LGCI
Lahlaf Geotechnical Consulting, Inc.

September 9, 2024

Ms. Alicia Caritano, AIA, LEED AP, MCPPO
JCJ Architecture, PC
One State Street, Suite 900
Boston, MA 02109
Phone: (617) 532-6609
E-mail: ACaritano@jcj.com

Re: **SD Phase Geotechnical Report**
Proposed Cutler Elementary School
South Hamilton, Massachusetts
LGCI Project No. 2353-Rev. 1

Dear Ms. Caritano:

Lahlaf Geotechnical Consulting, Inc. (LGCI) has completed a Schematic Design (SD) Phase geotechnical study for the proposed Cutler Elementary School in South Hamilton, Massachusetts. We are submitting our geotechnical report electronically. Please notify us if you need a hard copy.

The soil samples from our explorations are currently stored at LGCI for further analysis, if requested. Unless notified otherwise, we will dispose of the soil samples after three (3) months.

Thank you for choosing LGCI as your geotechnical engineer.

Very truly yours,

Lahlaf Geotechnical Consulting, Inc.

Abdelmadjid M. Lahlaf, Ph.D., P.E.
Principal Engineer

LGCI
Lahlaf Geotechnical Consulting, Inc.

SD PHASE GEOTECHNICAL REPORT
PROPOSED CUTLER ELEMENTARY SCHOOL
SOUTH HAMILTON, MASSACHUSETTS

LGCI Project No. 2353-Rev. 1
August 10, 2024
Revised September 9, 2024

Prepared for:

JCJ Architecture, PC
One State Street, Suite 900
Boston, MA 02109
Phone: (617) 532-6609

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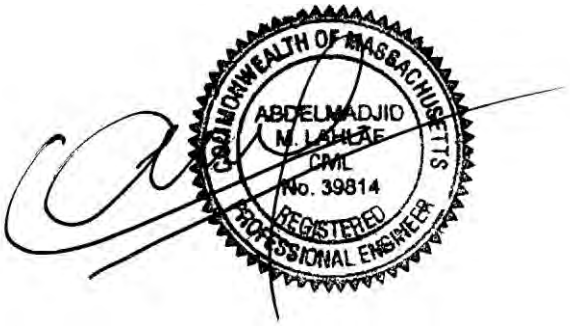
One State Street, Suite 900
Boston, MA 02109
Phone: (617) 532-6609

Prepared by:

LAHLAF GEOTECHNICAL CONSULTING, INC.
100 Chelmsford Road, Suite 2
Billerica, Massachusetts 01862
Phone: (978) 330-5912
Fax: (978) 330-5056



Abdelmadjid M. Lahlaf, Ph.D., P.E.
Principal Engineer

EXECURUVE SUMMARY

LGCI Engaged a drilling subcontractor for three (3) days to advance ten (10) soil borings and twelve (12) rock probes at the site, including five (5) soil borings and twelve (12) rock probes as part of our feasibility phase, and five (5) soil borings as part of our SD phase. Our drilling subcontractor installed one (1) groundwater observation well as part of the feasibility phase in one (1) of the soil borings.

LGCI Submitted four (4) soil samples collected from the borings for laboratory testing, including two (2) soil samples as part of our feasibility phase services, and two (2) soil samples as part of our SD phase services.

Our borings indicated 0.3 to 2 feet of topsoil, overlying subsoil or fill that extended to depths of up to 4 feet beneath the ground surface, overlying natural sand and gravel that extended to the top of the underlying silt layer or weathered rock, or to the termination depths of the borings.

A layer of silt was encountered beneath or within the sand and gravel layer in a few borings.

Groundwater was encountered in borings in a few borings at depths ranging between 6.0 feet and 20.0 feet beneath the ground surface.

A groundwater observation well was installed in one (1) boring. The groundwater level was measured at a depth of 9.8 feet and 14.5 feet beneath the ground surface on March 22, 2024, and July 22, 2024, corresponding to El. 55.2 feet and El. 50.5 feet, respectively.

The topsoil should be removed from within the entire construction area, including the proposed building footprint and the proposed paved areas.

The subsoil should be entirely removed from within the proposed building footprint. We anticipate that the removal will extend to depths of up to about 4 feet.

The existing fill should be entirely removed from within the proposed building's footprint and replaced with Structural Fill. We anticipate that the removal will extend up to depths of about 4 feet. The removal may extend to greater depths at locations not explored by LGCI.

Within paved areas, the existing fill and the subsoil should be removed to the top of the natural sand and gravel or to a depth of 18 inches beneath the bottom of the proposed pavement, whichever occurs first. The exposed surface in the existing fill and subsoil deeper than 18 inches beneath the bottom of the proposed pavement can remain in place provided these materials are firm and unyielding following proofrolling.

Based on the results of the borings, the subsurface conditions are suitable to support shallow spread and continuous footings bearing on Structural Fill placed directly on top of the sand and gravel layer after entirely removing the topsoil, the subsoil, and the existing fill. The proposed slabs may be designed as slabs-on-grade.

Based on the grading information available at the time of this report and based on the groundwater data from the borings and the groundwater observation well, an under-slab drainage system, is not required.

The excavation for the proposed foundations and utilities may extend into weathered rock and sound rock. While the weathered rock was penetrated with the drilling equipment, it may not be locally excavatable with conventional earth moving equipment. Provisions should be made in the contract documents for rock removal.

We recommend engaging LGCI to perform additional explorations during the design development (DD) phase. The purpose of the additional explorations would be to obtain additional information about the depth to weathered rock and rock. We recommend one (1) day of borings with at least one (1) rock core and one (1) groundwater observation well, and one (1) day of probes. We also recommend engaging LGCI to continue monitoring the existing groundwater observation well.

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1. PROJECT INFORMATION

1.1 Project Authorization

This Schematic Design (SD) geotechnical report presents the results of the subsurface explorations, and a geotechnical evaluation performed by Lahlaf Geotechnical Consulting, Inc. (LGCI) for the proposed Cutler Elementary School in South Hamilton, Massachusetts. Our services were performed in two (2) phases, a Feasibility Phase, and an SD Phase. We performed our services in general accordance with our proposal No. 23096-Rev.1 dated August 14, 2023, revised on February 9, 2024, and in accordance with the terms and conditions of the Standard Form of Agreement Architect and Consultant dated August 28, 2023, and signed by Mr. James E. LaPosta of JCJ Architecture, PC (JCJ).

1.2 Purpose and Scope of Services

The purpose of our feasibility and SD phase studies were to perform subsurface explorations at the site for the proposed Cutler Elementary School, and to provide foundation design and construction recommendations. LGCI performed the following services:

- Coordinated our exploration locations with JCJ and with school staff.
- Marked the exploration locations at the site and notified Dig Safe Systems Inc. (Dig Safe) and the Town of South Hamilton Department of Public Works (DPW) for utility clearance.
- Engaged a drilling subcontractor for three (3) days to advance ten (10) soil borings and twelve (12) rock probes at the site, including five (5) soil borings and twelve (12) rock probes as part of our feasibility phase, and five (5) soil borings as part of our SD phase. Our drilling subcontractor installed one (1) groundwater observation well as part of the feasibility phase in one (1) of the soil borings.
- Provided an LGCI geotechnical field representative at the site to coordinate and observe the borings and probes, describe the soil samples, and prepare field logs.
- Submitted four (4) soil samples collected from the borings for laboratory testing, including two (2) soil samples as part of our feasibility phase services, and two (2) soil samples as part of our SD phase services.
-
- Prepared this SD phase geotechnical report containing the results of our subsurface explorations and our recommendations for foundation design and construction. Upon the completion of our feasibility phase explorations, LGCI submitted a feasibility phase geotechnical report dated March 22, 2024. This SD Phase geotechnical report contains the results of Feasibility Phase explorations and supersedes it.

Our scope does not include preparing specifications, reviewing contract documents, attending meetings, or providing construction services. LGCI would be pleased to perform these services when needed. Recommendations for stormwater management, erosion control, pavement design, slope stability analyses, site specific seismic and liquefaction analyses, pile analysis and design, FEMA 100-year flood elevation, historic uses of site, contaminated soil and groundwater treatment and disposal requirements and techniques, and cost or quantity estimates are not included in our scope of work.

LGCI's scope of services does not include an environmental assessment for the presence or absence of wetlands or analytical testing for hazardous or toxic materials in the soil, surface water, groundwater, or air, on or below or around this site, or mold in the soil or in any structure at the site. Any statements regarding odors, colors, or unusual or suspicious items or conditions are strictly for the information of the client.

1.3 Site Description

Our understanding of the site is based on our field observations and on the following drawing:

- "Topographic Plan of Land, Cutler Elementary School, 237 Asbury Street, South Hamilton, MA," (Topographic Plan) prepared by Samiotes Consultants Inc. of Framingham, Massachusetts, dated October 30, 2023, and provided to us by JCJ via e-mail on February 26, 2024.

The site is located at 237 Asbury Street in South Hamilton, Massachusetts as shown in Figure 1. The site is bordered by Asbury Street on the western side, by Woodland Mead on the northern and eastern sides, and by private properties on the southern side. The site is accessible from Asbury Street. The site is occupied by the existing one-story school building, paved parking lot, driveways, and a drop-off loop, a playground, and athletic fields. The athletic fields are located on the western side of the existing building.

Based on the Topographic Plan, the existing grades at the site range between about El. 65 feet on the southern side and about El. 86 feet on the northern side. The grades around the existing building range between El. 82 feet on the southern side and El. 86 feet on the northern side of the existing building. The grades in the athletic fields range between El. 86 feet near the existing building on the eastern side and El. 67 feet on the western side. Rock outcrops are visible near the southern side of the athletic fields.

1.4 Project Description

Our understanding of the proposed construction is based on our discussions with JCJ and on the following drawings:

- Drawings titled: "First Floor Plan to Third Floor Plan, Cutler Elementary School," (SD Phase Draft Floor Plans) prepared by JCJ, dated August 7, 2024, and provided to LGCI by JCJ via e-mail on August 7, 2024.

- Drawing titled: "Cutler Elementary School, Progress Site Plan," (SD Phase Draft Site Plan) prepared by JCJ, dated August 8, 2024, and provided to LGCI by JCJ via e-mail on August 8, 2024.

Based on the SD Phase Draft Floor Plans and the SD Phase Draft Site Plan, we understand that the proposed construction will consist of an irregular-shaped building that will be located in the existing athletic fields and landscaped areas on the northern side of the existing school building. We understand that the proposed building will be three (3) stories and will have an approximate footprint of about 78,000 square feet.

The proposed grading, including the proposed finished floor elevation (FFE), are evolving as the design progresses. Based on information available at this time, we understand that the proposed building will be stepped. The first floor will be located on the western side of the proposed building and have a FFE of about El. 68 feet, with the FFE of the proposed mechanical room on the southern side of the proposed building at El. 64.67 feet. These FFEs will require cuts up to about 5 feet and minor fill to achieve the proposed first floor FFE. We understand that second floor will cover the entire footprint of the proposed building and will be at grade on the eastern side of the proposed building (near the existing building). The proposed second floor will have two (2) levels: an FFE at elevation El. 80 feet at the southern learning neighborhoods' entrance on the southern side of the proposed building, and an FFE at El. 83.33 feet at the remainder of the second floor. These FFEs will require minor cuts and fills up to about 5 feet to achieve the proposed second floor FFE of the proposed building.

1.5 Elevation Datum

We understand that the elevations provided in the Topographic Plan are referenced with respect to the North American Vertical Datum of 1988 (NAVD88).

2. SITE AND SUBSURFACE CONDITIONS

2.1 Surficial Geology

LGCI reviewed a surficial geologic map titled: "Surficial Materials Map of the Salem Quadrangle, Massachusetts," prepared by Byron D. Stone, Janet R. Stone, and Mary L. DiGiacomo-Cohen, Scientific Investigation Map 3402, Quadrangle 136 for Salem, Massachusetts, 2018.

The surficial geologic map of the site indicates that the natural soils in the general vicinity of the site consist of thin till and Coarse Deposits.

The thin till is described as a non-sorted, non-stratified matrix of sand, some silt, and little clay that contains scattered pebble, cobble, and boulder clasts. The thin till is generally less than 10 to 15 feet thick.

The coarse deposits consist of sand, sand and gravel, and gravel deposits as described below.

Sand Deposits – The sand deposits are comprised mostly of fine to coarse sand. Coarser layers may contain up to 25 percent gravel. Finer layers may contain very fine sand, silt, and clay.

Sand and Gravel Deposits –The sand and gravel deposits occur as a mixture of gravel and sand within individual layers and as alternating layers of sand and gravel. The sand and gravel layers range between 25 to 50 percent gravel and 50 to 75 percent sand.

Gravel Deposits – The gravel deposits are comprised of at least 50 percent gravel, cobbles, and boulders. Sand occurs within gravel beds and as separate layers within the gravel.

The Surficial Geologic Map is shown in Figure 2.

2.2 LGCI's Explorations

2.2.1 General

LGCI coordinated our exploration locations with JCJ and the school staff, and we marked the exploration locations in the field. LGCI notified Dig Safe and the Town of South Hamilton for utility clearance prior to starting our explorations at the site.

Unless notified otherwise, we will dispose of the soil samples obtained during our explorations after three (3) months.

2.2.2 LGCI's Soil Borings

As part of our feasibility phase explorations, LGCI engaged Soil X, Corp. (Soil X) of Leominster, Massachusetts to advance five (5) soil borings (B-1 to B-5) at the site on March

7 and 8, 2024. As part of our SD phase explorations, LGCI engaged Soil X to advance an additional five (5) soil borings (B-101 to B-105) at the site on July 22, 2024. The borings were advanced with a CME 750X ATV drill rig, or a Diedrich D-70 Turbo ATV drill rig using 4-¼-inch inner-diameter hollow stem augers. The borings extended to depths ranging between 13.0 and 26.5 feet beneath the ground surface. Upon completion, the boreholes were backfilled with the drill cuttings and sand. Soil X installed one (1) groundwater observation well in boring B-2-OW.

Soil X performed Standard Penetration Tests (SPT) and obtained split spoon samples with an automatic hammer at typical depth intervals of 2 feet or 5 feet as noted on the boring logs in general accordance with ASTM D-1586.

An LGCI geotechnical field representative observed and logged the borings in the field.

2.2.3 Rock Probes

As part of our feasibility phase explorations, Soil X advanced twelve (12) rock probes (P-1 to P-10, P-11A, and P-11B) at the site on March 8, 2024. The probes were advanced with a Diedrich D-70 Turbo ATV drill rig using 3.5-inch solid stem augers. The probes extended to depths ranging between 2.5 and 20 feet beneath the ground surface. The probes were advanced without sampling to a depth of 20 feet or to refusal, whichever occurred first.

An LGCI geotechnical field representative observed and logged the probes in the field.

2.2.4 Exploration Logs and Locations

The boring and probe locations are shown in Figure 3. Appendix A contains LGCI's boring logs and Appendix B contains LGCI's rock probe logs. Table 1 includes a summary of LGCI's borings and Table 2 includes a summary of LGCI's probes.

2.3 Subsurface Conditions

The subsurface description in this report is based on a limited number of explorations and is intended to highlight the major soil strata encountered during our explorations. The subsurface conditions are known only at the actual exploration locations. Variations may occur and should be expected between exploration locations. The exploration logs represent conditions that we observed at the time of our explorations and were edited, as appropriate, based on the results of the laboratory test data and inspection of the soil samples in the laboratory. The strata boundaries shown in our exploration logs are based on our interpretations and the actual transitions may be gradual. Graphic soil symbols are for illustration only.

The soil strata encountered in LGCI's explorations were as follows, starting at the ground surface.

Topsoil – A layer of surficial organic topsoil was encountered at the ground surface in all borings. The thickness of the topsoil ranged between 0.3 feet and 2 feet.

Subsoil – A layer of subsoil was encountered beneath the topsoil in borings B-2-OW, B-4, B-5, and B-101 to B-103. The subsoil extended to depths ranging between 2.0 and 4.0 feet beneath the ground surface. The samples in this layer were described as poorly graded sand, silty sand, and silt. The fines content in this layer ranged between 5 and 40 percent and the gravel content ranged between 0 and 20 percent. When described as silt, the sand content ranged between 5 and 10 percent. The subsoil contained traces of organic soil and roots. One (1) sample contained traces of weathered rock.

The standard penetration test (SPT) N-values in this layer ranged between 4 blows per foot (bpf) and 17 bpf, indicating very loose to medium dense material. Please note that the high SPT N-values recorded in the fill may be due to obstructions such as cobbles and boulders present in the subsoil and may not represent the true density of the subsoil.

Fill – A layer of fill was encountered beneath the topsoil in borings B-1, B-104, and B-105. The fill extended to a depth of 4 feet beneath the ground surface. The samples in the fill were described as well graded sand, silty sand, and well graded gravel. The fines content in the fill ranged between 5 and 25 percent, and the gravel content ranged between 5 and 45 percent. When described as gravel, the sand content ranged between 35 and 40 percent. One (1) sample in the fill contained traces of organic soil and traces of roots.

