NORTHEAST
GEOTECHNICAL, INC.
Delivering Practical Engineering Solutions

GEOTECHNICAL ENGINEERING REPORT
PROPOSED PETERSEN POOL
INDOOR SPORTS CENTER BUILDING
128 TOWN STREET
BRAINTREE, MA

Prepared For:
Level Design Group, LLC
249 South Street, Unit 1
Plainville, MA 02762

Prepared By:
Northeast Geotechnical, Inc.
166 Raymond Hall Drive
North Attleborough, MA 02760

File No. O313.00
August 20, 2018

NORTHEAST GEOTECHNICAL, INC.
Delivering Practical Engineering Solutions

August 20, 2018 Project No. O313.00

Daniel Campbell, P.E.
Principal
Level Design Group, L.L.C.
249 South Street, Unit 1
Plainville, MA 02762

SUBJECT: Geotechnical Engineering Services
Petersen Pool Indoor Sports Center
128 Town Street
Braintree, MA

Dear Dan:

Northeast Geotechnical, Inc. is pleased to present the results of our geotechnical engineering services in support of the proposed Petersen Pool Indoor Sports Complex building located at the subject site. The objective of our services has been to develop geotechnical engineering recommendations for use in design and construction of the proposed building. This report has been prepared in accordance with our proposal to you dated July 23, 2018.

The site of the proposed building contains an existing sports field. The natural soils within the proposed building area consist of primarily dense, silty glacial till. The proposed building will primarily require a raise in grade to reach proposed finish floor elevation. The exception is the pool area which will extend below existing ground surface and below observed groundwater levels. Recommendations are presented in the attached report for design to protect the pool from hydrostatic pressures when the water level in the pool is dropped and to facilitate design and construction of the building using normal spread footing foundations and slabs-on-grade.

The attached report contains a summary of our studies and presents our conclusions and recommendations for use in design and construction of the proposed building. Please feel free to contact Glenn Olson at 508-598-3510 or golson@northeastgeotechnical.com if you have any questions or need anything further.

Sincerely,
Northeast Geotechnical, Inc.

Glenn A. Olson, P.E.
Principal Engineer

James M. Handanyan, P.E.
Principal Engineer

TABLE OF CONTENTS

NORTHEAST GEOTECHNICAL, INC.
Delivering Practical Engineering Solutions

1.0 INTRODUCTION

Our understanding of the project is based on review of a site plan set last revised on February 5, 2018 provided by Level Design. Plans are to construct a new indoor sports center building having a footprint area of 87,710 square feet and a finish floor set at Elevation 121.75 feet. The two-level complex will house two ice hockey rinks and a swimming pool. Level Design indicated that the lowest level of the pool will be located at Elevation 110.75 feet.

The new building will be located in an area currently used as an outdoor soccer field and surrounding areas. The existing grades in and around the soccer field where the new building will be located are primarily between about Elevations 116± feet and 118± feet. There is a slope on the western side of the field where the building will extend where the ground surface extends to Elevations in the range of 120± to 123± feet.

The area of the proposed building appears to contain drainage structures and lines, underground electric and a below grade sprinkler system throughout the field.

2.0 SUBSURFACE EXPLORATIONS

A subsurface exploration program was coordinated and observed by Northeast Geotechnical personnel at the site on August 6 and 7, 2018. The subsurface exploration program consisted of eight soil test borings (B-1 through B-8) performed by New England Boring Contractors of Derry, New Hampshire.

The test boring locations were established in the field by taping and pacing from existing site features. The approximate test boring locations are shown on the attached Subsurface Exploration Location Plan, Figure No. 1. Existing ground surface elevations shown on the test boring logs were approximated using the plans provided. Ground surface elevations and other references to elevations made throughout this report should therefore be considered approximate.

The test borings were advanced using a track-mounted Acker test boring rig. Test borings were advanced to depths of about 13± to 21± feet below the existing ground surface. Each of the test borings was advanced into natural glacial till soils and terminated upon refusal conditions.

Standard Penetration Tests (SPTs) were generally performed continuously for the first 5± to 7± feet in an effort to discern the potential presence of fill soils and if present, the transition to firm, natural ground. SPTs were performed at approximate 5± foot intervals or at detected changes in strata thereafter. SPT testing was conducted by driving a 2 inch outside diameter standard split spoon sampler a distance of up to 24 inches at each sampling depth by blows of a 140-pound auto-trip hammer falling a distance of 30 inches. Test borings were advanced using 3.5± inch, inside diameter, hollow stem augers.

The soil samples retrieved in the split spoon sampler during each SPT were visually described in the field by Northeast Geotechnical, Inc. personnel using Burmister's soil descriptions. The visual descriptions, the hammer blow counts required to drive the split spoon sampler during the penetration testing, groundwater observations, approximate changes in soil strata and other observations are shown on the boring logs contained in Appendix B. Note that the soil descriptions are representative of the minus 1.4± inch size fraction of the overall soil deposits sampled.

3.0 LABORATORY TESTING

Selected soil samples were submitted to Geotesting Express of Acton, Massachusetts for laboratory testing to assist us in assessing the soils' geotechnical engineering properties. Six samples of the natural glacial till soils were submitted for gradation testing. Laboratory test results are presented in Appendix C.

4.0 SUBSURFACE CONDITIONS

The general subsurface conditions at the site were assessed based upon the results of the subsurface exploration program, laboratory test results and published USGS surficial geology information. In general, the proposed building area contains grass in a thin topsoil layer, then some granular fill soils, which are in turn underlain by natural glacial till soils to the depths explored. Refusals to the split spoon sampler and hollow stem augers indicate the potential presence of bedrock at the refusal depths.

There are also drainage lines and structures shown on the project plans along with underground electric and sprinkler lines. We anticipate fill soils above and surrounding these utilities which were not sampled as part of our test boring program. There may be other utilities as well not shown on the plans which become apparent during construction.

There appears to be up to approximately six inches of topsoil fill within the field and in the footprint of the proposed building. The wooded area on the west side of the proposed building was not explored during the test boring program due to access issues. There may be surficial organic soils within this area as well.

Test borings B-2, B-5 and B-7, performed within the existing playing field, appear to have encountered approximately two to four feet of granular fill soils. The granular fill soils are considered medium dense to dense based on the SPT and generally consisted of fine to coarse sand, little to and fine to coarse gravel, little to some silt. No underlying topsoil or subsoil was encountered below the apparent granular fill soils.

The soils encountered beneath the topsoil and granular fill appeared to consist of natural orangish brown to grayish brown to gray glacial till soils. These natural glacial till soils appeared to be primarily dense to very dense in accordance with the results of the SPT. These soils appeared to extend to depths explored which was approximately thirteen to twenty-one feet below ground surface.

The glacial till soils appeared to generally consist of a heterogenous mixture of brown sand, gravel and silt sized particles with possible cobbles and boulders present based on observations of borehole advancement. Refer to the test boring logs for additional information.

Groundwater was encountered in each of the borings at depths of approximately 4± to 6± feet below ground surface. Groundwater appeared to be located between approximate Elevations 110± and 113± feet at the time of the test borings. Level Design reports that previous test pits performed at the site indicated seasonal high groundwater appears to be located at approximate Elevation 114.2 based on redoximorphic features. This seasonal high groundwater level appears to be located approximately three to four feet higher than the low end of the proposed pool which will be established at Elevation 110.75 according to Level Design. Recommendations are presented herein for the contractor to be prepared to dewater to construct/install the pool and to design the pool to withstand hydrostatic pressures when empty.

It should be noted that groundwater levels will fluctuate due to variations in temperature, precipitation and other factors. Therefore, groundwater levels encountered during and after construction may be different than those reported herein.

5.0 CONCLUSIONS AND RECOMMENDATIONS

The following geotechnical engineering conclusions and recommendations are presented subject to the attached Limitations and Service Constraints in Appendix A.

5.1 Building Area Earthwork

Existing topsoil fill and any natural forest mat/topsoil and/or subsoil encountered within the wooded area of the site should be removed from the proposed building area as these materials are considered unsuitable to remain in place for foundation and floor slab support. We also recommend that existing underground utilities and structures and associated backfill be removed from the proposed building area. These unsuitable materials including the structures and utilities should be removed from the building area exposing the existing granular fill soils or natural glacial till soils. These unsuitable materials should be removed to a minimum distance of ten feet beyond the exterior building wall lines or to the extent of exterior foundation stress zone, whichever is greater. Stress zone is defined as a one horizontal to one vertical (1H:1V) line sloping down and out from the outside bottom edge of footing to firm natural ground.

The on-site geotechnical engineer should verify that unsuitables have been excavated from the proposed building area. The exposed granular soils should then be proof compacted by making a minimum of 6 passes with a self-propelled vibratory drum compactor having a minimum drum weight of 10,000 pounds. Weak or unstable areas should be removed and be replaced with compacted structural fill.

Excavations to remove existing utilities and structures which extend below the surrounding level of existing ground level and weak/unstable areas of existing fill identified during proof compaction should be backfilled in a controlled manner using compacted lifts of structural fill. The excavations should be backfilled with 6 to 8-inch-thick maximum loose lifts with each lift compacted to at least 95 percent of the soils' maximum dry density, as established by ASTM D1557, using walk behind vibratory compactors. New building foundations and walls should be similarly backfilled.

