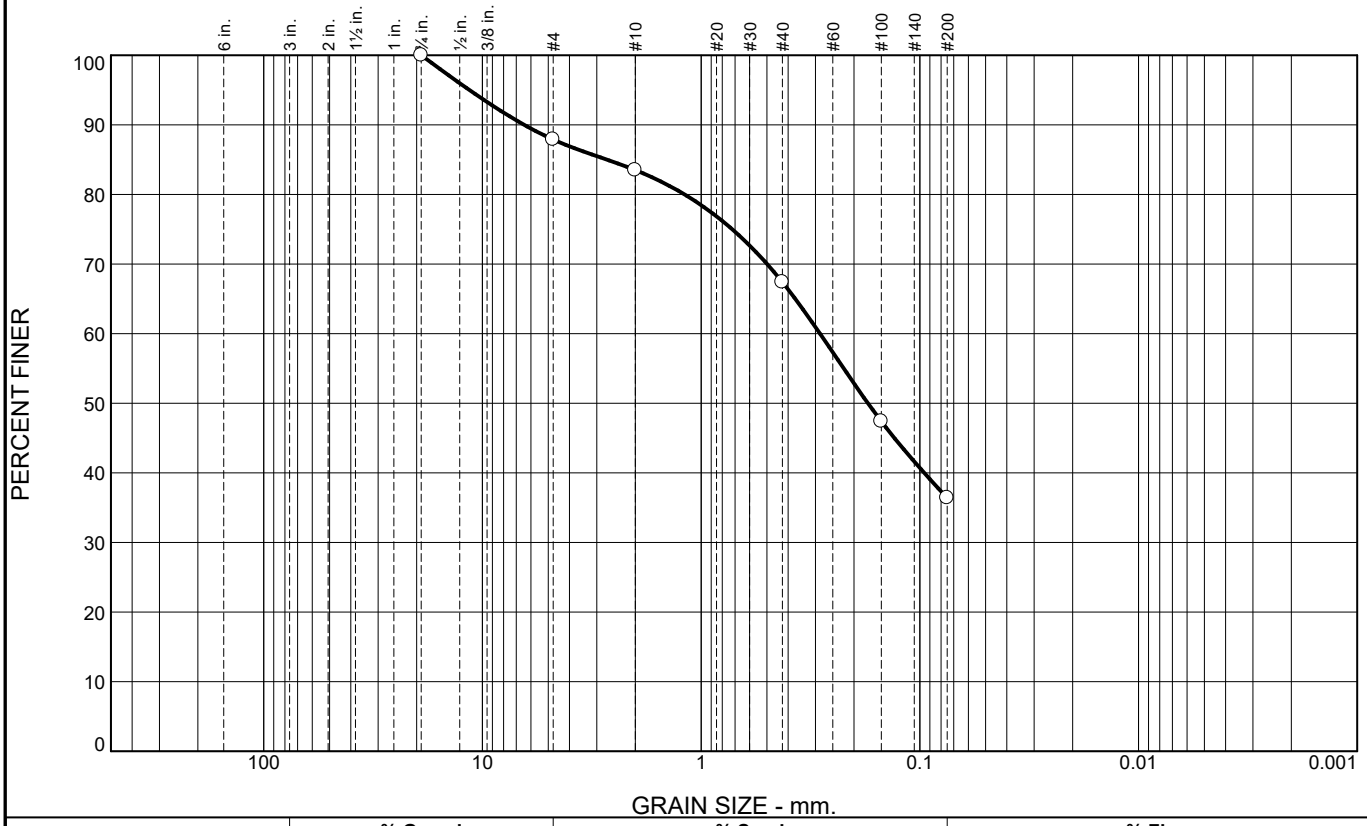
QCQA Laboratories, Inc.

Schuylerville, NY

Client: Axtech Environmental
Project: Old Forge and Sixth Lake

Project No: ST20-071 **Figure** B9SS5

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	12.1	4.4	16.1	31.0	36.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
#4	87.9		
#10	83.5		
#40	67.4		
#100	47.4		
#200	36.4		

* (no specification provided)

Soil Description

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 6.4392 D_{85}= 2.6964 D_{60}= 0.2859
D_{50}= 0.1726 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Water Content: 16.3 %

Location: Sixth Lake B-9
Sample Number: SS-5 **Depth:** 8 - 10' **Date:** 8/6/20

QCQA Laboratories, Inc.