The SPT N-values in this layer ranged between 4 bpf and 70 bpf, with most values lower than 25 bpf, indicating loose to medium dense material. Please note that the high SPT N-values recorded in the fill may be due to obstructions such as cobbles and boulders present in the fill and may not represent the true density of the fill.

Sand and Gravel – A layer of sand and gravel was encountered beneath the topsoil, subsoil, or fill in all borings. The sand and gravel extended to depths ranging between 10.7 and 25.0 feet beneath the ground surface in borings B-1 to B-4, and to the termination depths in borings B-5 and B-101 to B-105. Split spoon and hollow stem auger refusals were encountered in borings B-101 and B-103 to B-105 on possible rock at depths of 16.0, 17.0, 18.0, and 13.0 feet beneath the ground surface, respectively. The samples in this layer were mostly described as silty sand and well graded sand. Five (5) samples were described as poorly graded sand, one (1) sample was described as silty gravel, and one (1) sample was described as silt. The fines content in the sand and gravel ranged between 5 and 40 percent, and the gravel content ranged between 0 and 40 percent. When described as gravel or silt, the sand content ranged between 15 and 35 percent. The sand and gravel contained traces of weathered rock and two (2) samples contained traces of roots.

The SPT N-values in this layer ranged between 12 bpf and refusal, with most values between 12 and 50 bpf, indicating medium dense to dense material. Please note that the high SPT N-values in the sand and gravel may be due to obstructions such as cobbles and boulders in the sand and gravel and may not represent the true density of the sand and gravel.

Silt – A layer of silt was encountered beneath the sand and gravel layer in borings B-1, B-2-OW, and B-4. A layer of silt was also encountered within the sand and gravel layer in borings B-2-OW and B-3, between depths of 6.5 to 12.0 feet and 8.0 to 15.0 feet beneath the ground surface, respectively. The silt layer extended to a depth of 19.0 feet beneath the ground surface in boring B-4 and extended to the termination depths in borings B-1 and B-2-OW. The silt was described as slightly to moderately plastic. The sand content in the silt ranged between 0 and 40 percent, and the gravel content ranged between 0 and 35 percent. Two (2) samples in the silt contained traces of organic soil and one (1) sample in the silt contained traces of weathered rock.

The SPT N-values in this layer ranged between 13 bpf and refusal, with most values between 12 and 21 bpf, indicating stiff to very stiff silt. Please note that the high SPT N-values in the silt may be due to obstructions such as cobbles and boulders in the silt and may not represent the true density of the silt.

Weathered Rock – Weathered rock was encountered beneath the silt in borings B-3 and B-4 and extended to the termination depths of the borings. The weathered rock broke into a sandy silt or a silty sand matrix. The samples in this layer were described as silty sand and silt. The fines content in this layer was about 30 percent, and the gravel content was about 15 percent. When described as silt, the sand content in this layer was about 30 percent. Please note that the weathered rock may be higher than shown in our boring logs as it was difficult to distinguish between the weathered rock and the overlying silt layer.

Split spoon refusal was encountered in the weathered rock, indicating very dense material. Please note that the high SPT N-values in the weathered rock layer may be due to obstructions such as cobbles and boulders in the weathered rock and may not represent the true density of the weathered rock.

Refusal on apparent rock was encountered in probes P-3 to P-6, P-9, P-11A, and P-11B at depths ranging between 2.5 and 16.5 feet beneath the ground surface. Based on the drilling action, weathered rock was encountered at higher depths.

2.4 Groundwater

Groundwater was encountered in borings B-1 to B-5, B-102, and B-104 at depths ranging between 6.0 feet and 20.0 feet beneath the ground surface, as shown in Table 1 and in the boring logs.

A groundwater observation well was installed by Soil X in boring B-2-OW. Below is a summary of the reading performed in March and July 2024.

Date	Groundwater Depth, (ft.)	Ground Surface El., (ft.)	Groundwater El., (ft)
3/22/2024	9.8	65	55.2
7/22/2024	14.5	65	50.5

The groundwater information reported herein is based on observations made during or shortly after the completion of drilling. Therefore, the reported groundwater levels may not represent the actual groundwater conditions, as additional time may be required for the groundwater levels to stabilize. The groundwater information presented in this report only represents the conditions encountered at the time and location of the explorations. Seasonal fluctuation should be anticipated.

2.5 Laboratory Test Data

LGCI submitted four (4) soil samples collected from the borings for grain-size analysis. The results of the grain-size analyses are provided in the test data sheets included in Appendix C and are summarized in the table below:

Grain-Size Analysis Test Results

Boring No.	Sample No.	Stratum	Sample Depth (ft.)	Percent Gravel	Percent Sand	Percent Fines
B-1	S2	Fill	2.0 – 4.0	53.5	38.5	8.0
B-4	S2	Subsoil	2.0 – 4.0	16.6	77.9	5.5
B-104	S2	Fill	2.0 – 4.0	28.6	57.4	14.0
B-105	S2	Fill	2.0 – 4.0	42.3	46.7	11.0

3. EVALUATION AND RECOMMENDATIONS

3.1 General

Based on our understanding of the proposed construction, our observation of our borings, and the results of our laboratory testing, there are a few issues that we would like to highlight for consideration and discussion.

3.1.1 Surficial Topsoil, Subsoil, and Existing Fill

- Surficial topsoil and subsoil were encountered in the borings. These materials are not suitable to support foundations.

- The topsoil should be removed from within the entire construction area, including the proposed building footprint and the proposed paved areas.

- The subsoil should be entirely removed from within the proposed building footprint. We anticipate that the removal will extend to depths of up to about 4 feet.

- The existing fill was observed to be variable in composition and density. In addition, the existing fill contained traces of organic soil and roots. Existing fill that was not placed with strict moisture, density, and gradation control presents risk of unpredictable settlement that may result in poor performance of floor slabs and foundations. Due to these risks, the existing fill should be entirely removed from within the proposed building's footprint and replaced with Structural Fill. We anticipate that the removal will extend up to depths of about 4 feet. The removal may extend to greater depths at locations not explored by LGCI. Laterally, the removal should extend beyond the proposed building's footprint a distance equal to the distance between the bottom of the proposed footings and the top of the natural sand and gravel, or 5 feet, whichever is greater.

- The subgrade of footings should be prepared in accordance with the recommendations in Section 4.1.

- Within paved areas, the existing fill and the subsoil should be removed to the top of the natural sand and gravel or to a depth of 18 inches beneath the bottom of the proposed pavement, whichever occurs first. Where organic soil is exposed, the organic soil should be removed. The exposed surface in the existing fill and subsoil deeper than 18 inches beneath the bottom of the proposed pavement can remain in place provided these materials are firm and unyielding following proofrolling as described in Section 4.1.

3.1.2 Shallow Footings and Slabs-on-Grade

Based on the results of the borings, the subsurface conditions are suitable to support shallow spread and continuous footings bearing on Structural Fill placed directly on top of the sand

and gravel layer after entirely removing the topsoil, the subsoil, and the existing fill. The proposed slabs may be designed as slabs-on-grade. Our recommendation for net allowable bearing capacity in the sand and gravel is presented in Section 3.2.1. Our recommendations for slabs-on-grade are presented in Section 3.3.1. Our recommendations for lateral pressures for the proposed basement walls and other retaining walls, if any, are presented in Section 3.5.1. Section 4.1 provides recommendations for preparation of subgrades.

3.1.3 Weathered Rock and Rock

Weathered rock was encountered in two (2) borings (B-3 and B-4) and the depth to the top of the weathered rock was 20 and 19 feet beneath the ground surface (i.e., El. 47 feet and El. 51 feet) respectively). The weathered rock may be higher than described in our boring. Also, based on the results of the probes, apparent rock was encountered at depths ranging between 2.5 and 16.5 feet beneath the ground surface. Based on the drilling action, we believe that the bottom several feet of the probes may be in weathered rock. The excavation for the proposed foundations and utilities may extend into weathered rock and sound rock. While the weathered rock was penetrated with the drilling equipment, it may not be locally excavatable with conventional earth moving equipment. Provisions should be made in the contract documents for rock removal.

3.1.4 Additional Explorations

We recommend engaging LGCI to perform additional explorations during the design development (DD) phase. The purpose of the additional explorations would be to obtain additional information about the depth to weathered rock and rock. We recommend one (1) day of borings with at least one (1) rock core, including one (1) groundwater observation well, and one (1) day of probes. We also recommend engaging LGCI to continue monitoring the monitoring the existing groundwater observation well.

3.2 Foundation Recommendations

3.2.1 Footing Design

- We recommend entirely removing the surficial topsoil, subsoil, and the existing fill from within the proposed building footprint as described in Section 3.1.1.

- We recommend supporting the proposed building on spread footings bearing on Structural Fill placed directly on the natural sand and gravel.

- We recommend designing the proposed footings using a net allowable bearing pressure of 5 kips per square foot (ksf). We recommend that the footings bear on a minimum of 12 inches of Structural Fill placed directly on top of the natural sand and gravel, on weathered rock, or on rock. The Structural Fill should extend at least 1 foot laterally beyond the limits of the footings.

- Footing subgrades should be prepared in accordance with the recommendations in Section 4.1.

- Foundations should be designed in accordance with The Commonwealth of Massachusetts State Building Code 780 CMR, Ninth Edition (MSBC 9th Edition).

- Exterior footings and footings in unheated areas should be placed at a minimum depth of 4 feet below the final exterior grade to provide adequate frost protection. Interior footings in heated areas may be designed and constructed at a minimum depth of 2 feet below finished floor grades.

- Wall footings should be designed and constructed with continuous, longitudinal steel reinforcement for greater bending strength to span across small areas of loose or soft soils that may go undetected during construction.

- A representative of LGCI should be engaged to observe that the subgrade has been prepared in accordance with our recommendations.

3.2.2 Settlement Estimates

Based on our experience with similar soils and designs using a net allowable bearing pressure of 5 ksf, we anticipate that the total settlement will be approximately 1 inch, and that the differential settlement of the footings will be 3/4 inch or less over a distance of 25 feet. We believe that total and differential settlements of this magnitude are tolerable for a similar structure. However, the tolerance of the proposed structure to the predicted total and differential settlements should be assessed by the structural engineer.

3.3 Concrete Slab Considerations

3.3.1 Slabs-on-Grade

- Floor slabs should be constructed as a slabs-on-grade bearing on a minimum of 12 inches of Structural Fill placed directly on top of the sand and gravel. The subgrade of the slabs should be prepared as described in Section 4.1.

- To reduce the potential for dampness in the proposed floor slab, the project architect may consider placing a vapor barrier beneath the floor slab. The vapor barrier should be protected from puncture during the placement of the proposed slab reinforcement.

- For the design of the floor slab bearing on the materials described above, we recommend using a modulus of subgrade reaction, k_{s1}, of 100 tons per cubic foot (tcf). Please note that the values of k_{s1} are for a 1 x 1 square foot area. These values should be adjusted for larger areas using the following expression:

$$Modulus\ of\ Subgrade\ \mathrm{Re}action\ (k_s) = k_{s1} * \left(\frac{B+1}{2B}\right)^2$$

where:

k_s = Coefficient of vertical subgrade reaction for loaded area;
k_{s1} = Coefficient of vertical subgrade reaction for a 1 x 1 square foot area; and
B = Width of area loaded, in feet.

Please note that cracking of slabs-on-grade can occur as a result of heaving or compression of the underlying soil, but also as a result of concrete curing stresses. To reduce the potential for cracking, the precautions listed below should be closely followed during the construction of all slabs-on-grade:

- Construction joints should be provided between the floor slab and the walls and columns in accordance with the American Concrete Institute (ACI) requirements, or other applicable code.

- The backfill in interior utility trenches should be properly compacted.

- In order for the movement of exterior slabs not to be transmitted to foundations or superstructures, exterior slabs, such as approach slabs and sidewalks, should be isolated from the superstructure.

3.3.2 Under-slab Drains and Waterproofing

Based on the FFEs listed in Section 1.4 and the groundwater levels described in Section 2.4, we do not believe that an under-slab drainage system is required. LGCI will update this recommendation if the FFE changes, and if needed, after additional groundwater levels are obtained from the groundwater observation wells.

The proposed elevator pit or other structure that extends beneath the FFE should be designed to be waterproof.

3.4 Seismic Design

Based on the SPT N-values from the borings, we estimate that the seismic criteria for the site are as follows:

- Site Class: C
- Spectral Response Acceleration at short period (Ss): 0.253g
- Spectral Response Acceleration at 1 sec. (S_1): 0.075g

- Site Coefficient Fa (Table 1613.5.3(1)): 1.2
- Site Coefficient Fv (Table 1613.5.3(2): 1.7
- Adjusted spectral response S_{MS}: 0.304g
- Adjusted spectral response S_{M1}: 0.128g

Based on the SPT data from the borings, the site soils are not susceptible to liquefaction.

3.5 Lateral Pressures for Wall Design

3.5.1 Lateral Earth Pressures

Lateral earth pressures for the design of below-grade walls, and site retaining walls, if any, are provided below.

Coefficient of Active Earth Pressure, K_A:	0.31
Coefficient of At-Rest Earth Pressure, K_o:	0.47
Coefficient of Passive Earth Pressure, K_p:	3.25
Total Unit Weight γ:	125 pcf

Note: The values in the table are based on a friction angle for the backfill of 32 degrees and neglecting friction between the backfill and the wall. The design active and passive coefficients are based on horizontal surfaces (non-sloping backfill) on both the active and passive sides, and on a vertical wall face.

- Exterior walls of below-ground spaces, and the retaining wall separating between the first and second floors, and other retaining walls braced at the top to restrain movement/rotation, should be designed using the "at-rest" pressure coefficient.

- We recommend placing free-draining material within the 3 feet immediately behind retaining walls.

- We recommend providing weep holes at the bottom of site retaining walls, including temporary SOE systems, to promote drainage where possible. Alternatively, a pipe should be placed at the base of the wall to collect the water. Groundwater collected by the wall drains should be discharged into a lower area if gravity flow is possible.

- Passive earth pressures should only be used at the toe of the wall where special measures or provisions are taken to prevent the disturbance or future removal of the soil on the passive side of the wall, or in areas where the wall design includes a key. In any case, the passive pressures should be neglected in the top 4 feet.

- Where a permanent vertical uniform load will be applied to the active side immediately adjacent to the wall, a horizontal surcharge load equal to half of the uniform vertical load should be applied over the height of the wall. At a minimum, a temporary lateral construction surcharge load of 100 pounds per square foot (psf) should be applied uniformly over the height of the wall.

- We recommend using an ultimate friction factor of 0.5 between the weathered rock and the bottom of the wall. Below-grade walls should be designed for minimum factors of safety of 1.5 for sliding and 2.0 for overturning.

3.5.2 Seismic Pressures

In accordance with the Massachusetts State Building Code, 9th Edition (MSBC 9th Edition), Section 1610, a lateral earthquake force equal to $0.100*(S_s)*(F_a)*\gamma*H^2$ should be included in the design of the walls (for horizontal backfill), where S_s is the maximum considered earthquake spectral response acceleration (defined in Section 3.4), F_a is the site coefficient (defined in Section 3.4), γ is the total unit weight of the soil backfill, and H is the height of the wall.

The earthquake force should be distributed as an inverted triangle over the height of the wall. In accordance with MSBC 9th Edition, Section 1610.2, a load factor of 1.43 should be applied to the earthquake force for wall strength design.

Temporary surcharges should not be included when designing for earthquake loads. Surcharge loads applied for extended periods of time should be included in the total static lateral soil pressure, and their earthquake lateral force should be computed and added to the force determined above.

3.5.3 Perimeter Drains

- We recommend that free-draining material be placed within 3 feet of the exterior of walls of below-ground spaces, including behind the retaining wall separating the two levels. To reduce the potential for dampness in below-ground spaces, proposed below-ground walls should be damp-proofed.

- We recommend that drains be provided behind the exterior of walls of below-ground spaces, including behind the retaining wall separating the two floors. The drains should consist of 4-inch perforated PVC pipes installed with the slots facing down. Perimeter drains should be installed at the bottom of the wall in 18 inches of crushed stone wrapped in a geotextile for separation and filtration.

- To the extent possible, groundwater collected by the wall drains should be discharged in a lower area if gravity flow is possible. In any case, the groundwater collected by the wall drains should be discharged in accordance with municipal, state, and other applicable standards.

3.6 Parking Lots, Driveways, and Sidewalks

3.6.1 General

The subsurface conditions encountered at the site are generally suitable to support the proposed driveways, parking lots, and sidewalks after preparation of the subgrade as described in Section 4.1.

- We recommend entirely removing the topsoil and subsoil from within the footprint of the proposed driveways and parking lots.

- The existing fill should be improved in accordance with the recommendations in Section 4.1.

- Cobbles and boulders should be removed to at least 18 inches below the bottom of the pavement.

3.6.2 Sidewalks

- Sidewalks should be placed on a minimum of 12 inches of Structural Fill with less than 5 percent fines.