Structural fill placed within the proposed building area should be placed in 6 to 12-inch-thick maximum loose lifts depending on the compaction equipment used. Structural fill should be compacted to at least 95 percent of the soils' maximum dry density. Besides meeting the minimum compaction

requirements, each lift of fill should be assessed by the on-site geotechnical engineer to be compacted to a firm and stable condition.

It appears that off-site structural fill will be required to be imported to the site to reach the floor slab area within the rink area. Granular soils from above groundwater levels within the proposed pool area of the building are anticipated to be suitable for reuse as structural fill. However, the soils are anticipated to contain upwards of 20± to 30± percent fines and will be sensitive to moisture changes. If the soil is allowed to become wet of its optimum for compaction, the soil may not be suitable for reuse as structural fill. Likewise, the soil is considered frost susceptible and should not be allowed to become frozen.

The proposed pool's lowest level will be established at Elevation 110.75 feet according to Level Design. The earthwork contractor should be prepared to dewater the excavation to maintain a dry excavation to construct/install the pool, and tie downs (if designed), and related equipment. The contractor should be required to maintain groundwater at least one foot below lowest excavation to establish the pool subgrade. Consideration should be given to placement of a Mirafi filter followed by twelve inches of crushed stone over the exposed subgrade below the pool. The crushed stone should be compacted with hand operated, large vibratory plate or double drum compactors making a minimum of six passes.

Recommended gradations of off-site fill materials are presented below. Structural fill should be placed and compacted up to the bottom of the proposed building's slab base course level.

5.2 Off-Site Fill Materials

Northeast Geotechnical anticipates structural fill and base course sand and gravel will need to be obtained from off-site sources to complete the project. Recommended gradation criteria for off-site fill materials are presented below:

Off-site structural fill should conform to the following gradation requirements and be free from ice, snow, roots, sod, rubbish, and other deleterious or organic matter:

Off-Site Structural Fill Gradation Recommendations

Sieve Size	Percent Finer By Weight
2/3 the loose lift thickness	100
No. 10	30 – 95
No. 40	10 – 70
No. 200	0 – 12

Off-site sand and gravel should conform to the following gradation requirements and be free from ice, snow, roots, sod, rubbish, and other deleterious or organic matter:

Off-Site Sand and Gravel Fill Gradation Recommendations

Sieve Size	Percent Finer By Weight
4 inch	100
½ inch	50 – 85
No. 4	40 – 75
No. 10	30 – 60
No. 40	10 – 35
No. 100	5 – 20
No. 200	2 – 10

5.3 Foundations

Exterior foundation excavations may approach groundwater depending on when construction takes place. Exterior foundation excavations are anticipated to terminate in densified existing fill soils, natural glacial till soils or properly placed and compacted off-site structural fill. Loosened soil should be removed by hand. Foundation excavations should be recompacted to a firm and stable condition using vibratory plate compactors provided the excavations terminate above groundwater level. Care should be taken to not overly compact the natural soils in proximity to groundwater to avoid overstressing the soils and causing instability due to the buildup of hydrostatic pressures.

We recommend that the earthwork contractor over excavate for the exterior foundations to accommodate the placement and compaction of a layer of crushed stone. This is especially important in the portion of the building where the pool will be located. No foundation plans were available for the building at the time of our report. Therefore, it is unclear where the foundations in the area of the pool will be established. These foundations may extend to or below groundwater levels.

If groundwater is encountered, then the contractor should be prepared to dewater and only open foundation excavations to the extent they can maintain groundwater below the level of excavations. The over excavations for foundations should extend approximately 6 inches below proposed bottom of foundation elevations. The contractor should immediately place and compact a 6-inch layer of ¾-inch crushed stone on the exposed, dewatered foundation subgrade. The crushed stone should be compacted to a firm and stable condition by making a minimum of 4 passes using a vibratory plate compactor.

The building may be designed using standard shallow spread footing foundations provided the proposed foundation subgrades are prepared as recommended herein. The foundations for the project may be designed utilizing a maximum allowable soil bearing capacity of two tons per square foot (2 TSF).

Regardless of the recommended allowable bearing capacity, continuous wall footings should be at least 24 inches wide and column footings should be no less than 36 inches wide in the least lateral dimension.

Exterior footings should be founded at least four feet (4') below the finish exterior grade for frost protection.

5.4 Groundwater Considerations for Pool

The pool, when empty, should be designed to withstand hydrostatic pressures due to a groundwater level at Elevation 115 or higher. This recommendation is based on our observations of groundwater during the test borings as well as the observation of a seasonal high groundwater level at Elevation 114.2 feet reported by Level Design. This may take the form of series of foundations to tie the pool down to.

Alternatively, a permanent dewatering system could be installed which would be utilized to maintain groundwater levels below the base of the pool when the pool is emptied. The pump system should include a series of underdrain or header pipes which surround that portion of the pool which extends at least a foot below the lowest elevation of the pool. The system would remain inactive until just prior to emptying the pool and should designed with battery backup to run full-time until the level of water in the pool can be added to Elevation 115 or above. A specialty dewatering contractor should design the system.

5.5 Floor Slab

Slab on grade construction is recommended for the building provided the building area subgrade is prepared as recommended herein. The floor slab should bear directly on minimum 12-inch-thick base course sand and gravel layer compacted to at least 95 percent maximum laboratory dry density as determined by ASTM D-1557. A maximum modulus of subgrade reaction of 275 pci may be used in the design of the floor slab on grade.

5.6 Seismic Design Criteria

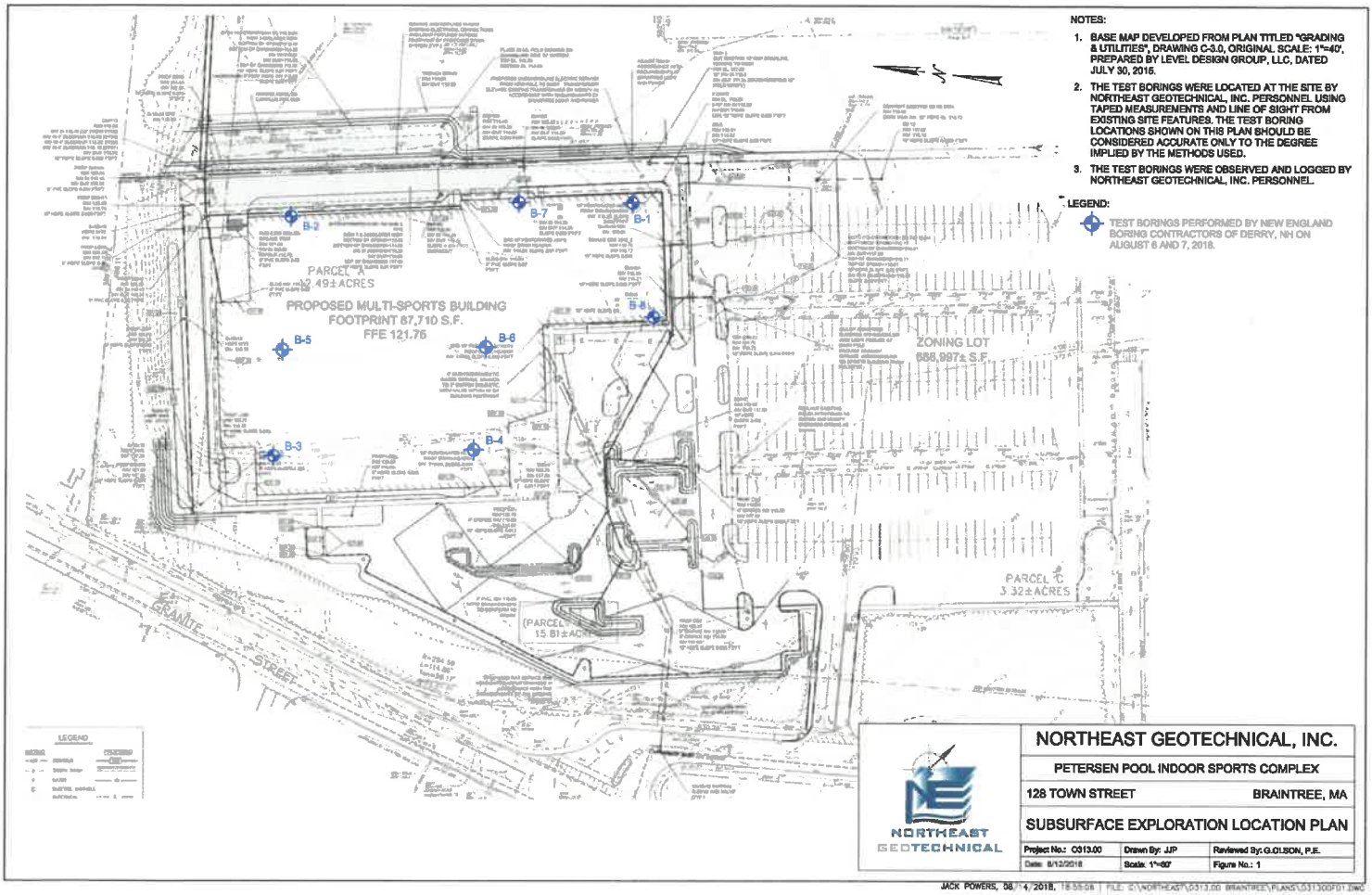
The site soils in the area of the proposed building addition are not considered susceptible to liquefaction in accordance with section 1806.4 of the ninth edition of The Massachusetts State Building Code (the Building Code). Provided earthwork is performed, and building foundations are designed and constructed as recommended in this report, the site of the proposed building will be considered Site Class C in accordance with Section 1613.3.2 of the Building Code.