Schuylerville, NY

Client: Axtech Environmental
Project: Old Forge and Sixth Lake

Project No: ST20-071 **Figure** B9SS5

Particle Size Distribution Report

% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.6	3.1	15.5	36.4	43.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
#4	98.4		
#10	95.3		
#40	79.8		
#100	57.2		
#200	43.4		

* (no specification provided)

Soil Description

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.9108 D_{85}= 0.5896 D_{60}= 0.1703
D_{50}= 0.1056 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Water Content: 9.1 %

Location: Sixth Lake B-10
Sample Number: S-4 **Depth:** 6 - 8' **Date:** 8/6/20

QCQA Laboratories, Inc.

Schuylerville, NY

Client: Axtech Environmental
Project: Old Forge and Sixth Lake

Project No: ST20-071 **Figure** B10S4

Particle Size Distribution Report

% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.4	5.7	20.6	36.2	34.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
#4	96.6		
#10	90.9		
#40	70.3		
#100	46.9		
#200	34.1		

* (no specification provided)

Soil Description

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 1.8007 D_{85}= 1.0957 D_{60}= 0.2671
D_{50}= 0.1732 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Water Content: 8.9 %

Location: Sixth Lake B-10
Sample Number: S-10 **Depth:** 25 - 27' **Date:** 8/6/20

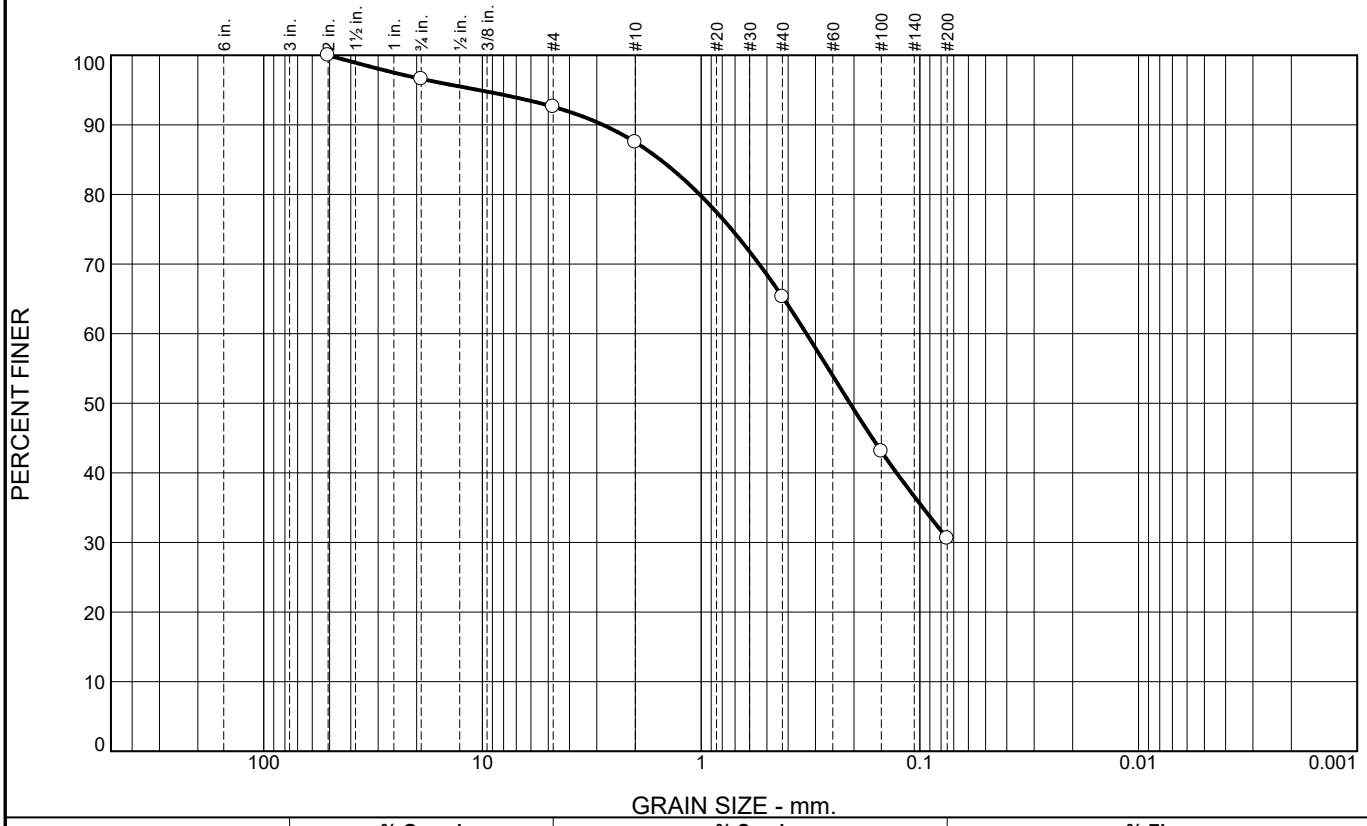
QCQA Laboratories, Inc.