- To reduce the potential for heave caused by surface water penetrating under the sidewalk, the joints between sidewalk concrete sections should be sealed with a waterproof compound. The sidewalks should be sloped away from the building or other vertical surfaces to promote flow of water. To the extent possible, roof leaders should not discharge onto sidewalk surfaces.

3.6.3 Pavement Sections

A typical, minimum, standard-duty pavement section that could be used for parking areas is as follows:

1.5" Asphalt "Top Course"
2.0" Asphalt "Base Course"
8" Processed Gravel for Sub-Base (MassDOT M1.03.1)

A typical, minimum, heavy-duty pavement section that could be used for areas of heavy truck traffic is as follows:

2.0" Asphalt "Top Course"
2.5" Asphalt "Base Course"
12" Processed Gravel for Sub-Base (MassDOT M1.03.1)

The pavement sections shown above represent minimum thicknesses representative of typical local construction practices for similar use. Periodic maintenance should be anticipated.

Pavement material types and construction procedures should conform to specifications of the "Standard Specifications for Highways and Bridges," prepared by the Commonwealth of Massachusetts Department of Transportation dated 2023.

Areas to receive relatively highly concentrated, sustained loads such as dumpsters, loading areas, and storage bins are typically installed over a rigid pavement section to distribute concentrated loads and reduce the possibility of high stress concentrations on the subgrade. Typical rigid pavement sections consist of 6 inches of concrete placed over a minimum of 12 inches of subbase material.

3.7 Underground Utilities

Boulders at the bottom of utility trenches should be removed to at least 12 inches below the pipe invert and the resulting excavation should be backfilled with suitable backfill. Utilities should be placed on suitable bedding material in accordance with the manufacturer's recommendations. "Cushion" material should be placed, by hand, above the utility pipe in maximum 6-inch lifts. The lift should be compacted by hand to avoid damage to the utility. Where the bedding/cushion material consists of crushed stone, it should be wrapped in a geotextile fabric.

Compaction of fill in utility trenches should be in accordance with our recommendations in Section 4.3. To reduce the potential for damage to utilities, placement and compaction of fill immediately above the utilities should be performed in accordance with the manufacturer's recommendations.

4. CONSTRUCTION CONSIDERATIONS

4.1 Subgrade Preparation

- Asphalt, topsoil, organic materials, existing fill, buried organic soil, buried subsoil, abandoned utilities, buried foundations, and other below-ground structures should be entirely removed from within the footprints of the proposed building and site structures, including site retaining walls, and exterior stairs, if any, before the start of foundation work.

- Tree stumps, root balls, and roots larger than ½ inch in diameter should be removed and the cavities filled with suitable material and compacted per Section 4.3 of this report.

- Cobbles and boulders should be removed at least 6 inches from beneath footings and 18 inches beneath the bottom of slabs and paved areas. The resulting excavations should be backfilled with compacted Structural Fill under the building and with Ordinary Fill under the subbase of paved areas.

- The bottom of the excavation resulting from the removal of the existing fill or natural soil should be compacted with a dynamic vibratory compactor imparting a minimum of 40 kips of force to the subgrade.

- The base of the footing excavations in granular soil should be compacted with a dynamic vibratory compactor weighing at least 200 pounds and imparting a minimum of 4 kips of force to the subgrade.

- After the surficial materials are removed to a depth of 18 inches within the proposed paved areas and walkways in accordance with the recommendations in Section 3.1, the exposed existing fill and subsoil deeper than 18 inches beneath the bottom of the proposed pavement should be improved by compacting the exposed surface with at least six (6) passes of a vibratory roller compactor imparting a dynamic effort of at least 40 kips. Where soft zones of soil are observed, the soft soil should be removed, and the grade should be restored using Ordinary Fill to the bottom of the proposed subbase layer. If pumping of the existing fill or subsoil deeper than 18 inches beneath the bottom of the proposed pavement is observed, the soft and/or pumping material should be removed and replaced.

- Fill placed within the footprint of the proposed buildings should meet the gradation and compaction requirements of Structural Fill, shown in Section 4.3.1.

- Fill placed under the subbase of paved areas should meet the gradation and compaction requirements of Ordinary Fill, shown in Section 4.3.2.

- Fill placed in the top 12 inches beneath sidewalks should consist of Structural Fill with less than 5 percent fines.

- Loose or soft soils identified during the compaction of the footing or floor slab subgrades should be excavated to a suitable bearing stratum, as determined by the representative of LGCI. Grades should be restored by backfilling with Structural Fill or crushed stone.

- When crushed stone is required in the drawings or is used for the convenience of the contractor, it should be wrapped in a geotextile fabric for separation except where introduction of the geotextile fabric promotes sliding. A geotextile fabric should not be placed between the bottoms of the footings and the crushed stone.

- An LGCI representative should observe the exposed subgrades prior to fill and concrete placement to verify that the exposed bearing materials are suitable for the design soil bearing pressure. If soft or loose pockets are encountered in the footing excavations, the soft or loose materials should be removed and the bottom of the footing should be placed at a lower elevation on firm soil, or the resulting excavation should be backfilled with Structural Fill, or crushed stone wrapped in a filter fabric.

4.2 Subgrade Protection

The onsite fill and natural soils are frost susceptible. If construction takes place during freezing weather, special measures should be taken to prevent the subgrade from freezing. Such measures should include the use of heat blankets or excavating the final 6 inches of soil just before pouring the concrete. Footings should be backfilled as soon as possible after footing construction. Soil used as backfill should be free of frozen material, as should the ground on which it is placed. Filling operations should be halted during freezing weather.

Materials with high fines contents are typically difficult to handle when wet, as they are sensitive to moisture content variations. Subgrade support capacities may deteriorate when such soils become wet and/or disturbed. The contractor should keep exposed subgrades properly drained and free of ponded water. Subgrades should be protected from machine and foot traffic to reduce disturbance.

4.3 Fill Materials

Structural Fill and Ordinary Fill should consist of inert, hard, durable sand and gravel free from organic matter, clay, surface coatings, and deleterious materials, and should conform to the gradation requirements shown below.

4.3.1 Structural Fill

The Structural Fill should have a plasticity index of less than 6 and should meet the gradation requirements shown below. Structural Fill should be compacted in maximum 9-inch loose lifts to at least 95 percent of the Modified Proctor maximum dry density (ASTM D1557), with moisture contents within ±2 percentage points of the optimum moisture content.

Sieve Size Percent	Passing by Weight
3 inches	100
1 ½ inch	80-100
½ inch	50-100
No. 4	30-85
No. 20	15-60
No. 60	5-35
No. 200*	0-10

* 0 – 5 for the top 12 inches under sidewalks, exterior slabs, pads, and walkways

4.3.2 Ordinary Fill

Ordinary Fill should have a plasticity index of less than 6 and should meet the gradation requirements shown below. Ordinary Fill should be compacted in maximum 9-inch loose lifts to at least 95 percent of the Modified Proctor maximum dry density (ASTM D1557), with moisture contents within ±2 percentage points of the optimum moisture content.

Sieve Size Percent	Passing by Weight
6 inches	100
1 inch	50-100
No. 4	20-100
No. 20	10-70
No. 60	5-45
No. 200	0-20

4.4 Reuse of Onsite Materials

Based on our field observations and the results of the grain-size analyses, the onsite fill, free of organic matter, and the natural sand and gravel may be used as Ordinary Fill.

The contractor should avoid mixing the reusable soils with fine-grained and/or organic soils. The soils to be reused should be excavated and stockpiled separately for compliance testing. Soils with 20 percent or greater fines contents are generally very sensitive to moisture content variations and are susceptible to frost. Such soils are very difficult to compact at moisture contents that are much higher or much lower than the optimum moisture content determined from the laboratory compaction test. Therefore, strict moisture control should be implemented during the compaction of onsite soils with fines contents of 20 percent or greater. The contractor should be prepared to remove and replace such soils if pumping occurs.

If needed, the onsite material could be blended with imported rock and processed in a crusher to produce fill meeting the gradation requirements of the materials in Section 4.3. Suitable imported material and amended/improved materials should be stockpiled separately from unimproved onsite soils.

Materials to be used as fill should first be tested for compliance with the applicable gradation specifications.

4.5 Groundwater Control Procedures

Based on the groundwater levels measured in our borings, we anticipate that groundwater control procedures will be needed during construction. We anticipate that filtered sump pumps installed in a series of sump pump pits located at least 3 feet below the bottom of planned excavations may be sufficient to handle groundwater and surface runoff that may enter the excavation during wet weather. The contractor should be prepared to use multiple sump pumps to maintain a dry excavation during the removal of the existing fill.

The contractor should be permitted to employ whatever commonly accepted means and practices are necessary to maintain the groundwater level below the bottom of the excavation and to maintain a dry excavation during wet weather. Groundwater levels should be maintained at a minimum of 1 foot below the bottom of the excavations during construction. The placement of reinforcing steel or concrete in standing water should not be permitted.

To reduce the potential for sinkholes developing over sump pump pits after the sump pumps are removed, the crushed stone placed in the sump pump pits should be wrapped in a geotextile fabric. Alternatively, the crushed stone should be entirely removed after the sump pump is no longer in use, and the sump pump pit should be restored with suitable backfill.

4.6 Temporary Excavations

All excavations to receive human traffic should be constructed in accordance with OSHA guidelines.

The site soils should generally be considered Type “C” and should have a maximum allowable slope of 1.5 Horizontal to 1 Vertical (1.5H:1V) for excavations less than 20 feet deep. Deeper excavations, if needed, should have shoring designed by a professional engineer.

The contractor is solely responsible for designing and constructing stable, temporary excavations and should shore, slope, or bench the sides of the excavations as required to maintain the stability of the excavation sides and bottom.

5. RECOMMENDATIONS FOR FUTURE WORK

We recommend engaging LGCI to perform the following services:

- Perform additional explorations during the DD phase.
- Prepare Earth Moving Specifications and review the geotechnical aspect of contract drawings.
- Review contractor submittals and Request for Information (RFIs);
- Provide a field representative during construction to observe the removal of the unsuitable soil, and to observe the subgrade of footings and slabs.

6. REPORT LIMITATIONS

Our analyses and recommendations are based on project information provided to us at the time of this report. If changes to the type, size, and location of the proposed structures or to the site grading are made, the recommendations contained in this report shall not be considered valid unless the changes are reviewed, and the conclusions and recommendations modified in writing by LGCI. LGCI cannot accept responsibility for designs based on our recommendations unless we are engaged to review the final plans and specifications to determine whether any changes in the project affect the validity of our recommendations, and whether our recommendations have been properly implemented in the design.

It is not part of our scope to perform a more detailed site history; therefore, we have not explored for or researched the locations of buried utilities or other structures in the area of the proposed construction. Our scope did not include environmental services or services related to moisture, mold, or other biological contaminants in or around the site.

The recommendations in this report are based in part on the data obtained from the subsurface explorations. The nature and extent of variations between explorations may not become evident until construction. If variations from anticipated conditions are encountered, it may be necessary to revise the recommendations in this report. We cannot accept responsibility for designs based on recommendations in this report unless we are engaged to 1) make site visits during construction to check that the subsurface conditions exposed during construction are in general conformance with our design assumptions and 2) ascertain that, in general, the work is being performed in compliance with the contract documents.

Our report has been prepared in accordance with generally accepted engineering practices and in accordance with the terms and conditions set forth in our agreement. No other warranty, expressed or implied, is made. This report has been prepared for the exclusive use of JCJ Architecture, PC for the proposed Cutler Elementary School in South Hamilton, Massachusetts as conceived at this time.

7. REFERENCES

In addition to the references included in the text of the report, we used the following references:

American Society of Civil Engineers, "Minimum Design Loads and Associated Criteria for Buildings and Other Structures," ASCE/SEI 7-16, 2017.

The Commonwealth of Massachusetts (2017), "The Massachusetts State Building Code, Ninth (9^{th}) Edition."

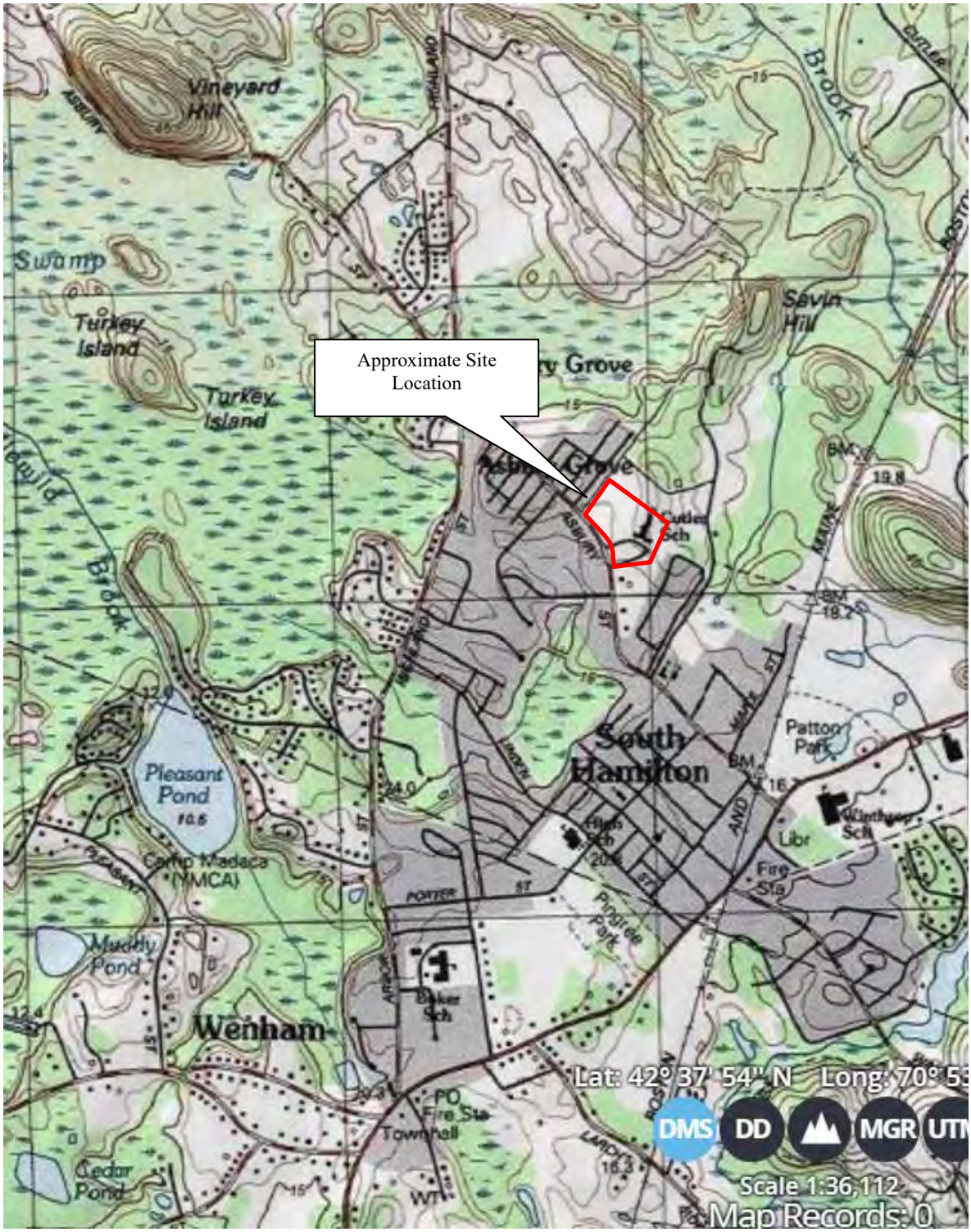
The Department of Labor, Occupational Safety and Health Administration (1989), "Occupational Safety and Health Standards - Excavations; Final Rule," 20 CFR Part 1926, Subpart P.

USGS South Hamilton, MA topographic map from http://mapserver.mytopo.com.