6.0 CONSTRUCTION OBSERVATION, TESTING AND REVIEW

Northeast Geotechnical, Inc. should be retained to provide construction observation and soil testing services during the earthwork construction and foundation installation phases of the project. The purpose of our participation is to observe that the contractors perform earthwork and foundation installation in general compliance with the requirements of the pertinent sections of the plans and specifications as well as the recommendations presented in this report. Our presence on-site during construction will also allow us to verify our design assumptions in the field and provide engineering input in a timely manner if subsurface conditions are found to vary from those anticipated prior to construction and warrant a design change or a change in earthwork procedures.

We also recommend Northeast Geotechnical be afforded the opportunity to review the foundation and site plans, and earthwork specifications prior to bidding for construction to see that our recommendations have been properly interpreted and included.

FIGURE



NOTES:

1. BASE MAP DEVELOPED FROM PLAN TITLED "GRADING & UTILITIES", DRAWING C-3.0, ORIGINAL SCALE: 1"=40', PREPARED BY LEVEL DESIGN GROUP, LLC, DATED JULY 30, 2018.
2. THE TEST BORINGS WERE LOCATED AT THE SITE BY NORTHEAST GEOTECHNICAL, INC. PERSONNEL USING TAPED MEASUREMENTS AND LINE OF SIGHT FROM EXISTING SITE FEATURES. THE TEST BORING LOCATIONS SHOWN ON THIS PLAN SHOULD BE CONSIDERED ACCURATE ONLY TO THE DEGREE IMPLIED BY THE METHODS USED.
3. THE TEST BORINGS WERE OBSERVED AND LOGGED BY NORTHEAST GEOTECHNICAL, INC. PERSONNEL.

LEGEND:

TEST BORINGS PERFORMED BY NEW ENGLAND BORING CONTRACTORS OF DERRY, NH ON AUGUST 6 AND 7, 2018.

NORTHEAST GEOTECHNICAL

NORTHEAST GEOTECHNICAL, INC.

PETERSEN POOL INDOOR SPORTS COMPLEX

128 TOWN STREET — BRAINTREE, MA

SUBSURFACE EXPLORATION LOCATION PLAN

Project No.: 0313.00	Drawn By: JJP	Reviewed By: G.OLSON, P.E.
Date: 8/12/2018	Scale: 1"=60'	Figure No.: 1

JACK POWERS, 08/14/2018, 18:55:08 | FILE: C:\NORTHEAST\0313.00 BRAINTREE\PLANS\0313001F01.DWG

APPENDIX A

Limitations and Service Constraints

LIMITATIONS AND SERVICE CONSTRAINTS
Geotechnical Engineering Consulting Services

The opinions, conclusions and recommendations presented in this report are based upon the scope of services, information obtained through the performance of the services, and the schedule as agreed upon by Northeast Geotechnical, Inc. and the party for whom this report was originally prepared. This report is an instrument of professional service and was prepared in accordance with the generally accepted standards and level of skill and care under similar conditions and circumstances established by the geotechnical consulting industry. No representation, warranty, or guarantee, express or implied, is intended or given. To the extent that Northeast Geotechnical, Inc. relied upon any information prepared by other parties not under contract to Northeast Geotechnical, Inc. , Northeast Geotechnical, Inc. makes no representation as to the accuracy or completeness of such information. This report is expressly for the sole and exclusive use of the party for whom this report was originally prepared and/or other specifically named parties have the right to make use of and rely upon this report. Reuse of this report or any portion thereof for other than its intended purpose, or if modified, or if used by third parties, shall be at the user's sole risk.

Furthermore, nothing contained in this document shall relieve any other party of its responsibility to abide by contract documents and applicable laws, codes, regulations, or standards.

Subsurface Explorations and Testing

Results of any observations, subsurface exploration or testing, and any findings presented in this report apply solely to conditions existing at the time when Northeast Geotechnical, Inc.'s exploratory work was performed. It must be recognized that any such observations and exploratory or testing activities are inherently limited and do not represent a conclusive or complete characterization. Conditions in other parts of the project site may vary from those at the locations where data were collected and conditions can change with time. Northeast Geotechnical, Inc.'s ability to interpret exploratory and test results is related to the availability of the data and the extent of the exploratory and testing activities.

The findings, conclusions and recommendations submitted in this report are based, in part, on data obtained from subsurface borings, test pits, and specific, discrete sampling locations. The nature and extent of variation between these test locations, which may be widely spaced, may not become evident until construction. If variations are subsequently encountered, it will be necessary to re-evaluate the conclusions and recommendations of this report.

Correlations and descriptions of subsurface conditions presented in boring logs, test pit logs, subsurface profiles, and other materials are approximate only. Subsurface conditions may vary significantly from those encountered in borings and sampling locations and transitions between subsurface materials may be gradual or highly variable.

Conditions at the time water level measurements and other subsurface observations were made are presented in the boring logs or other sampling forms. This field data has been reviewed and interpretations provided in this report. However, groundwater levels may be variable and may fluctuate due to variation in precipitation, temperature, and other factors. Therefore, groundwater levels at the site at any time may be different than stated in this report.

Review

In the event that any change in the nature, design, or location of the proposed structure(s) is planned, the conclusions and recommendations in this report shall not be considered valid unless the changes are reviewed and the conclusions and recommendations of this report are modified or verified in writing.

Northeast Geotechnical, Inc. should be provided the opportunity for a general review of final design plans and specifications to assess that our recommendations have been properly interpreted and included in the design and construction documents.

Construction

To verify conditions presented in this report and modify recommendations based on field conditions encountered in the field, Northeast Geotechnical, Inc. should be retained to provide geotechnical engineering services during the construction phase of the project. This is to observe compliance with design concepts, specifications, and recommendations contained in this report, and to verify and refine our recommendations as necessary in the event that subsurface conditions differ from those anticipated prior to the start of construction.

APPENDIX B

Test Boring Logs

NORTHEAST GEOTECHNICAL, INC.

TEST BORING LOG

Project: Petersen Pool Indoor Sports Complex
128 Town Street
Braintree, MA

Test Boring No.: B-1
Page: 1 of 1
File No.: O313.00
Reviewed By: Glenn Olson, P.E.

Boring Co.: New England Boring Contractors
Foreman: Matt
Boring Equipment: Track -mounted Acker drill rig; 3-1/4" (ID) HSA; 2" (OD) split-spoon driven w/140# auto-trip hammer

Date: 8/7/2018
Northeast Geotechnical Observer: Michael Clement
Test Boring Location: See Subsurface Exploration Location Plan
Ground Surface Elevation: 116'±
Depth to Water: 5± feet

	Sample Data						Strata Change	Sample Description
	No.	Depth	Pen.	Rec.	Blows per 6 in.	Rem.		
	S-1	0'-2'	24"	7"	5-8-23-23			Dense, brown, fine to coarse SAND, little Silt, little fine to coarse Gravel
	S-2	2'-4'	24"	15"	14-20-18-16			Dense, brown, fine to coarse SAND, some Silt, little fine Gravel
5'	S-3	4'-4.8'	9"	4"	26-40/3"	1,2		Moist, orangish brown, fine to coarse SAND, some fine to coarse Gravel, some (-) Silt
							Natural Glacial Till	
10'	S-4	9'-11'	24"	13"	17-20-22-19			Dense, wet, grayish brown, fine to coarse SAND, little (+) fine to coarse fine Gravel, little (+) Silt
						3	13'±	
15'								Refusal to auger on apparent bedrock at a depth of 13± ft.
20'								
25'								

Notes:
1. Apparent groundwater observed at a depth of about 5± ft at time of boring.
2. Refusal to auger on apparent bedrock at a depth of 13± ft.

Standard Penetration Resistance (Blows/Foot)	Density
0 -4	Very Loose
4 - 10	Loose
10 - 30	Med. Dense
30 - 50	Dense
50+	Very Dense

Abbreviations
F = Fine
M = Medium
C = Coarse
F/M = Fine to Medium
F/C = Fine to Coarse

Proportions Used
Trace (T) = 0 - 10%
Little (Li) = 10 - 20%
Some (So) = 20 - 35%
AND = 35-50%

NORTHEAST GEOTECHNICAL, INC.

TEST BORING LOG

Project: Petersen Pool Indoor Sports Complex
128 Town Street
Braintree, MA

Test Boring No.: B-2
Page: 1 of 1
File No.: O313.00
Reviewed By: Glenn Olson, P.E.

