

FINAL FOUNDATION ENGINEERING REPORT

LEICESTER SCHOOL

LEICESTER, MASSACHUSETTS

JANUARY 8, 2020

Prepared For:

Finegold Alexander Architects 77 North Washington Street Boston, MA 02114

PROJECT NO. 6743.2.01

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January 8, 2020

Finegold Alexander Architects 77 North Washington Street Boston, MA 02114

Attention: Ms. Regan Shields Ives

Reference: Leicester School; Leicester, Massachusetts Final Foundation Engineering Report

Ladies and Gentlemen:

This report documents the results of our subsurface exploration programs and final foundation design study for the Leicester School project to be located at 70 Winslow Avenue in Leicester, Massachusetts. Refer to the Project Location Plan (**Figure 1**) for the general site location.

This report was prepared in accordance with our proposal dated October 9, 2019, and the subsequent authorization of Finegold Alexander Architects (FAA). These services are subject to the limitations contained in **Appendix A**.

Purpose and Scope

The purposes of the foundation design study are to assess the subsurface soil and groundwater conditions at the site as they relate to foundation design, and based on these conditions, to provide safe and economic foundation design recommendations for the proposed building.

Foundation design includes foundation support of the proposed structure and its lowest level slab, treatment of the lowest level slab in consideration of groundwater, lateral earth pressures on foundation walls, and seismic design considerations in accordance with the provisions of the Ninth Edition of the Massachusetts State Building Code (Code). Construction considerations relating to geotechnical aspects of the proposed project are also presented herein.

Available Information

Information available to McPhail Associates, LLC (McPhail) for use in the preparation of this report included the following:

• An electronic version of the Site Civil plans prepared by Nitsch Engineering, Inc. (Nitsch) dated December 4, 2019, downloaded from the project SharePoint site;



- An electronic version of the Landscape plans prepared by Warner Larson Landscape Architects (WLLA) dated December 4, 2019, downloaded from the project SharePoint site; and
- Various architectural plans and layouts available on the project SharePoint site.

Elevations referenced herein are in feet and are referenced to the North American Vertical Datum of 1988 (NAVD 88).

Existing and Proposed Conditions

The proposed school building will be located in the area north of the existing Leicester Middle School, which fronts onto Winslow Avenue to the south, and south of the existing Leicester High School, which fronts onto Paxton Street to the west. The existing school buildings are generally surrounded by bituminous concrete paved parking lots and roadways with landscaped margins. Grassed athletic fields occupy the majority of the remaining site area and a pond is located at the southeast corner of the site. The remainder of the site is generally bordered by wooded areas and/or residential properties. The Leicester Senior Center borders the site to the southeast.

It is understood that the proposed project scope will include demolition of the existing middle school building and construction of a new pre-kindergarten to 8th grade school. The proposed building is understood to be an at-grade three-story, steel-framed structure with a plan area of approximately 69,000 square-feet (SF). The first floor slab will be at Elevation +994. The northwest and southwest portions of the proposed building will contain classroom wings. Between the two wings will be a landscaped outdoor learning area. The proposed grading within and around the building footprint will generally require cuts of about 1 to 3 feet, except within the southwest wing where fills of up to about 7 feet will be required to raise the grade for the proposed slab.

Ground surface across the project site generally slopes downward from north to south by approximately 20 to 60 feet in elevation. The proposed location of the new school building is primarily within a slightly sloping, existing grassed area on the northwestern portion of the site. Existing ground surface across the proposed building footprint generally slopes downward from north to south from about Elevation +995 to Elevation +992, and locally downward from east to west within the southwestern wing from about Elevation +991 to Elevation +987. To the north of the proposed building the grade continues to slope upward.

The northeast portion of the site is occupied by the existing football field and track which are generally level at about Elevation +1000. The southeast portion of the site is occupied by a baseball field which is generally level at approximately Elevation +967. The southwestern portion of the site, the area occupied by the existing school and surrounding parking areas, generally slopes downward from the north at about +990 to the south at about Elevation +970 to Elevation +980. West of the existing school the grade slopes downward from west to east to about Elevation +950.