Table 1 - Summary of LGCI's Borings
Proposed Cutler Elementary School
South Hamilton, MA
LGCI Project No. 2353

Boring No.	Ground Surface Elevation (ft.)[1]	Groundwater[2] Depth / **El.** (ft.)	Bottom of Topsoil Depth / **El.** (ft.)	Bottom of Subsoil/**Fill** Depth / **El.** (ft.)	Bottom of Sand and Gravel Depth / **El.** (ft.)	Bottom of Silt Depth / **El.** (ft.)	Bottom of Weathered Rock Depth / **El.** (ft.)	Bottom of Boring Depth / **El.** (ft.)
March 2024 Borings								
B-1	69.0	16.0 / **53.0**	1.1 / **67.9**	**4.0** / **65.0**	25.0 / **44.0**	26.5 [3]/ **42.5**	- / **-**	26.5 / **42.5**
B-2-OW	65.0	12.0 / **53.0**	0.6 / **64.4**	2.0 / **63.0**	20.0 [4]/ **45.0**	22.0 [5]/ **43.0**	- / **-**	22.0 / **43.0**
B-3	67.0	12.0 / **55.0**	2.0 / **65.0**	- / **-**	20.0 [4]/ **47.0**	- / **-**	21.3 [6]/ **45.7**	21.3 / **45.7**
B-4	70.0	6.0 / **64.0**	1.0 / **69.0**	4.0 / **66.0**	10.7 / **59.3**	19.0 / **51.0**	20.7 [6]/ **49.3**	20.7 / **49.3**
B-5	79.0	19.0 / **60.0**	0.9 / **78.1**	4.0 / **75.0**	22.0 [7]/ **57.0**	- / **-**	- / **-**	22.0 / **57.0**
July 2024 Borings								
B-101	71.0	- / **-**	0.3 / **70.7**	2.0 / **69.0**	16.0 [8]/ **55.0**	- / **-**	- / **-**	16.0 / **55.0**
B-102	73.0	20.0 / **53.0**	0.5 / **72.5**	2.0 / **71.0**	22.0 [7]/ **51.0**	- / **-**	- / **-**	22.0 / **51.0**
B-103	78.0	- / **-**	2.0 / **76.0**	4.0 / **74.0**	17.0 [8]/ **61.0**	- / **-**	- / **-**	17.0 / **61.0**
B-104	67.0	15.0 / **52.0**	2.0 / **65.0**	**4.0** / **63.0**	18.0 [8]/ **49.0**	- / **-**	- / **-**	18.0 / **49.0**
B-105	68.0	- / **-**	2.0 / **66.0**	**4.0** / **64.0**	13.0 [8]/ **55.0**	- / **-**	- / **-**	13.0 / **55.0**

1. The ground surface elevation was interpolated to the nearest foot from drawing EX-1 titled: "Topographic Plan of Land, Cutler Elementary School, 237 Asbury Street, South Hamilton, MA," prepared by Samiotes Consultants, Inc., dated October 30, 2023, and provided to LGCI by JCJ Architecture, PC, via e-mail on February 26, 2024.
2. Groundwater was measured during drilling, at the end of drilling, after drilling, or based on sample moisture whichever is shallow
3. Boring terminated with refusal on rock at the bottom of the silt layer.
4. Silt layer encountered within sand and gravel layer between depths of 6.5 ft. to 12 ft. beneath the ground surface in boring B-2-OW and between depths of 8 ft. and 15 ft. beneath the ground surface in boring B-3.
5. Boring terminated in the silt layer.
6. Boring terminated in the weathered rock.
7. Boring terminated in the sand and gravel layer.
8. Boring terminated on refusal on possible rock at the bottom of the sand and gravel layer.



N

Contour Intervals: 3 meters

0.4 mi

Note: Figure based on USA Topo Maps of South Hamilton, MA *ngmdb.usgs.gov/topoview/viewer*

Client:	Project:	
JCJ Architecture, PC	Proposed Cutler Elementary School	Figure 1 – Site Location Map

LGCI Lahlaf Geotechnical Consulting, Inc.	Project Location: South Hamiliton, MA	LGCI Project No.: 2353	Date: Sept. 2024

N

Thin till—Nonsorted, nonstratified matrix of sand, some silt, and little clay containing scattered pebble, cobble, and boulder clasts; large surface boulders are common; unit was mapped where till is generally less than 10 to 15 ft thick including areas of shallow bedrock. Predominantly consists of upper till of the last glaciation; loose to moderately compact, generally sandy, commonly stony. Two facies are present in some places: a looser, coarser grained ablation facies, melted out from supraglacial position; and an underlying more compact, finer grained lodgement facies deposited subglacially. In general, both ablation and lodgement facies of upper till derived from fine-grained bedrock are finer grained, more compact, less stony and have fewer surface boulders than upper till derived from coarse-grained crystalline rocks. Across Massachusetts, fine-grained bedrock sources include the red Mesozoic sedimentary rocks of the Connecticut Valley lowland, marble in the western river valleys, and fine-grained schists in upland areas

Coarse deposits consist of *gravel deposits*, *sand and gravel deposits*, and *sand deposits*, not differentiated in this report. *Gravel deposits* are composed of at least 50 percent gravel-size clasts; cobbles and boulders predominate; minor amounts of sand occur within gravel beds, and sand comprises a few separate layers. Gravel layers generally are poorly sorted, and bedding commonly is distorted and faulted due to postdepositional collapse related to melting of ice. *Sand and gravel deposits* occur as mixtures of gravel and sand within individual layers and as layers of sand alternating with layers of gravel. Sand and gravel layers generally range between 25 and 50 percent gravel particles and between 50 and 75 percent sand particles. Layers are well sorted to poorly sorted; bedding may be distorted and faulted due to postdepositional collapse. *Sand deposits* are composed mainly of very coarse to fine sand, commonly in well-sorted layers. Coarser layers may contain up to 25 percent gravel particles, generally granules and pebbles; finer layers may contain some very fine sand, silt, and clay

Bedrock outcrops and areas of abundant outcrop or shallow bedrock—Solid color shows extent of individual bedrock outcrops; horizontal-line pattern indicates areas of shallow bedrock or areas where small outcrops are too numerous to map individually; in areas of shallow bedrock, surficial materials are less than 5 to 10 ft thick. These units were not mapped consistently among all quadrangles; see note at beginning of appendix 1 for information on bedrock outcrop mapping by quadrangle

Note: Figure based on map titled: “Surficial Materials Map of the Salem Quadrangle, Massachusetts,” prepared by Byron D. Stone, Janet R. Stone, and Mary DiGiacomo-Cohen, Scientific Investigation Map 3402, Quadrangle 136 – Salem, 2018.

Client:	Project	Figure 2 – Surficial Geologic Map	
JCJ Architecture, PC	Proposed Cutler Elementary School		
LGCI Lahlaf Geotechnical Consulting, Inc.	Project Location: South Hamiliton, MA	LGCI Project No.: 2353	Date: Sept. 2024

Legend

Approximate location of borings advanced by Soil X Corp. (Soil X) of Leominster, MA on March 7 and 8, 2024, and observed by Lahlaf Geotechnical Consulting, Inc. (LGCI).

Approximate location of rock probes advanced by Soil X on March 8, 2024, and observed LGCI.

Approximate location of borings advanced by Soil X Corp. (Soil X) of Leominster, MA on July 22, 2024, and observed by LGCI.

Note

Figure based on drawing EX-1 titled: "Topographic Plan of Land, Cutler Elementary School, 237 Asbury Street, South Hamilton, Massachusetts," prepared by Samiotes Consultants Inc., dated October 30, 2023, and provided to LGCI by JCJ Architecture, PC on February 26, 2024.

Client: JCJ Architecture, PC	Project: Proposed Cutler Elementary School	Figure 3 – Boring and Probe Location Plan	
LGCI Lahlaf Geotechnical Consulting, Inc.	Project Location: South Hamiliton, MA	LGCI Project No.: 2353	Date: Sept. 2024

Appendix A – LGCI's Boring Logs

LGCI
Lahlaf Geotechnical Consulting, Inc.
100 Chelmsford Rd Suite 2
Billerica, MA 01862
Telephone: 9783305912
Fax: 9783305056

BORING LOG

B-1

CLIENT: JCJ Architecture, PC
PROJECT NAME: Proposed Cutler Elementary School
LGCI PROJECT NUMBER: 2353
PROJECT LOCATION: South Hamilton, MA

DATE STARTED: 3/7/24 **DATE COMPLETED:** 3/7/24
BORING LOCATION: Near NW corner of site
COORDINATES: NA
SURFACE El.: 69 ft. (see note 1) **TOTAL DEPTH:** 26.5 ft.
WEATHER: 30's / Sunny
GROUNDWATER LEVELS:
DURING DRILLING: 20.0 ft. / El. 49.0 ft. Based on sample moisture
AT END OF DRILLING: 16.0 ft. / El. 53.0 ft.
OTHER: -

DRILLING SUBCONTRACTOR: Soil Exploration Corp.
DRILLING FOREMAN: Edwin Fajardo
DRILLING METHOD: Hollow Stem Auger (4-1/4" I.D.)
DRILL RIG TYPE/MODEL: Diedrich D-70 turbo
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: JKW **CHECKED BY:** SG

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		0	S1	1-2-2-7 (4)	24/16		Topsoil	1.1	S1 - Top 13": Topsoil
		2	S2	12-25-45-26/3" (70)	21/15		Fill	67.9	Bot. 3": Silty SAND (SM), fine to medium, 20-25% fines, 5-10% fine to coarse subrounded gravel, trace of organic soil, trace of roots, brown, moist S2 - Well Graded GRAVEL with Silt and Sand (GW-GM), fine to coarse, subangular, 5-10% fines, 35-40% fine to coarse sand, orange-brown, moist
	65.0	3.8						4.0	
5		4	S3	20-27-29-26 (56)	24/15		Sand and Gravel	65.0	S3 - Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 10-15% fines, 20-25% fine to coarse subangular gravel, orange-brown, moist
		6	S4	25-27-22-15 (49)	24/14				S4 - Silty SAND with Gravel (SM), fine to coarse, 20-25% fines, 30-35% fine to coarse subangular gravel, brown to orange, moist
	60.0	8							
10		10	S5	7-13-19-19 (32)	24/21				S5 - Silty SAND (SM), fine to medium, trace coarse, 30-35% fines, 0-5% fine subangular gravel, brown to orange, moist
		12							
	55.0								
15		15	S6	10-20-22-19 (42)	24/17				S6 - Silty SAND (SM), fine to coarse, 25-30% fines, 10-15% fine to coarse subangular gravel, brown, moist
		17				1			REMARK 1: HSA grinding on possible rock or boulder at depth of 18 feet.
	50.0								
20		20	S7	12-12-16-18 (28)	24/17				S7 - Silty SAND (SM), fine to coarse, 30-35% fines, 5-10% fine subangular gravel, brown, wet
		22				2			REMARK 2: HSA grinding on possible rock or boulder at depth of 23.5 feet.
	45.0								
25								25.0	

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing EX-1 titled: "Topographic Plan of Land, Cutler Elementary School, 237 Asbury Street, South Hamilton, MA," prepared by Samiotes Consultants, Inc., dated October 30, 2023, and provided to LGCI by JCJ Architecture, PC, via e-mail on Febuary 26, 2024.

LGCI
Lahlaf Geotechnical Consulting, Inc.
100 Chelmsford Rd Suite 2
Billerica, MA 01862
Telephone: 9783305912
Fax: 9783305056

BORING LOG

B-1

CLIENT: JCJ Architecture, PC
PROJECT NAME: Proposed Cutler Elementary School
LGCI PROJECT NUMBER: 2353
PROJECT LOCATION: South Hamilton, MA

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		25.3	S8	100/4"	4/4	3	Silt	44.0	S8 - Sandy SILT (ML), slightly plastic, 35-40% fine to coarse sand, 0-5% fine to coarse subangular gravel, brown to orange, wet
								26.5	REMARK 3: Split spoon refusal on possible rock at depth of 25.3 feet.
						4			REMARK 4: HSA refusal on rock at depth of 26.5 feet.
									Bottom of borehole at 26.5 feet. Backfilled borehole with drill cuttings.
	40.0								
30									
	35.0								
35									
	30.0								
40									
	25.0								
45									
	20.0								
50									
	15.0								
55									
	10.0								
60									

LGCI
Lahlaf Geotechnical Consulting, Inc.
100 Chelmsford Rd Suite 2
Billerica, MA 01862
Telephone: 9783305912
Fax: 9783305056

BORING LOG

B-2-OW
PAGE 1 OF 1

CLIENT: JCJ Architecture, PC
PROJECT NAME: Proposed Cutler Elementary School
LGCI PROJECT NUMBER: 2353
PROJECT LOCATION: South Hamilton, MA

DATE STARTED: 3/8/24 **DATE COMPLETED:** 3/8/24
BORING LOCATION: Near western side of site
COORDINATES: NA
SURFACE El.: 65 ft. (see note 1) **TOTAL DEPTH:** 22 ft.
WEATHER: 30's / Sunny
GROUNDWATER LEVELS:
DURING DRILLING: 14.0 ft. / El. 51.0 ft. Based on sample moisture
AT END OF DRILLING: 12.0 ft. / El. 53.0 ft.
OTHER: -

DRILLING SUBCONTRACTOR: Soil Exploration Corp.
DRILLING FOREMAN: Edwin Fajardo
DRILLING METHOD: Hollow Stem Auger (4-1/4" I.D.)
DRILL RIG TYPE/MODEL: Diedrich D-70 turbo
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: JKW **CHECKED BY:** SG

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		0					Topsoil	0.6	S1 - Top 7": Topsoil
			S1	1-3-11-14 (14)	24/11		Subsoil	64.4	Bot. 4": Silty SAND with Gravel (SM), fine to coarse, 20-25% fines, 15-20% fine to coarse subangular gravel, trace of organic soil, brown to orange, moist
		2						2.0	
			S2	16-16-16-11 (32)	24/12		Sand and Gravel	63.0	S2 - Well Graded SAND with Silt (SW-SM), fine to coarse, ~10% fines, ~10% fine to coarse subangular gravel, brown to orange, moist
		4							
5	60.0		S3	9-8-8-11 (16)	24/16				S3 - Well Graded SAND with Silt (SW-SM), fine to coarse, 10-15% fines, 5-10% fine subrounded gravel, light brown, moist
		6						6.5	S4 - Top 6": Well Graded SAND with Silt (SW-SM), fine to coarse, 10-15% fines, 5-10% fine subrounded gravel, light brown, moist
			S4	11-9-9-12 (18)	24/16		Silt	58.5	Bot. 10": SILT (ML), slightly to moderately plastic, 0-5% fine subrounded gravel, trace of organic soil, light brown, moist
		8							S5 - SILT (ML), slightly to moderately plastic, 0-5% fine subrounded gravel, trace of organic soil, light brown, moist
			S5	5-8-11-12 (19)	24/22				
10	55.0	10							S6 - SILT with Sand (ML), slightly to moderately plastic, ~15% fine to coarse sand, ~10% fine subrounded gravel, light brown, moist
			S6	4-6-10-18 (16)	24/23			12.0	
		12						53.0	
15	50.0						Sand and Gravel		S7 - Silty GRAVEL with Sand (GM), fine to coarse, subangular, ~20% fines, 30-35% fine to coarse sand, brown, wet
		15	S7	6-16-14-13 (30)	24/10				
		17							
20	45.0							20.0	
		20						45.0	S8 - Sandy SILT with Gravel (ML), slightly plastic, 20-25% fine to coarse sand, 20-25% fine to coarse subangular gravel, grey, wet
			S8	13-14-35-25 (49)	24/18		Silt		
		22						22.0	Bottom of borehole at 22.0 feet. Backfilled borehole with drill cuttings, sand, and bentonite. Groundwater observation well installed.
25	40.0								

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing EX-1 titled: "Topographic Plan of Land, Cutler Elementary School, 237 Asbury Street, South Hamilton, MA," prepared by Samiotes Consultants, Inc., dated October 30, 2023, and provided to LGCI by JCJ Architecture, PC, via e-mail on Febuary 26, 2024.

LGCI
Lahlaf Geotechnical Consulting, Inc.
100 Chelmsford Rd Suite 2
Billerica, MA 01862
Telephone: 9783305912
Fax: 9783305056

BORING LOG

B-3

CLIENT: JCJ Architecture, PC
PROJECT NAME: Proposed Cutler Elementary School
LGCI PROJECT NUMBER: 2353
PROJECT LOCATION: South Hamilton, MA

DATE STARTED: 3/8/24 **DATE COMPLETED:** 3/8/24
BORING LOCATION: West of existing school
COORDINATES: NA
SURFACE El.: 67 ft. (see note 1) **TOTAL DEPTH:** 21.3 ft.
WEATHER: 30's / Sunny
GROUNDWATER LEVELS:
DURING DRILLING: 12.0 ft. / El. 55.0 ft. Based on sample moisture
AT END OF DRILLING: 12.0 ft. / El. 55.0 ft.
OTHER: -

DRILLING SUBCONTRACTOR: Soil Exploration Corp.
DRILLING FOREMAN: Edwin Fajardo
DRILLING METHOD: Hollow Stem Auger (4-1/4" I.D.)
DRILL RIG TYPE/MODEL: Diedrich D-70 turbo
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: JKW **CHECKED BY:** SG

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		0							
	65.0	2	S1	2-2-2-2 (4)	24/14		Topsoil	2.0	S1 - Topsoil
			S2	5-15-19-15 (34)	24/9		Sand and Gravel	65.0	S2 - Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, ~10% fines, 15-20% fine to coarse subangular gravel, brown, moist
		4	S3	11-11-14-21 (25)	24/17				S3 - Well Graded SAND with Silt (SW-SM), fine to coarse, 5-10% fines, 5-10% fine subangular gravel, light brown, moist
5		6	S4	18-17-19-18 (36)	24/15				S4 - Silty SAND with Gravel (SM), fine to coarse, 15-20% fines, 15-20% fine to coarse subangular gravel, trace of weathered rock, light brown, moist
	60.0	8						8.0	
		10	S5	7-9-12-16 (21)	24/4		Silt	59.0	S5 - Gravelly SILT (ML), moderately plastic, 10-15% fine to coarse sand, 30-35% fine to coarse subangular gravel, light brown, wet
10	55.0	12							
15		15	S6	15-16-21-37 (37)	24/20		Sand and Gravel	15.0 52.0	S6 - Silty SAND (SM), fine to medium, trace coarse, ~25% slightly plastic fines, 5-10% fine subrounded gravel, trace of weathered rock, brown, wet
	50.0	17							
20		20	S7	39-34-30/4" (64/10")	16/11		Weathered Rock	20.0 47.0	S7 - Silty SAND with Gravel (SM), fine to medium, trace coarse, ~30% slightly plastic fines, ~15% fine to coarse subangular gravel, trace of weathered rock, brown, wet
		21.3						21.3	Bottom of borehole at 21.3 feet. Backfilled borehole with drill cuttings.
	45.0								
25									

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing EX-1 titled: "Topographic Plan of Land, Cutler Elementary School, 237 Asbury Street, South Hamilton, MA," prepared by Samiotes Consultants, Inc., dated October 30, 2023, and provided to LGCI by JCJ Architecture, PC, via e-mail on Febuary 26, 2024.