Schuylerville, NY

Client: Axtech Environmental
Project: Old Forge and Sixth Lake

Project No: ST20-071 **Figure** B10S10

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.4	4.0	5.1	22.2	34.7	30.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2	100.0		
.75	96.6		
#4	92.6		
#10	87.5		
#40	65.3		
#100	43.1		
#200	30.6		

* (no specification provided)

Soil Description

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 2.8130 D_{85}= 1.5377 D_{60}= 0.3298
D_{50}= 0.2087 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Water Content: 9.3 %

Location: Sixth Lake B-10
Sample Number: S-12 **Depth:** 35 - 37' **Date:** 8/6/20

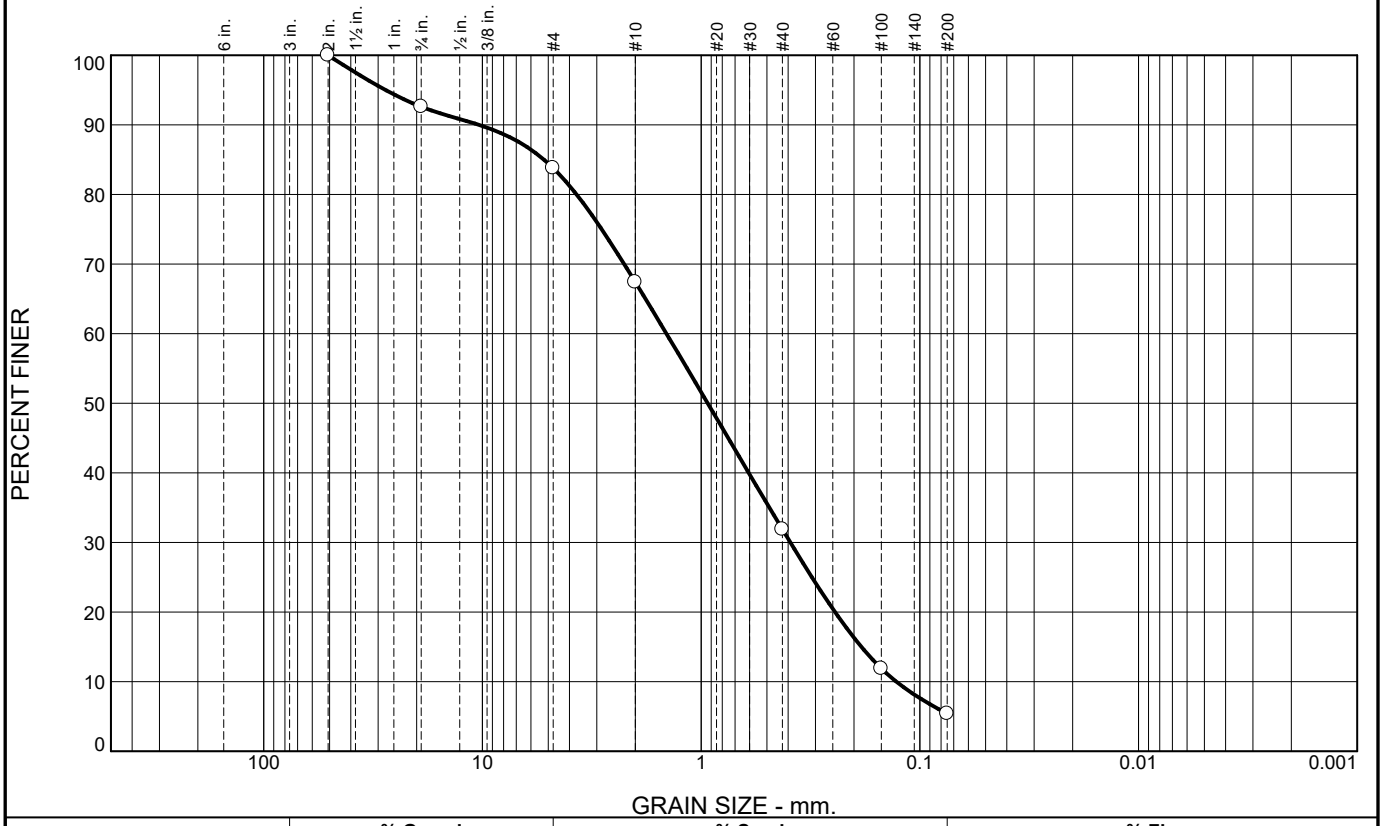
QCQA Laboratories, Inc.