Boring Co.: New England Boring Contractors
Foreman: Matt
Boring Equipment: Track -mounted Acker drill rig; 3-1/4" (ID) HSA; 2" (OD) split-spoon driven w/140# auto-trip hammer

Date: 8/6/2018
Northeast Geotechnical Observer: Michael Clement
Test Boring Location: See Subsurface Exploration Location Plan
Ground Surface Elevation: 117'±
Depth to Water: 6± feet

	Sample Data						Strata Change	Sample Description
	No.	Depth	Pen.	Rec.	Blows per 6 in.	Rem.		
	S-1	0'-2'	24"	8"	4-8-16-43		Fill	Medium dense, brown, f/m SAND, some Silt, little fine Gravel, roots
	S-2	2'-4'	24"	3"	35-41-40-41		4'±	Very dense, brown, fine to coarse SAND and fine to coarse GRAVEL, little Silt, roots
5'	S-3	4'-6'	24"	15"	22-24-14-22			Dense, brown, fine to coarse SAND, some (-) fine to coarse Gravel, little Silt
	S-4	6'-8'	24"	12"	11-11-18-20	1		Medium dense, wet, brown, fine to coarse SAND, some fine to coarse Gravel, little (-) Silt
10'	S-5	9'-11'	24"	16"	17-27-21-20		Natural Glacial Till	Dense, wet, grayish brown, fine to coarse SAND, some Silt, some (-) fine Gravel
15'	S-6	14'-16'	24"	18"	42-35-42-40			Very dense, wet, grayish brown, fine to coarse SAND, some Silt, little fine Gravel
20'	S-7	19'-20.2'	15"	10"	40-36-60/3"	2		
						3	21'±	Wet, grayish brown, fine to medium SAND, some Silt, little (-) fine Gravel
25'								Refusal to auger on apparent bedrock at a depth of 21± ft.

Notes:
1. Apparent groundwater observed at a depth of about 6± ft at time of boring.
2. Refusal to split spoon at a depth of 20.2± ft.
3. Refusal to auger on apparent bedrock at a depth of 21± ft.

Standard Penetration Resistance (Blows/Foot)	Density
0 -4	Very Loose
4 - 10	Loose
10 - 30	Med. Dense
30 - 50	Dense
50+	Very Dense

Abbreviations
F = Fine
M = Medium
C = Coarse
F/M = Fine to Medium
F/C = Fine to Coarse

Proportions Used
Trace (T) = 0 - 10%
Little (Li) = 10 - 20%
Some (So) = 20 - 35%
AND = 35-50%

NORTHEAST GEOTECHNICAL, INC.

TEST BORING LOG

Project: Petersen Pool Indoor Sports Complex
128 Town Street
Braintree, MA

Test Boring No.: B-3
Page: 1 of 1
File No.: O313.00
Reviewed By: Glenn Olson, P.E.

Boring Co.: New England Boring Contractors
Foreman: Matt
Boring Equipment: Track -mounted Acker drill rig; 3-1/4" (ID) HSA; 2" (OD) split-spoon driven w/140# auto-trip hammer

Date: 8/6/2018
Northeast Geotechnical Observer: Michael Clement
Test Boring Location: See Subsurface Exploration Location Plan
Ground Surface Elevation: 120'±
Depth to Water: 6± feet

	Sample Data						Strata Change	Sample Description
	No.	Depth	Pen.	Rec.	Blows per 6 in.	Rem.		
	S-1	0'-2'	24"	16"	5-7-12-22		Topsoil 0.5'±	Medium dense, brown, fine to coarse SAND, some Silt, little F/C Gravel
	S-2	2'-4'	24"	13"	27-27-23-17			Very dense, brown, fine to coarse SAND, some Silt, little fine Gravel
5'	S-3	5'-7'	24"	17"	10-16-16-22	1		Dense, wet, grayish brown, fine to coarse SAND, some (+) Silt, little fine Gravel
							Natural Glacial Till	
10'	S-4	10'-12'	24"	14"	18-46-57-54			Very dense, wet, grayish brown, fine to coarse SAND, some (+) Silt, trace (+) fine Gravel
15'	S-5	15'-15.7'	8"	6"	30-60/2"	2,3	16'±	Wet, grayish brown, fine to coarse SAND, some Silt, trace (+) fine Gravel
20'								Refusal to auger on apparent bedrock at a depth of 16± ft.
25'								

Notes:
1. Apparent groundwater observed at a depth of about 6± ft at time of boring.
2. Refusal to split spoon at a depth of 15.7± ft.
3. Refusal to auger on apparent bedrock at a depth of 16± ft.

Standard Penetration Resistance (Blows/Foot)	Density
0 -4	Very Loose
4 - 10	Loose
10 - 30	Med. Dense
30 - 50	Dense
50+	Very Dense

Abbreviations
F = Fine
M = Medium
C = Coarse
F/M = Fine to Medium
F/C = Fine to Coarse

Proportions Used
Trace (T) = 0 - 10%
Little (Li) = 10 - 20%
Some (So) = 20 - 35%
AND = 35-50%

NORTHEAST GEOTECHNICAL, INC.

TEST BORING LOG

Project: Petersen Pool Indoor Sports Complex
128 Town Street
Braintree, MA

Test Boring No.: B-4
Page: 1 of 1
File No.: O313.00
Reviewed By: Glenn Olson, P.E.

Boring Co.: New England Boring Contractors
Foreman: Matt
Boring Equipment: Track -mounted Acker drill rig; 3-1/4" (ID) HSA; 2" (OD) split-spoon driven w/140# auto-trip hammer

Date: 8/7/2018
Northeast Geotechnical Observer: Michael Clement
Test Boring Location: See Subsurface Exploration Location Plan
Ground Surface Elevation: 120'±
Depth to Water: 6± feet

	Sample Data						Strata Change	Sample Description
	No.	Depth	Pen.	Rec.	Blows per 6 in.	Rem.		
	S-1	0'-2'	24"	0"	18-22-26-31			Dense, No Recovery
	S-2	2'-4'	24"	8"	32-20-18-15			Dense, brown, fine to coarse SAND, some fine to coarse Gravel, little Silt
5'	S-3	5'-7'	24"	12"	12-29-29-16	1		Very dense, wet, brown, fine to coarse SAND, some (+) Silt, little fine to coarse Gravel
						2		
10'	S-4	9'-11'	24"	14"	11-12-15-14		Natural Glacial Till	Medium dense, wet, gray, fine to coarse SAND, some (+) Silt, trace (+) fine Gravel
15'	S-5	14'-16'	24"	16"	22-42-27-41			Very dense, wet, gray, fine to coarse SAND, some (+) Silt, trace (+) fine Gravel
20'	S-6	19'-19.7'	9"	6"	52-60/3"	3,4	20'±	Wet, gray, fine to medium SAND, some (+) Silt, trace (+) fine Gravel
25'								Refusal to auger on apparent bedrock at a depth of 20± ft.

Notes:
1. Apparent groundwater observed at a depth of about 6± ft at time of boring.
2. Refusal to auger on apparent boulder at a depth of 8± ft. Offset boring location 25± feet east beyond possible electrical and drainage utilities.
3. Refusal to split spoon at a depth of 19.7± ft.
4. Refusal to auger on apparent bedrock at a depth of 20± ft.

Standard Penetration Resistance (Blows/Foot)	Density
0 -4	Very Loose
4 - 10	Loose
10 - 30	Med. Dense
30 - 50	Dense
50+	Very Dense

Abbreviations
F = Fine
M = Medium
C = Coarse
F/M = Fine to Medium
F/C = Fine to Coarse

Proportions Used
Trace (T) = 0 - 10%
Little (Li) = 10 - 20%
Some (So) = 20 - 35%
AND = 35-50%

NORTHEAST GEOTECHNICAL, INC.

TEST BORING LOG

Project: Petersen Pool Indoor Sports Complex
128 Town Street
Braintree, MA

Test Boring No.: B-5
Page: 1 of 1
File No.: O313.00
Reviewed By: Glenn Olson, P.E.

Boring Co.: New England Boring Contractors
Foreman: Matt
Boring Equipment: Track -mounted Acker drill rig; 3-1/4" (ID) HSA; 2" (OD) split-spoon driven w/140# auto-trip hammer

Date: 8/6/2018
Northeast Geotechnical Observer: Michael Clement
Test Boring Location: See Subsurface Exploration Location Plan
Ground Surface Elevation: 118'±
Depth to Water: 6± feet

	Sample Data						Strata Change	Sample Description
	No.	Depth	Pen.	Rec.	Blows per 6 in.	Rem.		
	S-1	0'-2'	24"	18"	5-10-17-25		Fill	M. dense, brown, fine to coarse SAND, some (-) Silt, little fine to coarse Gravel
	S-2	2'-2.8'	9"	3"	29-60/3"	1	3'±	Brown, fine to coarse SAND, some (-) Silt, little (-) fine to coarse Gravel
5'	S-3	4'-6'	24"	14"	15-14-28-17	2	Natural Glacial Till	Dense, wet, brown, fine to coarse SAND, some fine to coarse Gravel, some (-) Silt
10'	S-4	9'-11'	24"	20"	15-23-34-46			Very dense, wet, grayish brown, fine to coarse SAND, some Silt, some (-) fine to coarse Gravel
15'	S-5	14'-15.1'	13"	10"	34-45-30/1"	3		
						4	15.5'±	Wet, grayish brown, fine to coarse SAND, some Silt, little (+) fine Gravel
20'								Refusal to auger on apparent bedrock at a depth of 15.5± ft.
25'								

Notes:
1. Refusal to split spoon at a depth of 2.9± ft.
2. Apparent groundwater observed at a depth of about 6± ft at time of boring.
3. Refusal to split spoon at a depth of 15.1± ft.
4. Refusal to auger on apparent bedrock at a depth of 15.5± ft.