LGCI
Lahlaf Geotechnical Consulting, Inc.
100 Chelmsford Rd Suite 2
Billerica, MA 01862
Telephone: 9783305912
Fax: 9783305056

BORING LOG

CLIENT: JCJ Architecture, PC
PROJECT NAME: Proposed Cutler Elementary School
LGCI PROJECT NUMBER: 2353
PROJECT LOCATION: South Hamilton, MA

DATE STARTED: 3/8/24 **DATE COMPLETED:** 3/8/24
BORING LOCATION: NW of exisitng school
COORDINATES: NA
SURFACE El.: 70 ft. (see note 1) **TOTAL DEPTH:** 20.7 ft.
WEATHER: 30's / Sunny
GROUNDWATER LEVELS:
DURING DRILLING: 6.0 ft. / El. 64.0 ft. Based on sample moisture
AT END OF DRILLING: 12.0 ft. / El. 58.0 ft.
OTHER: -

DRILLING SUBCONTRACTOR: Soil Exploration Corp.
DRILLING FOREMAN: Edwin Fajardo
DRILLING METHOD: Hollow Stem Auger (4-1/4" I.D.)
DRILL RIG TYPE/MODEL: Diedrich D-70 turbo
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: JKW **CHECKED BY:** SG

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		0	S1	1-2-2-2 (4)	24/19		Topsoil	1.0	S1 - Top 12": Topsoil
		2	S2	6-8-9-13 (17)	24/14		Subsoil	69.0	Bot. 7": Silty SAND (SM), fine to medium, 35-40% fines, trace of organic soil, trace of roots, orange to dark brown, moist S2 - Poorly Graded SAND with Silt and Gravel (SP-SM), mostly medium, 5-10% fines, 15-20% fine subangular gravel, orange-brown, moist
		4						4.0	
5	65.0		S3	16-21-17-13 (38)	24/8		Sand and Gravel	66.0	S3 - Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 10-15% fines, 35-40% fine to coarse subangular gravel, light brown to grey, moist
		6	S4	8-8-9-9 (17)	24/20				S4 - Poorly Graded SAND with Silt (SP-SM), fine to medium, 10-15% fines, 0-5% fine subrounded gravel, brown, wet
		8							
10	60.0								
		10	S5	6-6-7-9 (13)	24/24			10.7	S5 - Top 8": Poorly Graded SAND with Silt (SP-SM), fine to medium, 10-15% fines, 0-5% fine subrounded gravel, brown, wet
		12						59.3	Bot. 16": SILT (ML), moderately plastic, 0-5% fine sand, light brown, wet
						1			REMARK 1: HSA grinding and possible strata change at depth of 14 feet.
15	55.0						Silt		
		15	S6	26-44-50/5" (94/11")	17/14				S6 - SILT with Gravel (ML), slightly plastic, ~15% fine subangular gravel, trace of weathered rock, light brown, wet
		16.4							
								19.0	
						2		51.0	REMARK 2: HSA grinding and drill cuttings are saturated with water at depth of 19 feet.
20	50.0						Weathered Rock		
		20	S7	18-82/2" (82/2")	8/9				S7 - Sandy SILT with Gravel (ML), moderately plastic, ~30% fine to coarse sand, ~15% fine subangular gravel, light brown, wet (possible weathered rock)
		20.7						20.7	Bottom of borehole at 20.7 feet. Backfilled borehole with drill cuttings.
25	45.0								

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing EX-1 titled: "Topographic Plan of Land, Cutler Elementary School, 237 Asbury Street, South Hamilton, MA," prepared by Samiotes Consultants, Inc., dated October 30, 2023, and provided to LGCI by JCJ Architecture, PC, via e-mail on Febuary 26, 2024.

LGCI Lahlaf Geotechnical Consulting, Inc.
100 Chelmsford Rd Suite 2
Billerica, MA 01862
Telephone: 9783305912
Fax: 9783305056

BORING LOG

B-5

CLIENT: JCJ Architecture, PC
PROJECT NAME: Proposed Cutler Elementary School
LGCI PROJECT NUMBER: 2353
PROJECT LOCATION: South Hamilton, MA

DATE STARTED: 3/8/24 **DATE COMPLETED:** 3/8/24
BORING LOCATION: NW of existing school
COORDINATES: NA
SURFACE El.: 79 ft. (see note 1) **TOTAL DEPTH:** 22 ft.
WEATHER: 30's / Sunny
GROUNDWATER LEVELS:
DURING DRILLING: 20.0 ft. / El. 59.0 ft. Based on sample moisture
AT END OF DRILLING: 19.0 ft. / El. 60.0 ft.
OTHER: -

DRILLING SUBCONTRACTOR: Soil Exploration Corp.
DRILLING FOREMAN: Edwin Fajardo
DRILLING METHOD: Hollow Stem Auger (4-1/4" I.D.)
DRILL RIG TYPE/MODEL: Diedrich D-70 turbo
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: JKW **CHECKED BY:** SG

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		0	S1	1-2-3-4 (5)	24/16		Topsoil	0.9	S1 - Top 11": Topsoil
		2	S2	4-4-4-5 (8)	24/20		Subsoil	78.1	Bot. 5": SILT (ML), slightly plastic, 5-10% fine to medium sand, trace of roots, light brown, moist
	75.0	4						4.0	S2 - SILT (ML), slightly plastic, ~5% fine to coarse sand, trace of weathered rock, light brown, moist
5			S3	5-6-8-9 (14)	24/22			75.0	S3 - Silty SAND (SM), fine to medium, 20-25% fines, 0-5% fine subrounded gravel, brown, moist
		6	S4	8-8-9-6 (17)	24/22				S4 - SILT with Sand (ML), slightly to moderately plastic, 15-20% fine to medium sand, light brown, moist
	70.0	8							
10		10	S5	6-14-12-14 (26)	24/23		Sand and Gravel		S5 - Silty SAND with Gravel (SM), fine to coarse, 35-40% slightly plastic fines, 15-20% fine to coarse subangular gravel, trace of weathered rock, light brown, moist
		12							
		13	S6	7-16-22-26 (38)	24/14				S6 - Silty SAND with Gravel (SM), fine to coarse, 35-40% slightly plastic fines, 15-20% fine to coarse subangular gravel, trace of weathered rock, light brown, moist
15	65.0	15							
						1			REMARK 1: HSA grinding at depth of 19 feet.
	60.0								
20		20	S7	12-20-36-26 (56)	24/15				S7 - Silty SAND with Gravel (SM), fine to coarse, 35-40% slightly plastic fines, 20-25% fine to coarse subangular gravel, trace of weathered rock, light brown, moist
		22						22.0	
	55.0								Bottom of borehole at 22.0 feet. Backfilled borehole with drill cuttings.
25									

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing EX-1 titled: "Topographic Plan of Land, Cutler Elementary School, 237 Asbury Street, South Hamilton, MA," prepared by Samiotes Consultants, Inc., dated October 30, 2023, and provided to LGCI by JCJ Architecture, PC, via e-mail on Febuary 26, 2024.

LGCI Lahlaf Geotechnical Consulting, Inc.
100 Chelmsford Rd Suite 2
Billerica, MA 01862
Telephone: 9783305912
Fax: 9783305056

BORING LOG

B-101
PAGE 1 OF 1

CLIENT: JCJ Architecture, PC
PROJECT NAME: Proposed Cutler Elementary School
LGCI PROJECT NUMBER: 2353
PROJECT LOCATION: South Hamilton, MA

DATE STARTED: 7/22/24 **DATE COMPLETED:** 7/22/24
BORING LOCATION: SW of existing playground
COORDINATES: NA
SURFACE El.: 71 ft. (see note 1) **TOTAL DEPTH:** 16 ft.
WEATHER: 80's / Sunny
GROUNDWATER LEVELS:
DURING DRILLING: Not encountered
AT END OF DRILLING: Not encountered
OTHER: -

DRILLING SUBCONTRACTOR: Soil Exploration Corp.
DRILLING FOREMAN: Don Ledger
DRILLING METHOD: Hollow Stem Auger (4-1/4" I.D.)
DRILL RIG TYPE/MODEL: CME 750X
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: MBH **CHECKED BY:** EP

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
	70.0	0	S1	3-5-7-6 (12)	24/5		Topsoil / Subsoil	0.3 / 70.7	S1 - Top 4": Topsoil Bot. 1": Poorly Graded SAND with Silt (SP-SM), fine, 10-15% fines, brown to orange, moist
		2	S2	9-13-14-12 (27)	24/4			2.0 / 69.0	S2 - Poorly Graded SAND with Silt and Gravel (SP-SM), fine to coarse, ~10% fines, 15-20% fine to coarse subangular gravel, trace of roots, brown, moist
5		4	S3	4-6-8-10 (14)	24/18				S3 - Silty SAND (SM), mostly fine, 30-35% fines, brown, moist
	65.0	6	S4	20-20-20-18 (40)	24/18				S4 - Similar to S3, fine to medium, trace of roots
		8					Sand and Gravel		
10		10	S5	22-27-33-33 (60)	24/8				S5 - Well-Graded SAND with Silt (SW-SM), fine to coarse, 10-15% fines, 5-10% fine to coarse subangular gravel, brown, moist
	60.0	12				1			REMARK 1: Drill rig chattering at depth of 13 feet on possible boulder.
15		15 / 15.2	S6	100/2"	2/0				S6 - No Recovery
	55.0					2		16.0	REMARK 2: HSA refusal at depth of 16 feet on possible boulder or rock. Bottom of borehole at 16.0 feet. Backfilled borehole with drill cuttings.
20									
	50.0								
25									

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing EX-1 titled: "Topographic Plan of Land, Cutler Elementary School, 237 Asbury Street, South Hamilton, MA," prepared by Samiotes Consultants, Inc., dated October 30, 2023, and provided to LGCI by JCJ Architecture, PC, via e-mail on Febuary 26, 2024.

LGCI
Lahlaf Geotechnical Consulting, Inc.
100 Chelmsford Rd Suite 2
Billerica, MA 01862
Telephone: 9783305912
Fax: 9783305056

BORING LOG

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PAGE 1 OF 1

CLIENT: JCJ Architecture, PC
PROJECT NAME: Proposed Cutler Elementary School
LGCI PROJECT NUMBER: 2353
PROJECT LOCATION: South Hamilton, MA

DATE STARTED: 7/22/24 **DATE COMPLETED:** 7/22/24
BORING LOCATION: North of existing playground
COORDINATES: NA
SURFACE El.: 73 ft. (see note 1) **TOTAL DEPTH:** 22 ft.
WEATHER: 80's / Sunny
GROUNDWATER LEVELS:
DURING DRILLING: 20.0 ft. / El. 53.0 ft. Based on sample moisture
AT END OF DRILLING: Not encountered
OTHER: -

DRILLING SUBCONTRACTOR: Soil Exploration Corp.
DRILLING FOREMAN: Don Ledger
DRILLING METHOD: Hollow Stem Auger (4-1/4" I.D.)
DRILL RIG TYPE/MODEL: Diedrich D-70 turbo
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: MBH **CHECKED BY:** EP

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		0	S1	3-5-7-10 (12)	24/15		Topsoil	0.5 / 72.5	S1 - Top 6": Topsoil
							Subsoil	2.0 / 71.0	Bot. 9": Poorly Graded SAND with Silt (SP-SM), fine to medium, 10-15% fines, brown, moist
	70.0	2	S2	13-13-12-13 (25)	24/12				S2 - Silty SAND (SM), mostly fine, 30-35% fines, 0-5% fine subangular gravel, brown, moist
5		4	S3	10-12-16-20 (28)	24/15				S3 - Silty SAND (SM), fine, 15-20% fines, light brown, moist
		6	S4	25-15-26-24 (41)	24/19				S4 - Similar to S3
	65.0	8							
10		10	S5	8-8-10-11 (18)	24/24		Sand and Gravel		S5 - Silty SAND (SM), fine to medium, 25-30% fines, brown, moist
		12							
	60.0								
15		15	S6	14-24-26-32 (50)	24/24				S6 - Similar to S5, 5-10% fine to coarse subangular gravel
		17							
	55.0								
20		20	S7	10-36-32-40 (68)	24/8				▽ S7 - Silty SAND (SM), fine to medium, trace coarse, 30-35% fines, ~10% fine to coarse subangular gravel, brown, wet
		22						22.0	
	50.0								Bottom of borehole at 22.0 feet. Backfilled borehole with drill cuttings.
25									

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing EX-1 titled: "Topographic Plan of Land, Cutler Elementary School, 237 Asbury Street, South Hamilton, MA," prepared by Samiotes Consultants, Inc., dated October 30, 2023, and provided to LGCI by JCJ Architecture, PC, via e-mail on Febuary 26, 2024.

LGCI
Lahlaf Geotechnical Consulting, Inc.
100 Chelmsford Rd Suite 2
Billerica, MA 01862
Telephone: 9783305912
Fax: 9783305056

BORING LOG

B-103
PAGE 1 OF 1

CLIENT: JCJ Architecture, PC
PROJECT NAME: Proposed Cutler Elementary School
LGCI PROJECT NUMBER: 2353
PROJECT LOCATION: South Hamilton, MA

DATE STARTED: 7/22/24 **DATE COMPLETED:** 7/22/24
BORING LOCATION: West of existing school
COORDINATES: NA
SURFACE El.: 78 ft. (see note 1) **TOTAL DEPTH:** 17 ft.
WEATHER: 80's / Sunny
GROUNDWATER LEVELS:
DURING DRILLING: Not encountered
AT END OF DRILLING: Not encountered
OTHER: -

DRILLING SUBCONTRACTOR: Soil Exploration Corp.
DRILLING FOREMAN: Don Ledger
DRILLING METHOD: Hollow Stem Auger (4-1/4" I.D.)
DRILL RIG TYPE/MODEL: Diedrich D-70 turbo
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: MBH **CHECKED BY:** EP

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		0	S1	3-4-5-6 (9)	24/10		Topsoil	2.0	S1 - Topsoil
	75.0	2	S2	2-2-3-3 (5)	24/10		Subsoil	76.0 4.0	S2 - Poorly Graded SAND with Silt (SP-SM), fine, 10-15% fines, trace of organic soil, orange, moist
5		4	S3	9-8-8-10 (16)	24/18			74.0	S3 - Silty SAND (SM), fine, 25-30% fines, brown to orange, moist
		6	S4	11-14-15-30 (29)	24/18				S4 - Poorly Graded SAND with Silt (SP-SM), fine to medium, ~10% fines, brown, moist
	70.0	8							
10		10	S5	19-32-60-45/2" (92)	20/18		Sand and Gravel		S5 - Poorly Graded SAND with Silt and Gravel (SP-SM), fine to medium, 10-15% fines, ~20% fine to coarse subangular gravel, brown, moist
		11.7							
	65.0								
15		15	S6	25-80/5" (80/5")	11/5	1			S6 - Well-Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 10-15% fines, 25-30% fine to coarse subangular gravel, light brown to orange, moist REMARK 1: Drill rig chattering at depth of 16 feet on possible boulder.
		15.9				2		17.0	REMARK 2: HSA refusal at depth of 17 feet on possible boulder or rock. Bottom of borehole at 17.0 feet. Backfilled borehole with drill cuttings.
	60.0								
20									
	55.0								
25									

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing EX-1 titled: "Topographic Plan of Land, Cutler Elementary School, 237 Asbury Street, South Hamilton, MA," prepared by Samiotes Consultants, Inc., dated October 30, 2023, and provided to LGCI by JCJ Architecture, PC, via e-mail on Febuary 26, 2024.