Schuylerville, NY

Client: Axtech Environmental
Project: Old Forge and Sixth Lake

Project No: ST20-071 **Figure** B10S12

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	7.4	8.8	16.4	35.5	26.5	5.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2	100.0		
.75	92.6		
#4	83.8		
#10	67.4		
#40	31.9		
#100	11.9		
#200	5.4		

* (no specification provided)

Soil Description

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 10.3800 D_{85}= 5.2309 D_{60}= 1.4405
D_{50}= 0.9330 D_{30}= 0.3907 D_{15}= 0.1849
D_{10}= 0.1280 C_u= 11.25 C_c= 0.83

Classification

USCS= AASHTO=

Remarks

Water Content: 11.5 %

Location: Sixth Lake B-10
Sample Number: S-13 **Depth:** 40 - 42' **Date:** 8/6/20

QCQA Laboratories, Inc.

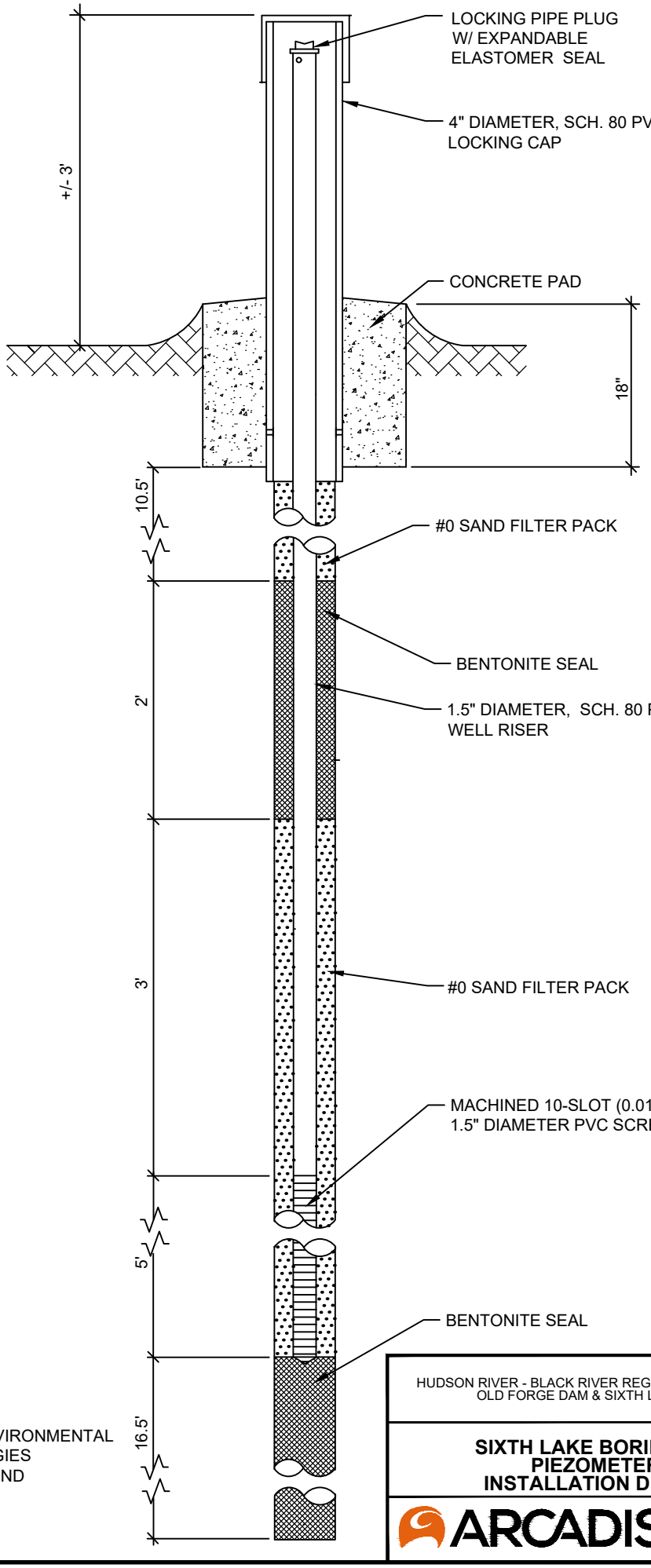
Schuylerville, NY