Standard Penetration Resistance (Blows/Foot)	Density
0 -4	Very Loose
4 - 10	Loose
10 - 30	Med. Dense
30 - 50	Dense
50+	Very Dense

Abbreviations
F = Fine
M = Medium
C = Coarse
F/M = Fine to Medium
F/C = Fine to Coarse

Proportions Used
Trace (T) = 0 - 10%
Little (Li) = 10 - 20%
Some (So) = 20 - 35%
AND = 35-50%

NORTHEAST GEOTECHNICAL, INC.

TEST BORING LOG

Project: Petersen Pool Indoor Sports Complex
128 Town Street
Braintree, MA

Test Boring No.: B-6
Page: 1 of 1
File No.: O313.00
Reviewed By: Glenn Olson, P.E.

Boring Co.: New England Boring Contractors
Foreman: Matt
Boring Equipment: Track -mounted Acker drill rig; 3-1/4" (ID) HSA; 2" (OD) split-spoon driven w/140# auto-trip hammer

Date: 8/7/2018
Northeast Geotechnical Observer: Michael Clement
Test Boring Location: See Subsurface Exploration Location Plan
Ground Surface Elevation: 118'±
Depth to Water: 6± feet

	Sample Data						Strata Change	Sample Description
	No.	Depth	Pen.	Rec.	Blows per 6 in.	Rem.		
	S-1	0'-2'	24"	16"	3-7-12-19		Topsoil 0.5'±	M. dense, dark brown, fine to medium SAND, some (+) Silt, trace fine Gravel
	S-2	2'-4'	24"	14"	20-21-30-26			Very dense, gray, fine to coarse SAND, little (+) Silt, little fine Gravel
5'	S-3	4'-6'	24"	18"	16-18-24-16			Dense, moist, brown, fine to coarse SAND, some (-) Silt, little fine Gravel
						1		
							Natural Glacial Till	
10'	S-4	9'-11'	24"	12"	14-10-8-6			Medium dense, wet, grayish brown, fine to coarse SAND, some Silt, little (+) fine to coarse Gravel
15'	S-5	14'-16'	24"	14"	26-31-28-44			Very dense, wet, grayish brown, fine to medium SAND, some (+) Silt, trace (+) fine Gravel
						2	18'±	
20'								Refusal to auger on apparent bedrock at a depth of 18± ft.
25'								

Notes:
1. Apparent groundwater observed at a depth of about 6± ft at time of boring.
2. Refusal to auger on apparent bedrock at a depth of 18± ft.

Standard Penetration Resistance (Blows/Foot)	Density
0 -4	Very Loose
4 - 10	Loose
10 - 30	Med. Dense
30 - 50	Dense
50+	Very Dense

Abbreviations
F = Fine
M = Medium
C = Coarse
F/M = Fine to Medium
F/C = Fine to Coarse

Proportions Used
Trace (T) = 0 - 10%
Little (Li) = 10 - 20%
Some (So) = 20 - 35%
AND = 35-50%

NORTHEAST GEOTECHNICAL, INC.

TEST BORING LOG

Project: Petersen Pool Indoor Sports Complex
128 Town Street
Braintree, MA

Test Boring No.: B-7
Page: 1 of 1
File No.: O313.00
Reviewed By: Glenn Olson, P.E.

Boring Co.: New England Boring Contractors
Foreman: Matt
Boring Equipment: Track -mounted Acker drill rig; 3-1/4" (ID) HSA; 2" (OD) split-spoon driven w/140# auto-trip hammer

Date: 8/6/2018
Northeast Geotechnical Observer: Michael Clement
Test Boring Location: See Subsurface Exploration Location Plan
Ground Surface Elevation: 116'±
Depth to Water: 6± feet

	Sample Data						Strata Change	Sample Description
	No.	Depth	Pen.	Rec.	Blows per 6 in.	Rem.		
	S-1	0'-2'	24"	8"	3-11-23-29		Fill 2'±	Dense, brown, fine to coarse SAND and fine to coarse GRAVEL, little (-) Silt
	S-2	2'-4'	24"	12"	18-23-34-42			Very dense, orangish brown, fine to coarse SAND, some (+) fine to coarse Gravel, some Silt
5'								
	S-3	5'-7'	24"	13"	16-21-23-25	1		Dense, wet, orangish brown, fine to coarse SAND and fine to coarse GRAVEL, little Silt
	S-4	7'-9'	24"	16"	24-23-23-21		Natural Glacial Till	Dense, wet, orangish brown, fine to coarse SAND, some fine to coarse Gravel, little (-) Silt
10'	S-5	9'-11'	24"	14"	7-8-8-14			Medium dense, wet, gray, fine to coarse SAND, some Silt, little fine Gravel
15'	S-6	14'-15.3'	15"	12"	28-38-60/3"	2		
						3	16'±	Wet, grayish brown, fine to coarse SAND, some Silt, trace (+) fine Gravel
20'								Refusal to auger on apparent bedrock at a depth of 16± ft.
25'								

Notes:
1. Apparent groundwater observed at a depth of about 6± ft at time of boring.
2. Refusal to split spoon at a depth of 15.3± ft.
3. Refusal to auger on apparent bedrock at a depth of 16± ft.

Standard Penetration Resistance (Blows/Foot)	Density
0 -4	Very Loose
4 - 10	Loose
10 - 30	Med. Dense
30 - 50	Dense
50+	Very Dense

Abbreviations
F = Fine
M = Medium
C = Coarse
F/M = Fine to Medium
F/C = Fine to Coarse

Proportions Used
Trace (T) = 0 - 10%
Little (Li) = 10 - 20%
Some (So) = 20 - 35%
AND = 35-50%

NORTHEAST GEOTECHNICAL, INC.

TEST BORING LOG

Project: Petersen Pool Indoor Sports Complex
128 Town Street
Braintree, MA

Test Boring No.: B-8
Page: 1 of 1
File No.: O313.00
Reviewed By: Glenn Olson, P.E.

Boring Co.: New England Boring Contractors
Foreman: Matt
Boring Equipment: Track -mounted Acker drill rig; 3-1/4" (ID) HSA; 2" (OD) split-spoon driven w/140# auto-trip hammer

Date: 8/7/2018
Northeast Geotechnical Observer: Michael Clement
Test Boring Location: See Subsurface Exploration Location Plan
Ground Surface Elevation:
Depth to Water: 4± feet

	Sample Data						Strata Change	Sample Description
	No.	Depth	Pen.	Rec.	Blows per 6 in.	Rem.		
	S-1	0'-2'	24"	4"	4-10-17-24			Medium dense, fine to coarse SAND, some Silt, little fine to coarse Gravel
	S-2	2'-4'	24"	17"	18-17-18-18	1		Dense, moist, brown, fine to coarse SAND, some Silt, little fine Gravel
5'	S-3	4'-6'	24"	16"	8-10-15-20			Medium dense, wet, brown, SILT, fine to medium SAND, little (-) fine to coarse Gravel
10'	S-4	9'-11'	24"	18"	19-32-34-36		Natural Glacial Till	Very dense, wet, gray,fine to coarse SAND and fine to coarse GRAVEL, little Silt
15'	S-5	14'-15.2`	15"	10"	17-18-40/3"	2		Wet, gray, fine to coarse SAND, some (+) fine to coarse Gravel, some Silt
20'	S-6	19'-19.8'	10"	6"	59-60/4"	3,4	20'±	Wet, grayish brown, fine to coarse SAND, some Silt, trace (+) fine Gravel
25'								Refusal to auger on apparent bedrock at a depth of 20± ft.

Notes:
1. Apparent groundwater observed at a depth of about 4± ft at time of boring.
2. Refusal to split spoon at a depth of 15.2± ft.
3. Refusal to split spoon at a depth of 19.8± ft.
4. Refusal to auger on apparent bedrock at a depth of 20± ft.