LGCI
Lahlaf Geotechnical Consulting, Inc.
100 Chelmsford Rd Suite 2
Billerica, MA 01862
Telephone: 9783305912
Fax: 9783305056

BORING LOG

B-104
PAGE 1 OF 1

CLIENT: JCJ Architecture, PC
PROJECT NAME: Proposed Cutler Elementary School
LGCI PROJECT NUMBER: 2353
PROJECT LOCATION: South Hamilton, MA

DATE STARTED: 7/22/24 **DATE COMPLETED:** 7/22/24
BORING LOCATION: West of exisitng parking lot
COORDINATES: NA
SURFACE El.: 67 ft. (see note 1) **TOTAL DEPTH:** 18 ft.
WEATHER: 80's / Sunny
GROUNDWATER LEVELS:
DURING DRILLING: 15.0 ft. / El. 52.0 ft. Based on sample moisture
AT END OF DRILLING: 17.0 ft. / El. 50.0 ft.
OTHER: -

DRILLING SUBCONTRACTOR: Soil Exploration Corp.
DRILLING FOREMAN: Don Ledger
DRILLING METHOD: Hollow Stem Auger (4-1/4" I.D.)
DRILL RIG TYPE/MODEL: Diedrich D-70 turbo
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: MBH **CHECKED BY:** EP

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		0							
	65.0	2	S1	6-7-9-8 (16)	24/2		Topsoil	2.0	S1 - Topsoil
			S2	14-12-13-14 (25)	24/10		Fill	65.0	S2 - Well-Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 10-15% fines, 25-30% fine subangular gravel, brown, moist (possibly reworked)
		4						4.0	
5			S3	6-7-5-6 (12)	24/11			63.0	S3 - Silty SAND (SM), fine to medium, trace coarse, 25-30% fines, 0-5% fine subangular gravel, brown, moist
		6	S4	9-10-13-14 (23)	24/24				S4 - Similar to S3, no gravel
	60.0	8							
10		10	S5	6-5-8-9 (13)	24/13		Sand and Gravel		S5 - Well Graded SAND with Silt (SW-SM), fine to coarse, 10-15% fines, 10-15% fine to coarse subangular gravel, brown, moist
	55.0	12				1			REMARK 1: Drill rig chattering at depth of 14 feet on possible boulder.
15		15	S6	21-38-72/5" (110/11")	17/11				S6 - Well-Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 10-15% fines, 20-25% fine to coarse subangular gravel, brown, wet
	50.0	16.4							
						2		18.0	REMARK 2: HSA refusal at depth of 18 feet on possible boulder or rock. Bottom of borehole at 18.0 feet. Backfilled borehole with drill cuttings.
20									
	45.0								
25									

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing EX-1 titled: "Topographic Plan of Land, Cutler Elementary School, 237 Asbury Street, South Hamilton, MA," prepared by Samiotes Consultants, Inc., dated October 30, 2023, and provided to LGCI by JCJ Architecture, PC, via e-mail on Febuary 26, 2024.

LGCI
Lahlaf Geotechnical Consulting, Inc.
100 Chelmsford Rd Suite 2
Billerica, MA 01862
Telephone: 9783305912
Fax: 9783305056

BORING LOG

B-105
PAGE 1 OF 1

CLIENT: JCJ Architecture, PC
PROJECT NAME: Proposed Cutler Elementary School
LGCI PROJECT NUMBER: 2353
PROJECT LOCATION: South Hamilton, MA

DATE STARTED: 7/22/24 **DATE COMPLETED:** 7/22/24
BORING LOCATION: SW of existing school
COORDINATES: NA
SURFACE El.: 68 ft. (see note 1) **TOTAL DEPTH:** 13 ft.
WEATHER: 80's / Sunny
GROUNDWATER LEVELS:
DURING DRILLING: Not encountered
AT END OF DRILLING: Not encountered
OTHER: -

DRILLING SUBCONTRACTOR: Soil Exploration Corp.
DRILLING FOREMAN: Don Ledger
DRILLING METHOD: Hollow Stem Auger (4-1/4" I.D.)
DRILL RIG TYPE/MODEL: Diedrich D-70 turbo
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: MBH **CHECKED BY:** EP

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		0	S1	4-4-7-7 (11)	24/3		Topsoil	2.0	S1 - Topsoil
	65.0	2	S2	5-8-16-23 (24)	24/7		Fill	66.0 4.0	S2 - Well-Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 10-15% fines, 40-45% fine subangular gravel, brown, moist (possibly reworked)
5		4	S3	17-36-39-25 (75)	24/12		Sand and Gravel	64.0	S3 - Well-Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 5-10% fines, 20-25% fine to coarse subangular gravel, brown, moist
		6	S4	17-19-34-37 (53)	24/13				S4 - Silty SAND (SM), fine to medium, ~15% fines, 5-10% fine to coarse subangular gravel, brown, moist
	60.0	8							
10		10	S5	9-100/4" (100/4")	10/1				S5 - Silty SAND with Gravel (SM), fine to medium, ~15% fines, 15-20% fine to coarse subangular gravel, brown, moist
		10.8							
	55.0					1		13.0	REMARK 1: HSA refusal at depth of 13 feet on possible boulder or rock. Bottom of borehole at 13.0 feet. Backfilled borehole with drill cuttings.
15									
	50.0								
20									
	45.0								
25									

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing EX-1 titled: "Topographic Plan of Land, Cutler Elementary School, 237 Asbury Street, South Hamilton, MA," prepared by Samiotes Consultants, Inc., dated October 30, 2023, and provided to LGCI by JCJ Architecture, PC, via e-mail on Febuary 26, 2024.

Appendix B – LGCI's Rock Probe Logs

LGCI
Lahlaf Geotechnical Consulting, Inc.

PROBE LOG

CLIENT: JCJ Architecture
PROJECT NAME: Proposed Cutler Elementary School
LGCI PROJECT NUMBER: 2353
PROJECT LOCATION: South Hamilton, MA

DATE STARTED: 3/8/24 **DATE COMPLETED:** 3/8/24
BORING LOCATION: West of existing playground
COORDINATES: NA
SURFACE El.: 72 ft. (see note 1) **TOTAL DEPTH:** 20 ft.
WEATHER: 30's
GROUNDWATER LEVELS:
DURING DRILLING: -
AT END OF DRILLING: Not Encountered
OTHER: -

DRILLING SUBCONTRACTOR: Soil Exploration Corp.
DRILLING FOREMAN: Edwin Fajardo
DRILLING METHOD: 3.5-inch Solid Stem Auger
DRILL RIG TYPE/MODEL: Diedrich D-70 turbo
HAMMER TYPE: NA
HAMMER WEIGHT: NA **HAMMER DROP:** NA
GEOPROBE CASING DIA.: NA
GEOPROBE LINER DIA.: NA
LOGGED BY: JKW **CHECKED BY:**

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
								Boring advanced as a rock probe without sampling.
					1			REMARK 1: Augering Effort from Depth of 1 ft to 5 ft: Easy
	70.0							
5					2			REMARK 2: Augering Effort from Depth of 5 ft to 12 ft: Medium
	65.0							
10								
	60.0				3			REMARK 3: Augering Effort from Depth of 12 ft to 14 ft: Medium/Difficult
					4			REMARK 4: Augering Effort from Depth of 14 ft to 16 ft: Difficult (SSA grinding from depths of 15 ft to 16 ft)
15					5			REMARK 5: Augering Effort from Depth of 16 ft to 20 ft: Medium/Difficult
	55.0							
20							20.0	
								Bottom of borehole at 20.0 feet. Backfilled borehole with drill cuttings.
	50.0							
25								

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing EX-1 titled: "Topographic Plan of Land, Cutler Elementary School, 237 Asbury Street, South Hamilton, MA," prepared by Samiotes Consultants, Inc., dated October 30, 2023, and provided to LGCI by JCJ Architecture, PC, via e-mail on Febuary 26, 2024.

LGCI
Lahlaf Geotechnical Consulting, Inc.

PROBE LOG

CLIENT: JCJ Architecture
PROJECT NAME: Proposed Cutler Elementary School
LGCI PROJECT NUMBER: 2353
PROJECT LOCATION: South Hamilton, MA

DATE STARTED: 3/8/24 **DATE COMPLETED:** 3/8/24
BORING LOCATION: West of existing playground
COORDINATES: NA
SURFACE El.: 72 ft. (see note 1) **TOTAL DEPTH:** 20 ft.
WEATHER: 30's
GROUNDWATER LEVELS:
DURING DRILLING: -
AT END OF DRILLING: Not Encountered
OTHER: -

DRILLING SUBCONTRACTOR: Soil Exploration Corp.
DRILLING FOREMAN: Edwin Fajardo
DRILLING METHOD: 3.5-inch Solid Stem Auger
DRILL RIG TYPE/MODEL: Diedrich D-70 turbo
HAMMER TYPE: NA
HAMMER WEIGHT: NA **HAMMER DROP:** NA
GEOPROBE CASING DIA.: NA
GEOPROBE LINER DIA.: NA
LOGGED BY: JKW **CHECKED BY:**

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
								Boring advanced as a rock probe without sampling.
					1			REMARK 1: Augering Effort from Depth of 1 ft to 10 ft: Easy
	70.0							
5								
	65.0							
10								
					2			REMARK 2: Augering Effort from Depth of 10 ft to 13 ft: Medium
	60.0							
					3			REMARK 3: Augering Effort from Depth of 13 ft to 20 ft: Medium/Difficult (no refusal encountered)
15								
	55.0							
20							20.0	
								Bottom of borehole at 20.0 feet. Backfilled borehole with drill cuttings.
	50.0							
25								

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing EX-1 titled: "Topographic Plan of Land, Cutler Elementary School, 237 Asbury Street, South Hamilton, MA," prepared by Samiotes Consultants, Inc., dated October 30, 2023, and provided to LGCI by JCJ Architecture, PC, via e-mail on Febuary 26, 2024.

LGCI
Lahlaf Geotechnical Consulting, Inc.

PROBE LOG

CLIENT: JCJ Architecture
PROJECT NAME: Proposed Cutler Elementary School
LGCI PROJECT NUMBER: 2353
PROJECT LOCATION: South Hamilton, MA

DATE STARTED: 3/8/24 **DATE COMPLETED:** 3/8/24
BORING LOCATION: East of existing school
COORDINATES: NA
SURFACE El.: 83 ft. (see note 1) **TOTAL DEPTH:** 12 ft.
WEATHER: 30's
GROUNDWATER LEVELS:
DURING DRILLING: -
AT END OF DRILLING: Not Encountered
OTHER: -

DRILLING SUBCONTRACTOR: Soil Exploration Corp.
DRILLING FOREMAN: Edwin Fajardo
DRILLING METHOD: 3.5-inch Solid Stem Auger
DRILL RIG TYPE/MODEL: Diedrich D-70 turbo
HAMMER TYPE: NA
HAMMER WEIGHT: NA **HAMMER DROP:** NA
GEOPROBE CASING DIA.: NA
GEOPROBE LINER DIA.: NA
LOGGED BY: JKW **CHECKED BY:**

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Pen./Rec. (in.)	Remark	Strata Depth El.(ft.)	Material Description
							Boring advanced as a rock probe without sampling.
					1		REMARK 1: Augering Effort from Depth of 1 ft to 2 ft: Easy
					2		REMARK 2: Augering Effort from Depth of 2 ft to 3 ft: Medium (slight SSA grinding on possible cobbles at depth of 3 ft)
	80.0				3		REMARK 3: Augering Effort from Depth of 3 ft to 6 ft: Easy
5							
					4		REMARK 4: Augering Effort from Depth of 6 ft to 7 ft: Medium/Difficult
					5		REMARK 5: Augering Effort from Depth of 7 ft to 8 ft: Difficult
	75.0				6		REMARK 6: Augering Effort from Depth of 8 ft to 10 ft: Medium/Difficult
10					7		REMARK 7: Augering Effort from Depth of 10 ft to 12 ft: Very Difficult (SSA refusal on possible rock at depth of 12 ft)
						12.0	
	70.0						Bottom of borehole at 12.0 feet. Backfilled borehole with drill cuttings.
15							
	65.0						
20							
	60.0						
25							

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing EX-1 titled: "Topographic Plan of Land, Cutler Elementary School, 237 Asbury Street, South Hamilton, MA," prepared by Samiotes Consultants, Inc., dated October 30, 2023, and provided to LGCI by JCJ Architecture, PC, via e-mail on Febuary 26, 2024.

LGCI
Lahlaf Geotechnical Consulting, Inc.

PROBE LOG

CLIENT: JCJ Architecture
PROJECT NAME: Proposed Cutler Elementary School
LGCI PROJECT NUMBER: 2353
PROJECT LOCATION: South Hamilton, MA

DATE STARTED: 3/8/24 **DATE COMPLETED:** 3/8/24
BORING LOCATION: North of existing parking lot
COORDINATES: NA
SURFACE El.: 70 ft. (see note 1) **TOTAL DEPTH:** 9 ft.
WEATHER: 30's
GROUNDWATER LEVELS:
DURING DRILLING: -
AT END OF DRILLING: Not Encountered
OTHER: -

DRILLING SUBCONTRACTOR: Soil Exploration Corp.
DRILLING FOREMAN: Edwin Fajardo
DRILLING METHOD: 3.5-inch Solid Stem Auger
DRILL RIG TYPE/MODEL: Diedrich D-70 turbo
HAMMER TYPE: NA
HAMMER WEIGHT: NA **HAMMER DROP:** NA
GEOPROBE CASING DIA.: NA
GEOPROBE LINER DIA.: NA
LOGGED BY: JKW **CHECKED BY:**

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
								Boring advanced as a rock probe without sampling.
					1			REMARK 1: Augering Effort from Depth of 1 ft to 3 ft: Easy
					2			REMARK 2: Augering Effort from Depth of 3 ft to 5 ft: Easy/Medium
5	65.0				3			REMARK 3: Augering Effort from Depth of 5 ft to 7 ft: Medium
					4			REMARK 4: Augering Effort from Depth of 7 ft to 9 ft: Difficult (SSA grinding on possible rock at depth of 8 ft and SSA refsual at depth of 9 ft)
							9.0	
10	60.0							Bottom of borehole at 9.0 feet. Backfilled borehole with drill cuttings.
15	55.0							
20	50.0							
25	45.0							

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing EX-1 titled: "Topographic Plan of Land, Cutler Elementary School, 237 Asbury Street, South Hamilton, MA," prepared by Samiotes Consultants, Inc., dated October 30, 2023, and provided to LGCI by JCJ Architecture, PC, via e-mail on Febuary 26, 2024.

LGCI
Lahlaf Geotechnical Consulting, Inc.

PROBE LOG

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PAGE 1 OF 1

CLIENT: JCJ Architecture
PROJECT NAME: Proposed Cutler Elementary School
LGCI PROJECT NUMBER: 2353
PROJECT LOCATION: South Hamilton, MA

DATE STARTED: 3/8/24 **DATE COMPLETED:** 3/8/24
BORING LOCATION: North of existing parking lot
COORDINATES: NA
SURFACE El.: 74 ft. (see note 1) **TOTAL DEPTH:** 12.5 ft.
WEATHER: 30's
GROUNDWATER LEVELS:
DURING DRILLING: -
AT END OF DRILLING: Not Encountered
OTHER: -

DRILLING SUBCONTRACTOR: Soil Exploration Corp.
DRILLING FOREMAN: Edwin Fajardo
DRILLING METHOD: 3.5-inch Solid Stem Auger
DRILL RIG TYPE/MODEL: Diedrich D-70 turbo
HAMMER TYPE: NA
HAMMER WEIGHT: NA **HAMMER DROP:** NA
GEOPROBE CASING DIA.: NA
GEOPROBE LINER DIA.: NA
LOGGED BY: JKW **CHECKED BY:**

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
								Boring advanced as a rock probe without sampling.
					1			REMARK 1: Augering Effort from Depth of 1 ft to 3 ft: Easy
					2			REMARK 2: Augering Effort from Depth of 3 ft to 4 ft: Medium (slight SSA grinding on possible boulder at depth of 3.5 ft)
	70.0				3			REMARK 3: Augering Effort from Depth of 4 ft to 5 ft: Easy
5					4			REMARK 4: Augering Effort from Depth of 5 ft to 7 ft: Medium
					5			REMARK 5: Augering Effort from Depth of 7 ft to 11 ft: Medium/Difficult
	65.0							
10								
					6			REMARK 6: Augering Effort from Depth of 11 ft to 12.5 ft: Very Difficult (SSA refusal on possible rock at depth of 12.5 ft)
							12.5	
	60.0							Bottom of borehole at 12.5 feet. Backfilled borehole with drill cuttings.
15								
	55.0							
20								
	50.0							
25								

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing EX-1 titled: "Topographic Plan of Land, Cutler Elementary School, 237 Asbury Street, South Hamilton, MA," prepared by Samiotes Consultants, Inc., dated October 30, 2023, and provided to LGCI by JCJ Architecture, PC, via e-mail on Febuary 26, 2024.

LGCI
Lahlaf Geotechnical Consulting, Inc.