Client: Axtech Environmental
Project: Old Forge and Sixth Lake

Project No: ST20-071 **Figure** B10S13

Appendix C

Piezometer Details



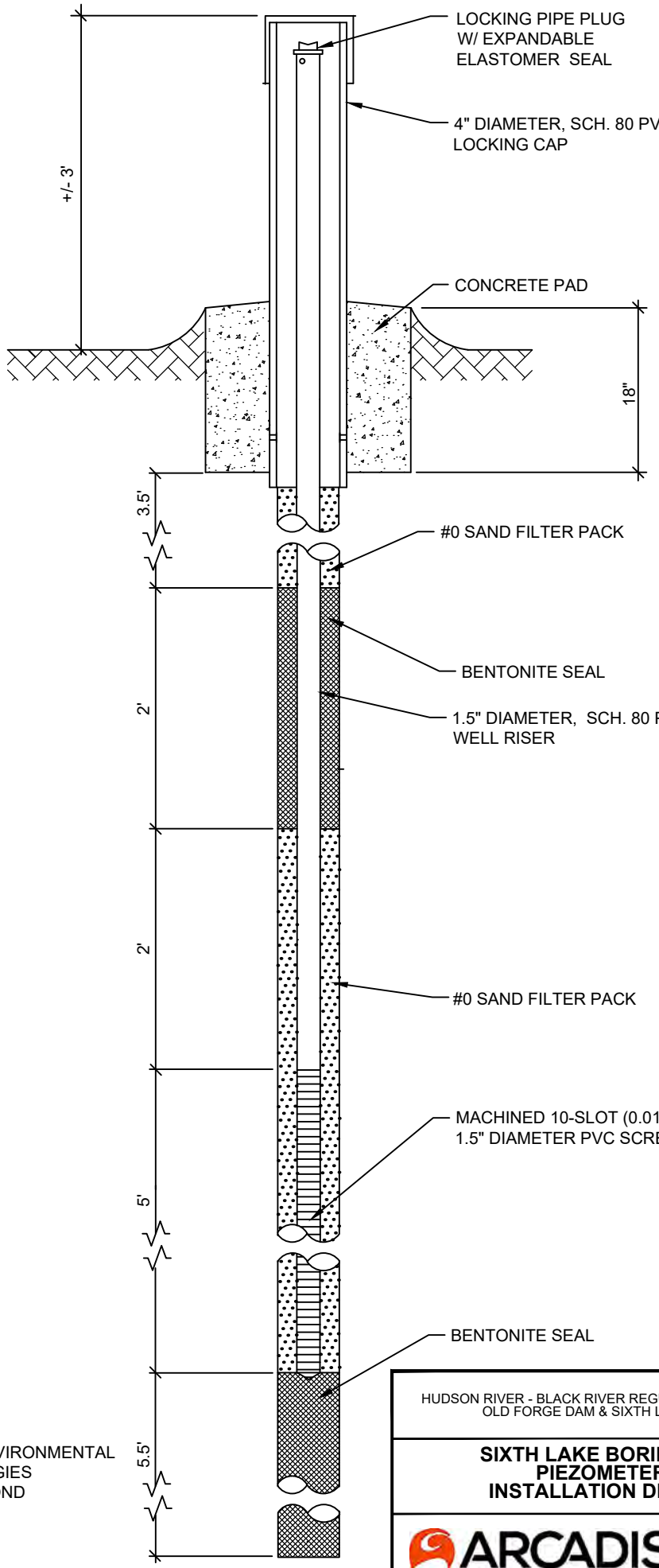
PROJECT NUMBER:	30001381
DRILLING CONTRACTOR:	AZTECH ENVIRONMENTAL TECHNOLOGIES
DRILLER:	RAY HAMMOND
DATE INSTALLED:	06/29/2020

HUDSON RIVER - BLACK RIVER REGULATING DISTRICT
OLD FORGE DAM & SIXTH LAKE DAM

SIXTH LAKE BORING B-4
PIEZOMETER
INSTALLATION DETAIL

ARCADIS

Appendix C



PROJECT NUMBER:	30001381
DRILLING CONTRACTOR:	AZTECH ENVIRONMENTAL TECHNOLOGIES
DRILLER:	RAY HAMMOND
DATE INSTALLED:	06/29/2020

HUDSON RIVER - BLACK RIVER REGULATING DISTRICT
OLD FORGE DAM & SIXTH LAKE DAM

SIXTH LAKE BORING B-5
PIEZOMETER
INSTALLATION DETAIL

ARCADIS

Appendix C

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