Standard Penetration Resistance (Blows/Foot)	Density
0 -4	Very Loose
4 - 10	Loose
10 - 30	Med. Dense
30 - 50	Dense
50+	Very Dense

Abbreviations
F = Fine
M = Medium
C = Coarse
F/M = Fine to Medium
F/C = Fine to Coarse

Proportions Used
Trace (T) = 0 - 10%
Little (Li) = 10 - 20%
Some (So) = 20 - 35%
AND = 35-50%

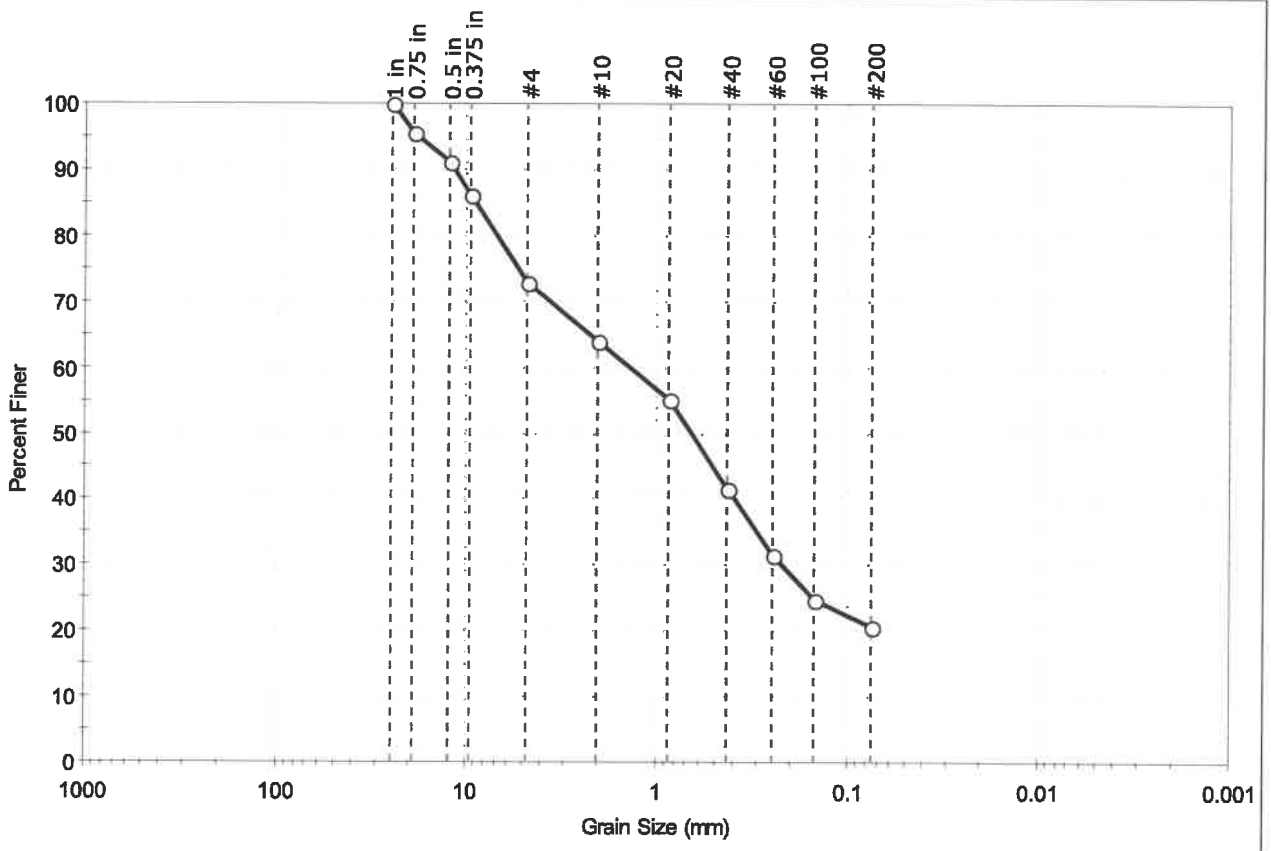
APPENDIX C

Laboratory Soil Test Results

GeoTesting EXPRESS

Client:	Northeast Geotechnical, Inc.				
Project:	Petersen Pool and Rinks				
Location:	Braintree, MA			Project No:	GTX-308624
Boring ID:	B-1	Sample Type:	jar	Tested By:	jbr
Sample ID:	S-3	Test Date:	08/17/18	Checked By:	bfs
Depth :	4-6 ft	Test Id:	468852		
Test Comment:	---				
Visual Description:	Moist, brown silty sand with gravel				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
–	27.0	52.4	20.6

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 in	25.00	100		
0.75 in	19.00	95		
0.5 in	12.50	91		
0.375 in	9.50	86		
#4	4.75	73		
#10	2.00	64		
#20	0.85	55		
#40	0.42	41		
#60	0.25	32		
#100	0.15	25		
#200	0.075	21		

Coefficients

D_{85} = 8.9302 mm D_{30} = 0.2211 mm
D_{60} = 1.3672 mm D_{15} = N/A
D_{50} = 0.6556 mm D_{10} = N/A
C_u = N/A C_c = N/A

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR

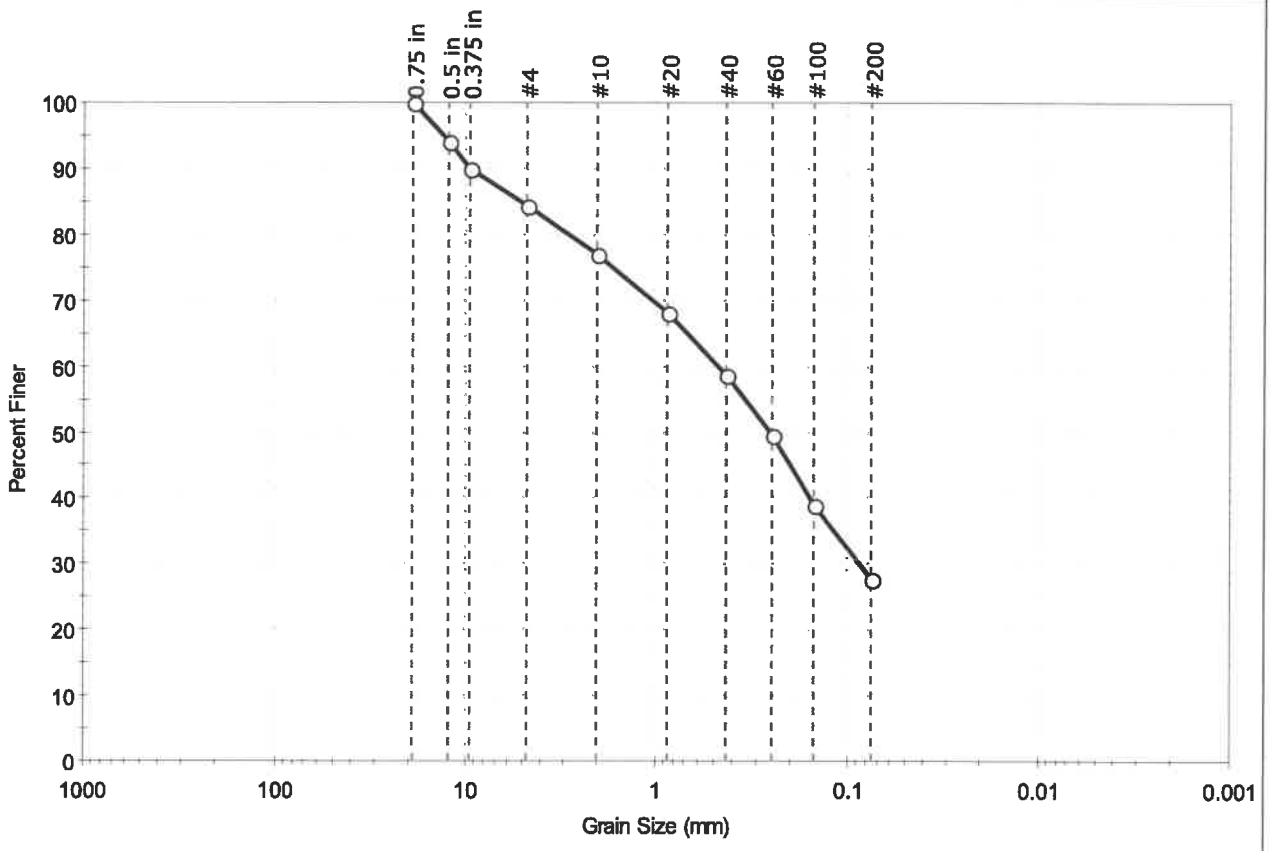
Sand/Gravel Hardness : HARD

printed 8/17/2018 3:25:15 PM

GeoTesting EXPRESS

Client:	Northeast Geotechnical, Inc.				
Project:	Petersen Pool and Rinks				
Location:	Braintree, MA			Project No:	GTX-308624
Boring ID:	B-3	Sample Type:	jar	Tested By:	jbr
Sample ID:	S-2	Test Date:	08/17/18	Checked By:	bfs
Depth :	2-4 ft	Test Id:	468853		
Test Comment:	---				
Visual Description:	Moist, grayish brown silty sand with gravel				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	15.8	56.5	27.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	94		
0.375 in	9.50	90		
#4	4.75	84		
#10	2.00	77		
#20	0.85	68		
#40	0.42	59		
#60	0.25	50		
#100	0.15	39		
#200	0.075	28		

Coefficients

D_{85} = 5.1955 mm D_{30} = 0.0862 mm
D_{60} = 0.4705 mm D_{15} = N/A
D_{50} = 0.2555 mm D_{10} = N/A
C_u = N/A C_c = N/A

Classification

ASTM N/A

AASHTO Silty Gravel and Sand (A-2-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR

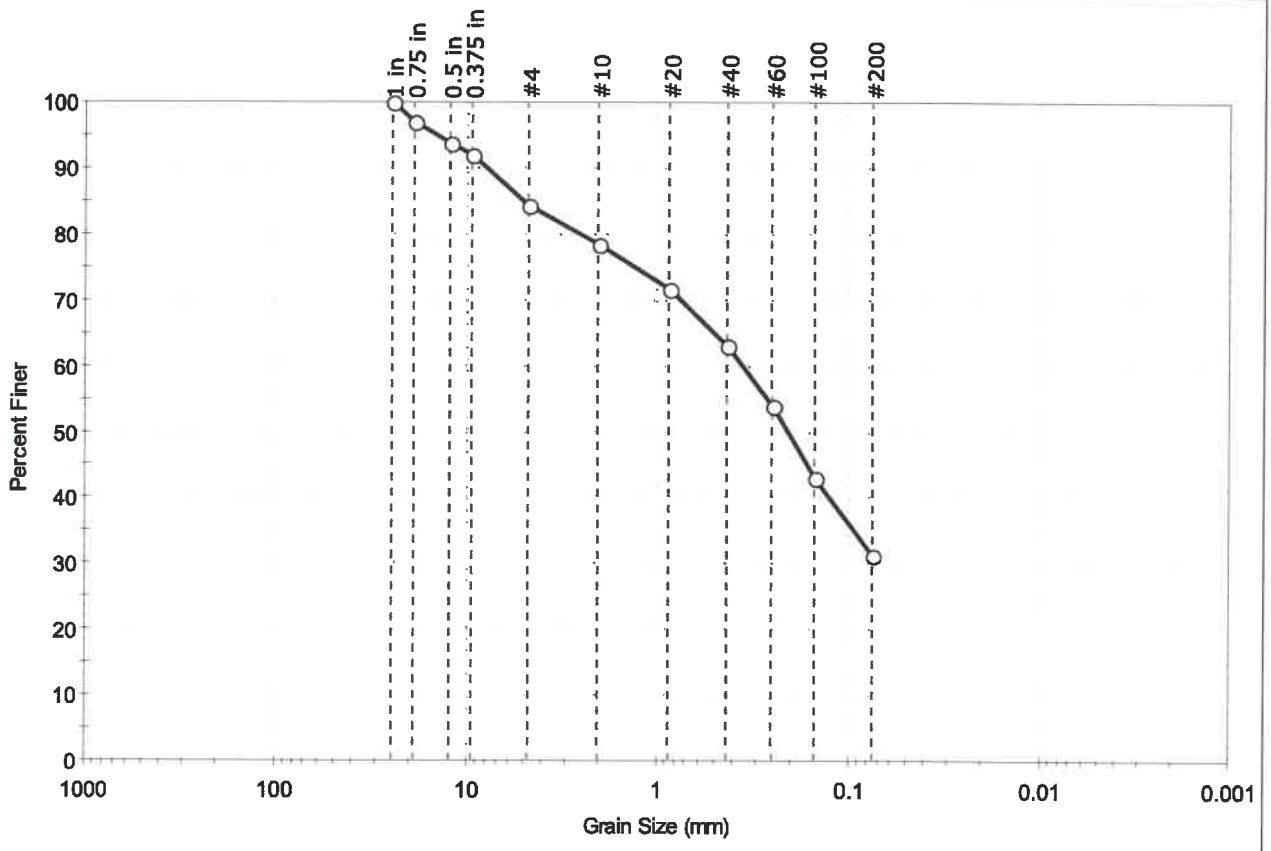
Sand/Gravel Hardness : HARD

printed 8/17/2018 3:25:16 PM

GeoTesting EXPRESS

Client:	Northeast Geotechnical, Inc.				
Project:	Petersen Pool and Rinks				
Location:	Braintree, MA			Project No:	GTX-308624
Boring ID:	B-4	Sample Type:	jar	Tested By:	jbr
Sample ID:	S-3	Test Date:	08/17/18	Checked By:	bfs
Depth :	5-7 ft	Test Id:	468854		
Test Comment:	---				
Visual Description:	Moist, brown silty sand with gravel				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
–	15.5	53.1	31.4

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 in	25.00	100		
0.75 in	19.00	97		
0.5 in	12.50	94		
0.375 in	9.50	92		
#4	4.75	84		
#10	2.00	79		
#20	0.85	72		
#40	0.42	63		
#60	0.25	54		
#100	0.15	43		
#200	0.075	31		

Coefficients

D_{85} =4.9788 mm D_{30} =N/A
D_{60} =0.3540 mm D_{15} =N/A
D_{50} =0.2078 mm D_{10} =N/A
C_u =N/A C_c =N/A

Classification

ASTM N/A

AASHTO Silty Gravel and Sand (A-2-4 (0))

Sample/Test Description

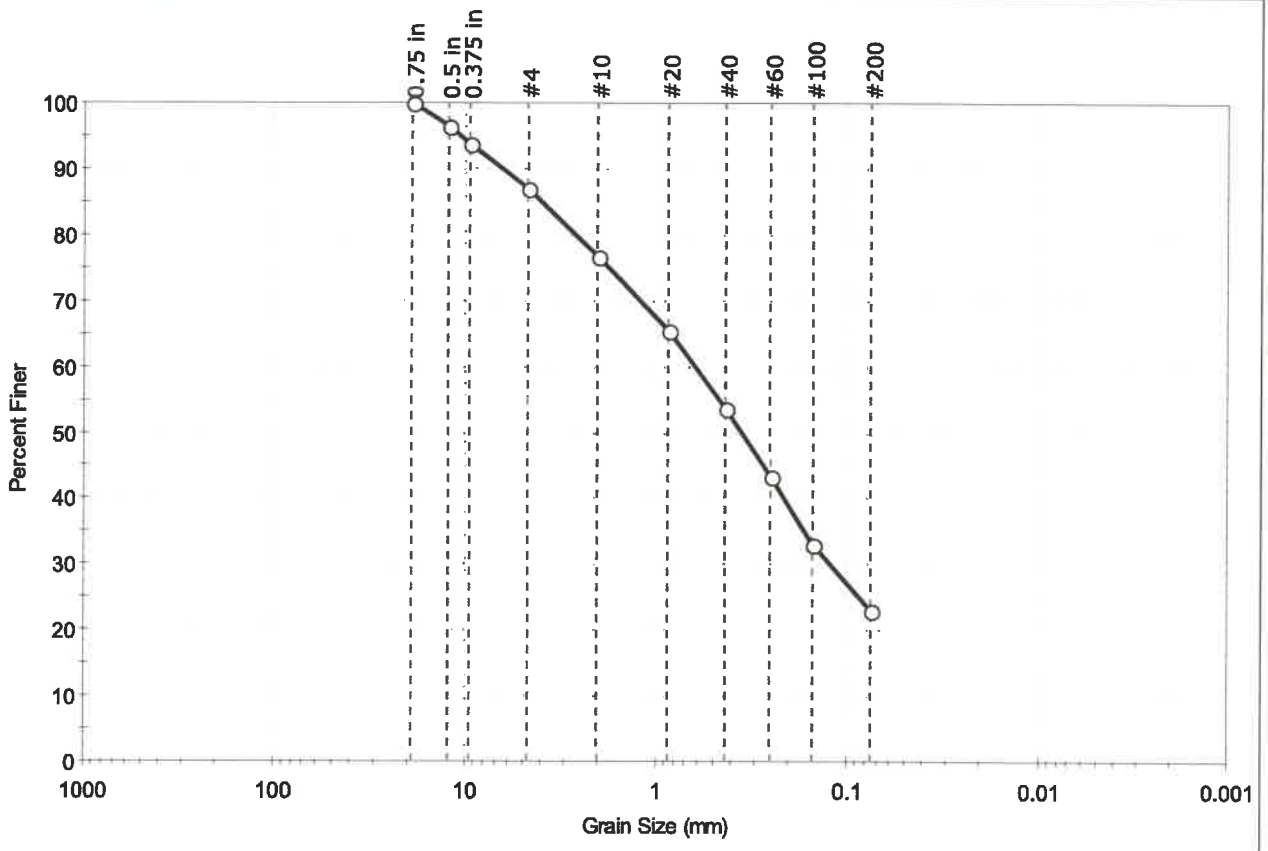
Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

GeoTesting EXPRESS

Client:	Northeast Geotechnical, Inc.				
Project:	Petersen Pool and Rinks				
Location:	Braintree, MA			Project No:	GTX-308624
Boring ID:	B-6	Sample Type:	jar	Tested By:	jbr
Sample ID:	S-3	Test Date:	08/17/18	Checked By:	bfs
Depth :	4-6 ft	Test Id:	468855		
Test Comment:	---				
Visual Description:	Moist, dark brown silty sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
--	13.1	64.0	22.9

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	96		
0.375 in	9.50	94		
#4	4.75	87		
#10	2.00	77		
#20	0.85	65		
#40	0.42	54		
#60	0.25	43		
#100	0.15	33		
#200	0.075	23		

Coefficients

D_{85} = 4.0436 mm D_{30} = 0.1216 mm
D_{60} = 0.6156 mm D_{15} = N/A
D_{50} = 0.3520 mm D_{10} = N/A
C_u = N/A C_c = N/A

Classification

ASTM N/A

AASHTO Silty Gravel and Sand (A-2-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR

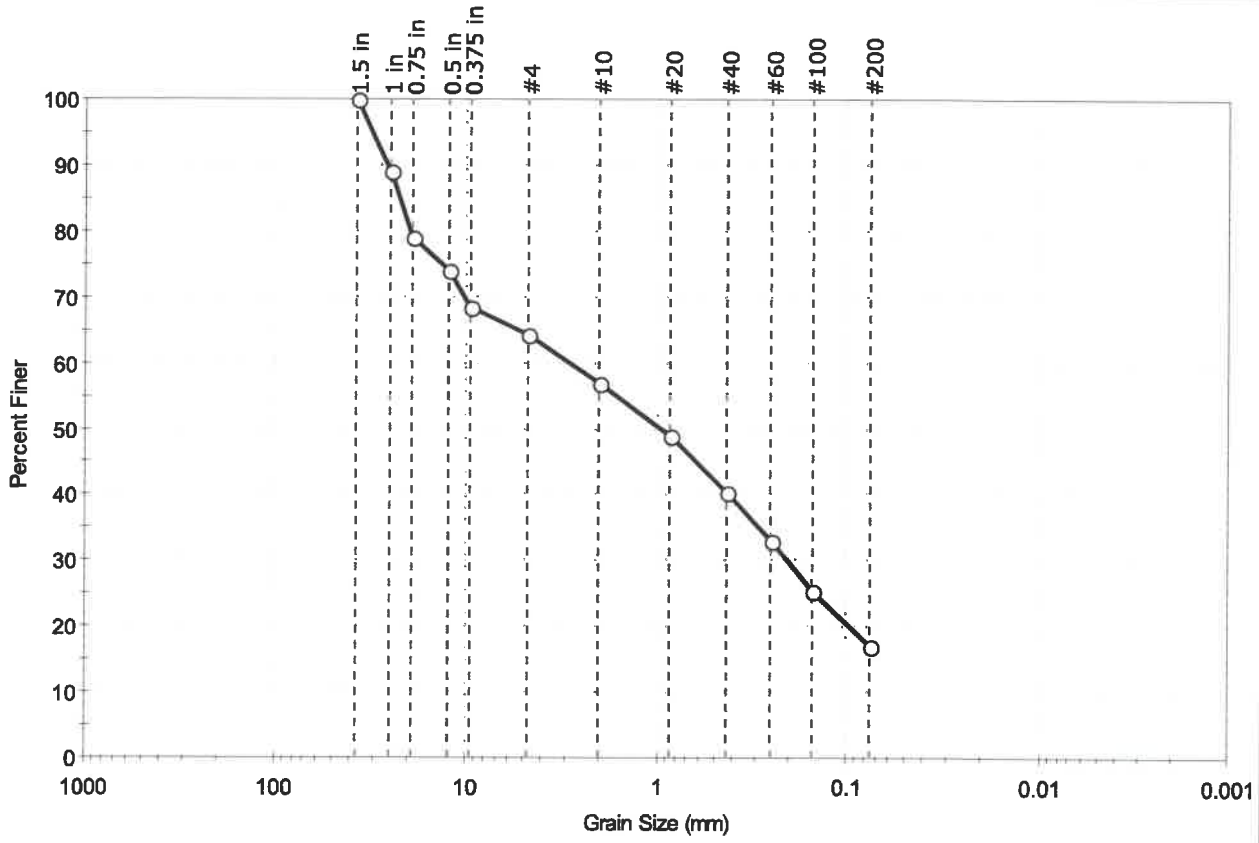
Sand/Gravel Hardness : HARD

printed 8/17/2018 3:25:17 PM

GeoTesting EXPRESS

Client:	Northeast Geotechnical, Inc.				
Project:	Petersen Pool and Rinks				
Location:	Braintree, MA			Project No:	GTX-308624
Boring ID:	B-7	Sample Type:	jar	Tested By:	jbr
Sample ID:	S-3	Test Date:	08/17/18	Checked By:	bfs
Depth :	5-7 ft	Test Id:	468856		
Test Comment:	---				
Visual Description:	Moist, dark brown silty sand with gravel				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	35.6	47.3	17.1

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1.5 in	37.50	100		
1 in	25.00	89		
0.75 in	19.00	79		
0.5 in	12.50	74		
0.375 in	9.50	68		
#4	4.75	64		
#10	2.00	57		
#20	0.85	49		
#40	0.42	40		
#60	0.25	33		
#100	0.15	25		
#200	0.075	17		

Coefficients

D_{85} = 22.4038 mm	D_{30} = 0.2037 mm
D_{60} = 2.8413 mm	D_{15} = N/A
D_{50} = 0.9451 mm	D_{10} = N/A
C_u = N/A	C_c = N/A

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

Sample/Test Description

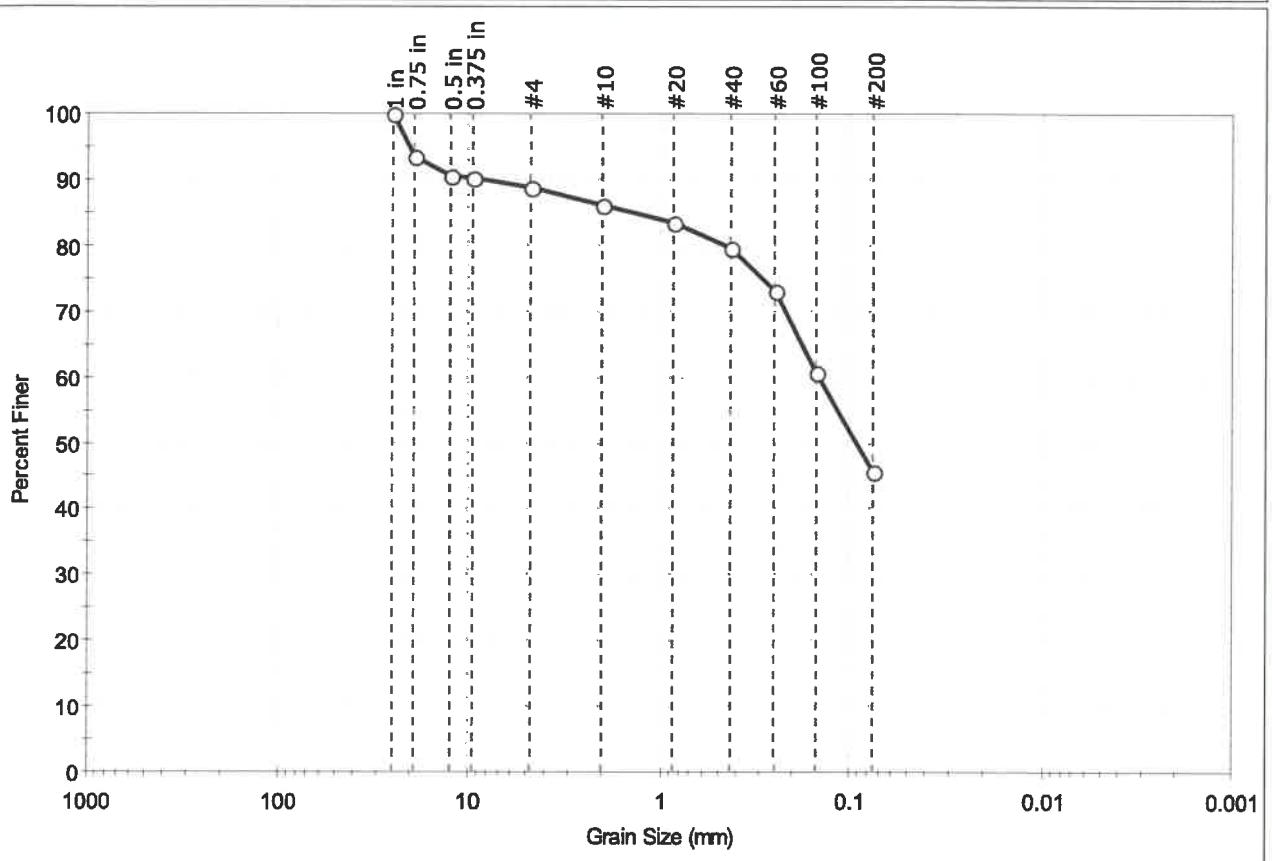
Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

GeoTesting EXPRESS

Client:	Northeast Geotechnical, Inc.				
Project:	Petersen Pool and Rinks				
Location:	Braintree, MA			Project No:	GTX-308624
Boring ID:	B-8	Sample Type:	jar	Tested By:	jbr
Sample ID:	S-3	Test Date:	08/17/18	Checked By:	bfs
Depth :	4-6 ft	Test Id:	468857		
Test Comment:	---				
Visual Description:	Moist, yellowish brown silty sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	11.3	43.1	45.6

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 in	25.00	100		
0.75 in	19.00	93		
0.5 in	12.50	91		
0.375 in	9.50	90		
#4	4.75	89		
#10	2.00	86		
#20	0.85	84		
#40	0.42	80		
#60	0.25	73		
#100	0.15	61		
#200	0.075	46		

Coefficients

D_{85} = 1.3810 mm D_{30} = N/A
D_{60} = 0.1449 mm D_{15} = N/A
D_{50} = 0.0918 mm D_{10} = N/A
C_u = N/A C_c = N/A

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

printed 8/17/2018 3:25:19 PM