PROBE LOG

CLIENT: JCJ Architecture
PROJECT NAME: Proposed Cutler Elementary School
LGCI PROJECT NUMBER: 2353
PROJECT LOCATION: South Hamilton, MA

DATE STARTED: 3/8/24 **DATE COMPLETED:** 3/8/24
BORING LOCATION: North of existing parking lot
COORDINATES: NA
SURFACE El.: 76 ft. (see note 1) **TOTAL DEPTH:** 7.5 ft.
WEATHER: 30's
GROUNDWATER LEVELS:
DURING DRILLING: -
AT END OF DRILLING: Not Encountered
OTHER: -

DRILLING SUBCONTRACTOR: Soil Exploration Corp.
DRILLING FOREMAN: Edwin Fajardo
DRILLING METHOD: 3.5-inch Solid Stem Auger
DRILL RIG TYPE/MODEL: Diedrich D-70 turbo
HAMMER TYPE: NA
HAMMER WEIGHT: NA **HAMMER DROP:** NA
GEOPROBE CASING DIA.: NA
GEOPROBE LINER DIA.: NA
LOGGED BY: JKW **CHECKED BY:**

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
	75.0				1			Boring advanced as a rock probe without sampling. REMARK 1: Augering Effort from Depth of 1 ft to 4 ft: Easy
					2			REMARK 2: Augering Effort from Depth of 4 ft to 5 ft: Medium/Difficult
5					3			REMARK 3: Augering Effort from Depth of 5 ft to 6 ft: Difficult
	70.0				4			REMARK 4: Augering Effort from Depth of 6 ft to 7.5 ft: Very Difficult (SSA refusal on possible rock at depth of 7.5 ft)
							7.5	
10								Bottom of borehole at 7.5 feet. Backfilled borehole with drill cuttings.
	65.0							
15								
	60.0							
20								
	55.0							
25								

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing EX-1 titled: "Topographic Plan of Land, Cutler Elementary School, 237 Asbury Street, South Hamilton, MA," prepared by Samiotes Consultants, Inc., dated October 30, 2023, and provided to LGCI by JCJ Architecture, PC, via e-mail on Febuary 26, 2024.

LGCI
Lahlaf Geotechnical Consulting, Inc.

PROBE LOG

CLIENT: JCJ Architecture
PROJECT NAME: Proposed Cutler Elementary School
LGCI PROJECT NUMBER: 2353
PROJECT LOCATION: South Hamilton, MA

DATE STARTED: 3/8/24 **DATE COMPLETED:** 3/8/24
BORING LOCATION: NW of existing school
COORDINATES: NA
SURFACE El.: 77 ft. (see note 1) **TOTAL DEPTH:** 20 ft.
WEATHER: 30's
GROUNDWATER LEVELS:
DURING DRILLING: -
AT END OF DRILLING: Not Encountered
OTHER: -

DRILLING SUBCONTRACTOR: Soil Exploration Corp.
DRILLING FOREMAN: Edwin Fajardo
DRILLING METHOD: 3.5-inch Solid Stem Auger
DRILL RIG TYPE/MODEL: Diedrich D-70 turbo
HAMMER TYPE: NA
HAMMER WEIGHT: NA **HAMMER DROP:** NA
GEOPROBE CASING DIA.: NA
GEOPROBE LINER DIA.: NA
LOGGED BY: JKW **CHECKED BY:**

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
								Boring advanced as a rock probe without sampling.
					1			REMARK 1: Augering Effort from Depth of 1 ft to 5 ft: Easy
	75.0							
5					2			REMARK 2: Augering Effort from Depth of 5 ft to 10 ft: Easy/Medium
	70.0							
10					3			REMARK 3: Augering Effort from Depth of 10 ft to 12 ft: Medium
	65.0				4			REMARK 4: Augering Effort from Depth of 12 ft to 15 ft: Medium/Difficult
15					5			REMARK 5: Augering Effort from Depth of 15 ft to 20 ft: Difficult
	60.0							
20							20.0	
								Bottom of borehole at 20.0 feet. Backfilled borehole with drill cuttings.
	55.0							
25								

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing EX-1 titled: "Topographic Plan of Land, Cutler Elementary School, 237 Asbury Street, South Hamilton, MA," prepared by Samiotes Consultants, Inc., dated October 30, 2023, and provided to LGCI by JCJ Architecture, PC, via e-mail on Febuary 26, 2024.

LGCI
Lahlaf Geotechnical Consulting, Inc.

PROBE LOG

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PAGE 1 OF 1

CLIENT: JCJ Architecture
PROJECT NAME: Proposed Cutler Elementary School
LGCI PROJECT NUMBER: 2353
PROJECT LOCATION: South Hamilton, MA

DATE STARTED: 3/8/24 **DATE COMPLETED:** 3/8/24
BORING LOCATION: NW of existing school
COORDINATES: NA
SURFACE El.: 76 ft. (see note 1) **TOTAL DEPTH:** 20 ft.
WEATHER: 30's
GROUNDWATER LEVELS:
DURING DRILLING: -
AT END OF DRILLING: Not Encountered
OTHER: -

DRILLING SUBCONTRACTOR: Soil Exploration Corp.
DRILLING FOREMAN: Edwin Fajardo
DRILLING METHOD: 3.5-inch Solid Stem Auger
DRILL RIG TYPE/MODEL: Diedrich D-70 turbo
HAMMER TYPE: NA
HAMMER WEIGHT: NA **HAMMER DROP:** NA
GEOPROBE CASING DIA.: NA
GEOPROBE LINER DIA.: NA
LOGGED BY: JKW **CHECKED BY:**

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
								Boring advanced as a rock probe without sampling.
	75.0				1			REMARK 1: Augering Effort from Depth of 1 ft to 3 ft: Easy
					2			REMARK 2: Augering Effort from Depth of 3 ft to 7 ft: Medium
5								
	70.0				3			REMARK 3: Augering Effort from Depth of 7 ft to 8 ft: Medium/Difficult
					4			REMARK 4: Augering Effort from Depth of 8 ft to 9 ft: Difficult (SSA grinding on possible cobbles at depth of 10.5 ft.
					5			REMARK 5: Augering Effort from Depth of 9 ft to 11 ft: Medium/Difficult
10								
	65.0				6			REMARK 6: Augering Effort from Depth of 11 ft to 18 ft: Difficult
15								
	60.0				7			REMARK 7: Augering Effort from Depth of 18 ft to 20 ft: Very Difficult
20							20.0	
	55.0							Bottom of borehole at 20.0 feet. Backfilled borehole with drill cuttings (which consists of sand and gravel).
25								

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing EX-1 titled: "Topographic Plan of Land, Cutler Elementary School, 237 Asbury Street, South Hamilton, MA," prepared by Samiotes Consultants, Inc., dated October 30, 2023, and provided to LGCI by JCJ Architecture, PC, via e-mail on Febuary 26, 2024.

LGCI
Lahlaf Geotechnical Consulting, Inc.

PROBE LOG

CLIENT: JCJ Architecture
PROJECT NAME: Proposed Cutler Elementary School
LGCI PROJECT NUMBER: 2353
PROJECT LOCATION: South Hamilton, MA

DATE STARTED: 3/8/24 **DATE COMPLETED:** 3/8/24
BORING LOCATION: NW of existing school
COORDINATES: NA
SURFACE El.: 86 ft. (see note 1) **TOTAL DEPTH:** 16.5 ft.
WEATHER: 30's
GROUNDWATER LEVELS:
DURING DRILLING: 9.0 ft. / El. 77.0 ft. Based on drill cutting moisture
AT END OF DRILLING: -
OTHER: -

DRILLING SUBCONTRACTOR: Soil Exploration Corp.
DRILLING FOREMAN: Edwin Fajardo
DRILLING METHOD: 3.5-inch Solid Stem Auger
DRILL RIG TYPE/MODEL: Diedrich D-70 turbo
HAMMER TYPE: NA
HAMMER WEIGHT: NA **HAMMER DROP:** NA
GEOPROBE CASING DIA.: NA
GEOPROBE LINER DIA.: NA
LOGGED BY: JKW **CHECKED BY:**

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
								Boring advanced as a rock probe without sampling.
	85.0				1			REMARK 1: Augering Effort from Depth of 1 ft to 2 ft: Easy
					2			REMARK 2: Augering Effort from Depth of 2 ft to 3 ft: Medium/Difficult
					3			REMARK 3: Augering Effort from Depth of 3 ft to 4 ft: Difficult (slight SSA grinding on possible cobbles at depth of 3.5 ft)
					4			REMARK 4: Augering Effort from Depth of 4 ft to 6 ft: Medium/Difficult
5								
	80.0				5			REMARK 5: Augering Effort from Depth of 6 ft to 8 ft: Medium
					6			REMARK 6: Augering Effort from Depth of 8 ft to 10 ft: Medium/Difficult
							▽	
10					7			REMARK 7: Augering Effort from Depth of 10 ft to 13 ft: Medium
	75.0							
					8			REMARK 8: Augering Effort from Depth of 13 ft to 14 ft: Medium/Difficult
					9			REMARK 9: Augering Effort from Depth of 14 ft to 15 ft: Difficult
15					10			REMARK 10: Augering Effort from Depth of 15 ft to 16.5 ft: Very Difficult (SSA refusal at depth of 16.5 ft)
	70.0						16.5	
								Bottom of borehole at 16.5 feet. Backfilled borehole with drill cuttings.
20								
	65.0							
25								

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing EX-1 titled: "Topographic Plan of Land, Cutler Elementary School, 237 Asbury Street, South Hamilton, MA," prepared by Samiotes Consultants, Inc., dated October 30, 2023, and provided to LGCI by JCJ Architecture, PC, via e-mail on Febuary 26, 2024.

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PROBE LOG

P-10
PAGE 1 OF 1

CLIENT: JCJ Architecture
PROJECT NAME: Proposed Cutler Elementary School
LGCI PROJECT NUMBER: 2353
PROJECT LOCATION: South Hamilton, MA

DATE STARTED: 3/8/24 **DATE COMPLETED:** 3/8/24
BORING LOCATION: West of existing school
COORDINATES: NA
SURFACE El.: 81 ft. (see note 1) **TOTAL DEPTH:** 12 ft.
WEATHER: 30's
GROUNDWATER LEVELS:
DURING DRILLING: -
AT END OF DRILLING: Not Encountered
OTHER: -

DRILLING SUBCONTRACTOR: Soil Exploration Corp.
DRILLING FOREMAN: Edwin Fajardo
DRILLING METHOD: 3.5-inch Solid Stem Auger
DRILL RIG TYPE/MODEL: Diedrich D-70 turbo
HAMMER TYPE: NA
HAMMER WEIGHT: NA **HAMMER DROP:** NA
GEOPROBE CASING DIA.: NA
GEOPROBE LINER DIA.: NA
LOGGED BY: JKW **CHECKED BY:**

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
	80.0				1			Boring advanced as a rock probe without sampling. REMARK 1: Augering Effort from Depth of 1 ft to 8 ft: Medium
5	75.0				2			REMARK 2: Augering Effort from Depth of 8 ft to 9 ft: Medium
					3			REMARK 3: Augering Effort from Depth of 9 ft to 10 ft: Medium/Difficult
10					4			REMARK 4: Augering Effort from Depth of 10 ft to 11 ft: Difficult
	70.0				5			REMARK 5: Augering Effort from Depth of 11 ft to 12 ft: Very Difficult (SSA refusal on possible rock at depth of 12 ft)
							12.0	Bottom of borehole at 12.0 feet. Backfilled borehole with drill cuttings.
15	65.0							
20	60.0							
25								

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing EX-1 titled: "Topographic Plan of Land, Cutler Elementary School, 237 Asbury Street, South Hamilton, MA," prepared by Samiotes Consultants, Inc., dated October 30, 2023, and provided to LGCI by JCJ Architecture, PC, via e-mail on Febuary 26, 2024.

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PROBE LOG

P-11-A
PAGE 1 OF 1

CLIENT: JCJ Architecture
PROJECT NAME: Proposed Cutler Elementary School
LGCI PROJECT NUMBER: 2353
PROJECT LOCATION: South Hamilton, MA

DATE STARTED: 3/8/24 **DATE COMPLETED:** 3/8/24
BORING LOCATION: NE of existing school
COORDINATES: NA
SURFACE El.: 86 ft. (see note 1) **TOTAL DEPTH:** 2.5 ft.
WEATHER: 30's
GROUNDWATER LEVELS:
DURING DRILLING: -
AT END OF DRILLING: Not Encountered
OTHER: -

DRILLING SUBCONTRACTOR: Soil Exploration Corp.
DRILLING FOREMAN: Edwin Fajardo
DRILLING METHOD: 3.5-inch Solid Stem Auger
DRILL RIG TYPE/MODEL: Diedrich D-70 turbo
HAMMER TYPE: NA
HAMMER WEIGHT: NA **HAMMER DROP:** NA
GEOPROBE CASING DIA.: NA
GEOPROBE LINER DIA.: NA
LOGGED BY: JKW **CHECKED BY:**

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
	85.0				1			Boring advanced as a rock probe without sampling.
								REMARK 1: Augering Effort from Depth of 1 ft to 2 ft: Easy
					2			REMARK 2: Augering Effort from Depth of 2 ft to 2.5 ft: Very Difficult (SSA refusal on possible rock at depth of 2.5 ft, offset boring to P-11-B)
							2.5	Bottom of borehole at 2.5 feet. Backfilled borehole with drill cuttings.
5	80.0							
10	75.0							
15	70.0							
20	65.0							
25								

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing EX-1 titled: "Topographic Plan of Land, Cutler Elementary School, 237 Asbury Street, South Hamilton, MA," prepared by Samiotes Consultants, Inc., dated October 30, 2023, and provided to LGCI by JCJ Architecture, PC, via e-mail on Febuary 26, 2024.

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PROBE LOG

P-11-B
PAGE 1 OF 1

CLIENT: JCJ Architecture
PROJECT NAME: Proposed Cutler Elementary School
LGCI PROJECT NUMBER: 2353
PROJECT LOCATION: South Hamilton, MA

DATE STARTED: 3/8/24 **DATE COMPLETED:** 3/8/24
BORING LOCATION: NE of existing school
COORDINATES: NA
SURFACE El.: 86 ft. (see note 1) **TOTAL DEPTH:** 3 ft.
WEATHER: 30's
GROUNDWATER LEVELS:
DURING DRILLING: -
AT END OF DRILLING: Not Encountered
OTHER: -

DRILLING SUBCONTRACTOR: Soil Exploration Corp.
DRILLING FOREMAN: Edwin Fajardo
DRILLING METHOD: 3.5-inch Solid Stem Auger
DRILL RIG TYPE/MODEL: Diedrich D-70 turbo
HAMMER TYPE: NA
HAMMER WEIGHT: NA **HAMMER DROP:** NA
GEOPROBE CASING DIA.: NA
GEOPROBE LINER DIA.: NA
LOGGED BY: JKW **CHECKED BY:**

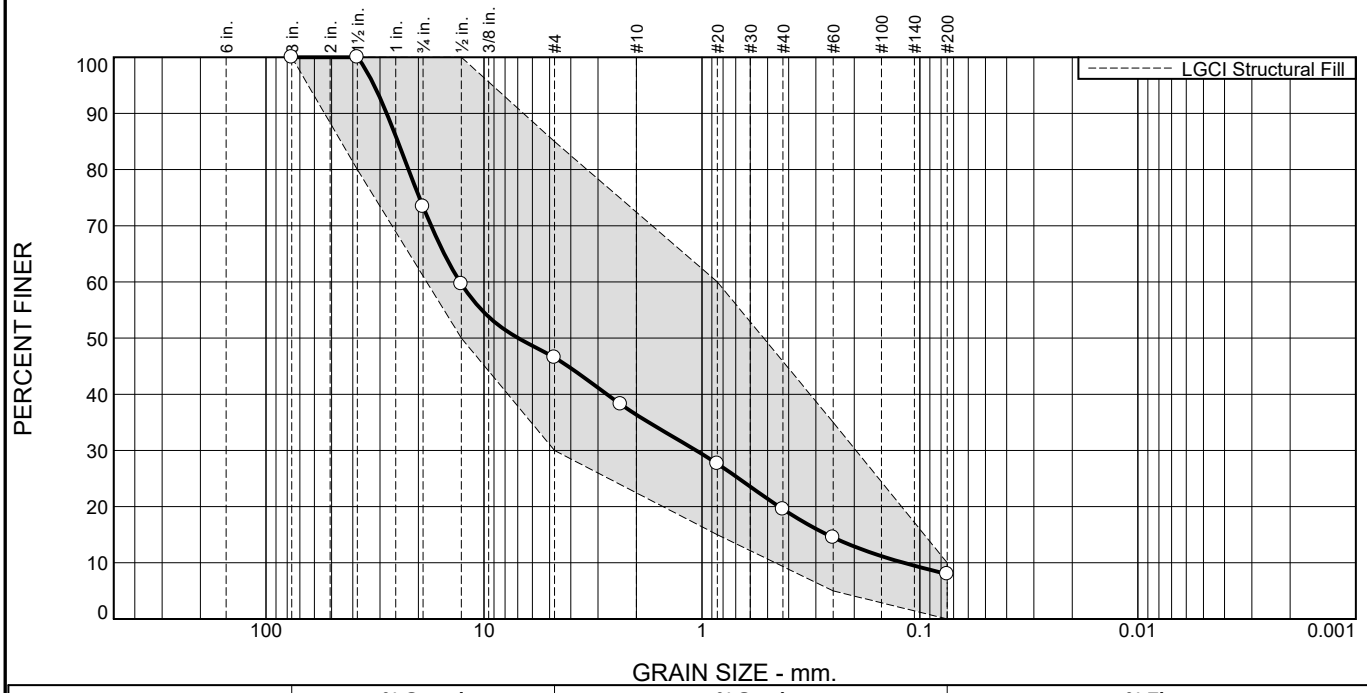
Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
	85.0				1			Boring advanced as a rock probe without sampling.
								REMARK 1: Augering Effort from Depth of 1 ft to 2 ft: Easy
					2			REMARK 2: Augering Effort from Depth of 2 ft to 3 ft: Very Difficult (SSA resfusal on possible rock at depth of 3 ft)
							3.0	Bottom of borehole at 3.0 feet. Backfilled borehole with drill cuttings.
5	80.0							
10	75.0							
15	70.0							
20	65.0							
25								

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest foot from drawing EX-1 titled: "Topographic Plan of Land, Cutler Elementary School, 237 Asbury Street, South Hamilton, MA," prepared by Samiotes Consultants, Inc., dated October 30, 2023, and provided to LGCI by JCJ Architecture, PC, via e-mail on Febuary 26, 2024.

Appendix C – Laboratory Test Results

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	26.6	26.9	10.1	16.9	11.5	8.0	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3"	100.0	100.0	
1.5"	100.0	80.0 - 100.0	
0.75"	73.4		
0.5"	59.6	50.0 - 100.0	
#4	46.5	30.0 - 85.0	
#8	38.2		
#20	27.6	15.0 - 60.0	
#40	19.5		
#60	14.5	5.0 - 35.0	
#200	8.0	0.0 - 10.0	

* LGCI Structural Fill

Material Description

ASTM (D 2488) Classification: Well Graded GRAVEL with Silt and Sand (GW-GM), fine to coarse, subangular, 5-10% fines, 35-40% fine to coarse sand

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= **AASHTO (M 145)=**

Coefficients

D_{90}= 27.9602 D_{85}= 24.8518 D_{60}= 12.8799
D_{50}= 6.9659 D_{30}= 1.0636 D_{15}= 0.2655
D_{10}= 0.1187 C_u= 108.47 C_c= 0.74

Remarks

Fill

Date Received: 3/7/24 **Date Tested:** 3/20/24

Tested By: AS

Checked By: AML

Location: B-1
Sample Number: S2 **Depth:** 2.0'-4.0'

Date Sampled: 3/7/24

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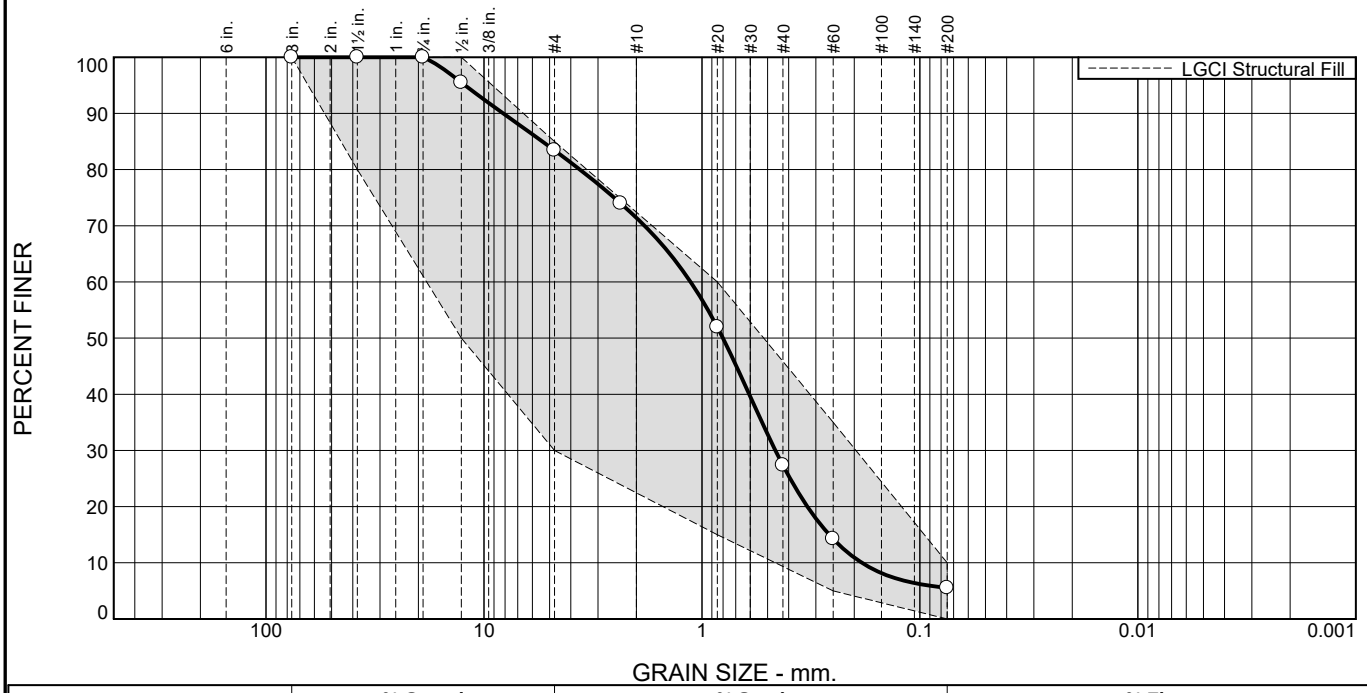
Client: JCJ Architecture, PC
Project: Proposed Cutler Elementary School

Project No: 2353 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	16.6	12.0	44.1	21.8	5.5	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3"	100.0	100.0	
1.5"	100.0	80.0 - 100.0	
0.75"	100.0		
0.5"	95.5	50.0 - 100.0	
#4	83.4	30.0 - 85.0	
#8	74.0		
#20	52.0	15.0 - 60.0	
#40	27.3		
#60	14.2	5.0 - 35.0	
#200	5.5	0.0 - 10.0	

* LGCI Structural Fill

Material Description

ASTM (D 2488) Classification: Poorly Graded SAND with Gravel (SP), mostly medium with fine and coarse, 5% fines, 15-20% fine subangular gravel, brown to orange

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= **AASHTO (M 145)=**

Coefficients

D_{90}= 8.1635 D_{85}= 5.3976 D_{60}= 1.1274
D_{50}= 0.8012 D_{30}= 0.4604 D_{15}= 0.2606
D_{10}= 0.1846 C_u= 6.11 C_c= 1.02

Remarks

Sand and Gravel

Date Received: 3/8/24 **Date Tested:** 3/20/24

Tested By: AS

Checked By: AML

Location: B-4
Sample Number: S2 **Depth:** 2.0'-4.0'

Date Sampled: 3/20/24

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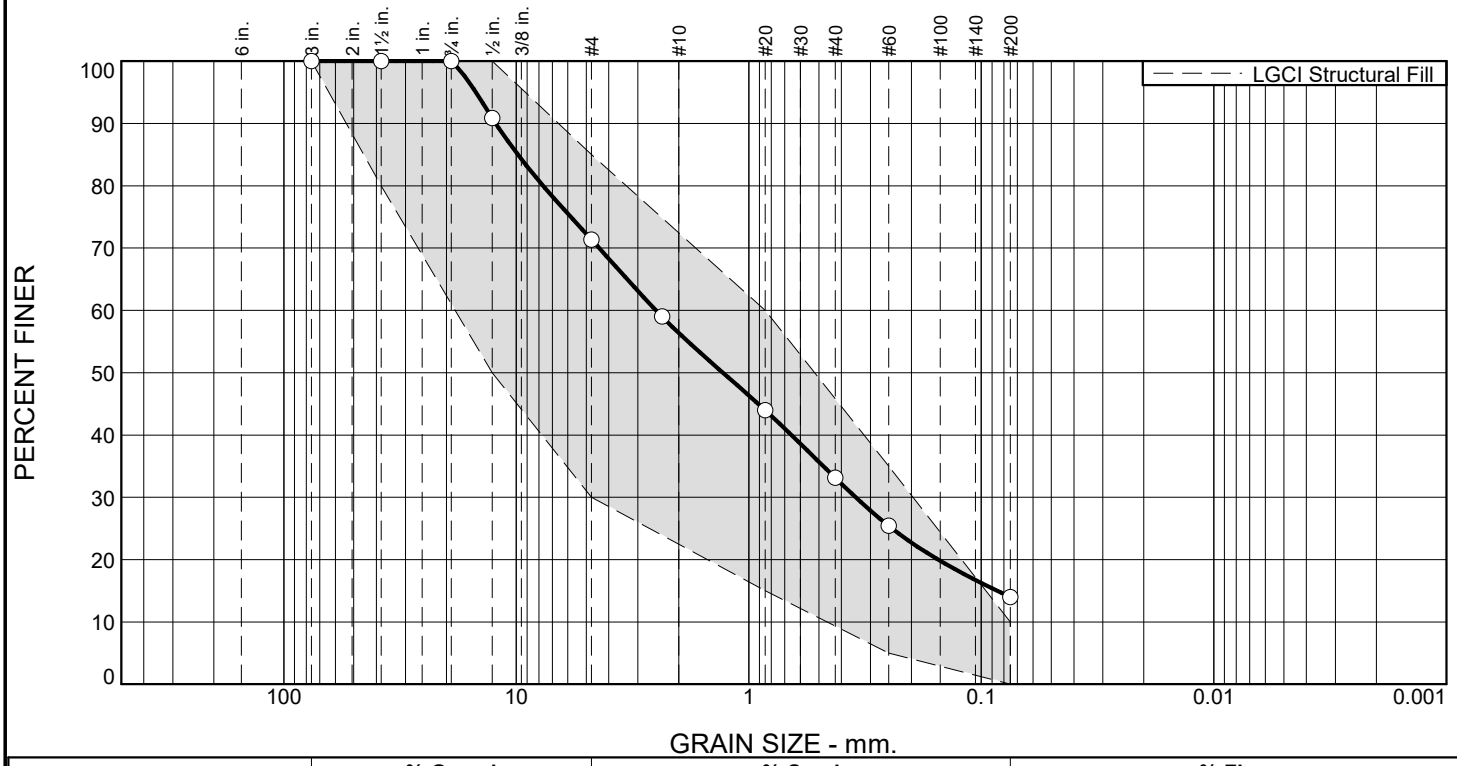
Client: JCJ Architecture, PC
Project: Proposed Cutler Elementary School

Project No: 2353 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	28.6	15.0	23.3	19.1	14.0	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3"	100.0	100.0	
1.5"	100.0	80.0 - 100.0	
0.75"	100.0		
0.5"	90.9	50.0 - 100.0	
#4	71.4	30.0 - 85.0	
#8	59.0		
#20	44.0	15.0 - 60.0	
#40	33.1		
#60	25.4	5.0 - 35.0	
#200	14.0	0.0 - 10.0	X

* LGCI Structural Fill

Material Description

ASTM (D 2488) Classification: Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 10-15% fines, 25-30% fine subangular gravel, brown (possibly reworked)

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= **AASHTO (M 145)=**

Coefficients

D_{90}= 12.2523 D_{85}= 9.8328 D_{60}= 2.5048
D_{50}= 1.2921 D_{30}= 0.3463 D_{15}= 0.0854
D_{10}= C_u= C_c=

Remarks

Fill sample.

Date Received: 7/22/24 **Date Tested:** 7/24/24

Tested By: EP

Checked By: DP

Location: Boring B-104
Sample Number: S2 **Depth:** 2.0'-4.0'

Date Sampled: 7/22/24

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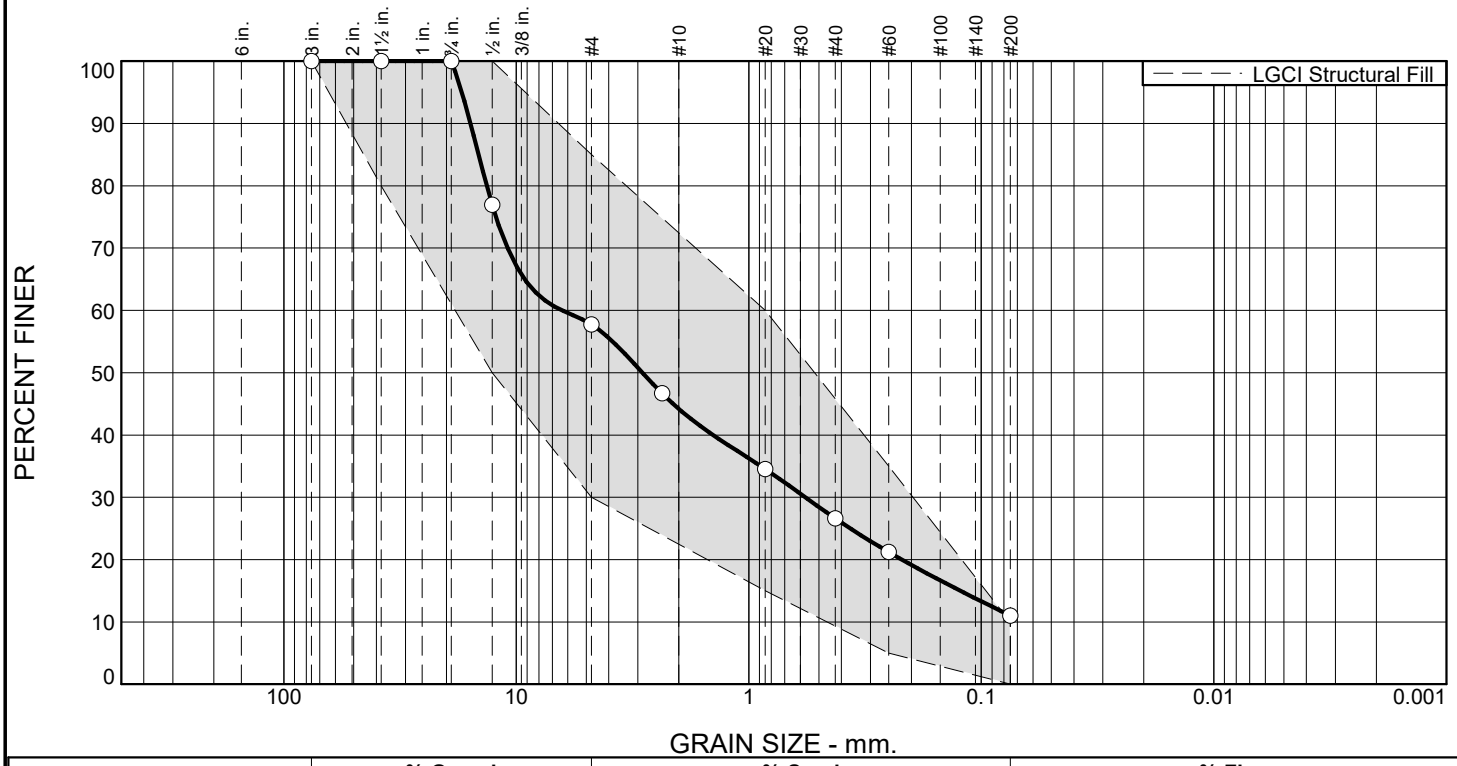
Client: JCJ Architecture, PC
Project: Proposed Cutler Elementary School, South Hamilton, MA

Project No: 2353 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	42.3	13.5	17.6	15.6	11.0	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3"	100.0	100.0	
1.5"	100.0	80.0 - 100.0	
0.75"	100.0		
0.5"	76.9	50.0 - 100.0	
#4	57.7	30.0 - 85.0	
#8	46.7		
#20	34.5	15.0 - 60.0	
#40	26.6		
#60	21.2	5.0 - 35.0	
#200	11.0	0.0 - 10.0	X

* LGCI Structural Fill

Material Description

ASTM (D 2488) Classification: Well Graded SAND with Silt and Gravel (SW-SM), fine to coarse, 10-15% fines, 40-45% fine subangular gravel, brown (possibly reworked)

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= **AASHTO (M 145)=**

Coefficients

D_{90}= 15.7516 D_{85}= 14.5431 D_{60}= 6.3570
D_{50}= 2.8664 D_{30}= 0.5714 D_{15}= 0.1230
D_{10}= C_u= C_c=

Remarks

Fill sample.

Date Received: 7/22/24 **Date Tested:** 7/24/24

Tested By: SP

Checked By: DP

Location: Boring B-105 **Date Sampled:** 7/22/24
Sample Number: S2 **Depth:** 2.0'-4.0'

LGCI
Lahlaf Geotechnical Consulting, Inc.

Client: JCJ Architecture, PC
Project: Proposed Cutler Elementary School, South Hamilton, MA

Project No: 2353 **Figure**