Surrounding the proposed building, the site will be regraded to facilitate the construction of a perimeter access road, asphalt-paved parking areas and a courtyard area consisting of landscaped and hardscaped portions. It is understood that a proposed below-grade storage tank will be located north of the proposed building.

Additionally, the proposed construction will include renovation of the existing track and football field, enlargement and reconstruction of the baseball field, construction of tennis courts, and other site improvements such as construction of play equipment. Lastly, new stormwater infiltration systems will be built at the project site as well. The proposed site work will typically necessitate cuts and fills on the order of 1 to 3 feet except to the north of the enlarged baseball field where cuts of up to 16 feet will be required to construct a site retaining wall.

Subsurface Exploration Program

Two (2) phases of subsurface explorations consisting of a total of sixteen (16) borings, five (5) hand auger explorations, and nine (9) test pits were completed at the site. The borings were performed by Technical Drilling Services (TDS) of Sterling, Massachusetts, under contract to McPhail. The hand auger explorations were performed by McPhail. The test pits were performed by the Leicester Department of Public Works (LDPW), which were observed by McPhail.

Approximate plan locations of the borings, hand auger explorations, and test pits are as indicated on the enclosed Subsurface Exploration Plan, **Figure 2**. Boring and test pit logs prepared by McPhail are contained in **Appendix B** and **Appendix C**, respectively. These explorations included the following:

- Eight (8) borings, MA-1 through MA-8, conducted on March 5 and 6, 2019;
- Eight (8) borings, MA-101 through MA-108, conducted on December 5 and 6, 2019;
- Four (4) hand auger explorations, H-1 through H-4, conducted on December 6, 2019; and
- Nine (9) test pits, TP-1 through TP-9, conducted on December 5 and 6, 2019.

Borings were performed utilizing track-mounted drilling equipment. Each boring was advanced using 2.25-inch inner diameter hollow-stem augers. Standard 2-inch O.D. split-spoon samples and standard penetration tests (SPT) were generally obtained at 5-foot intervals of depth in accordance with the standard procedures in ASTM D1586. The borings were terminated at depths ranging from 10 to 27 feet below the existing ground surface.

Test pits were performed utilizing a rubber-tired backhoe with a toothed bucket. The test pit locations were provided by the project Site/Civil Engineer for the purposes of stormwater



infiltration design. The test pits were terminated at depths ranging from 4.5 to 14 feet below existing ground surface.

Hand auger explorations were performed in locations provided by the project Landscape Architect for the purposes of determining the thickness of and obtaining samples of the topsoil. Additionally, samples of the topsoil layer were obtained from select test pit locations. Samples of the topsoil layer were submitted for laboratory analysis, as described below.

To permit monitoring of groundwater levels in the general vicinity of the proposed building, groundwater observation wells were installed in completed boreholes MA-104 and MA-106. Installation details of the observation wells are indicated on the boring logs contained in **Appendix B**. Groundwater Monitoring Reports are presented in **Appendix D**.

The explorations were observed by a representative of McPhail who performed field layout, prepared field logs, obtained and visually classified soil samples, monitored groundwater conditions in the borings and groundwater observation wells, and made minor adjustments to the exploration locations and determined the required exploration depths based upon the actual subsurface conditions encountered.

Field locations of the borings and the ground surface elevation at each boring location completed during the initial subsurface exploration program were determined by survey by Nitsch Engineering. Field locations of the borings and test pits at each exploration location completed during the supplemental subsurface exploration program were determined by taping from existing site features identified on the existing site conditions plan. The existing ground surface elevation at each exploration location completed during the supplemental program determined by linear interpolation based on elevations indicated on the existing conditions plan prepared by Nitsch.

Laboratory Testing

At the completion of the subsurface exploration programs, soil samples were returned to our laboratory for more detailed classification, analysis, and testing. The laboratory testing consisted of sieve analyses to determine the grain size distribution and confirm the visual classifications of the fill and glacial till deposits. Laboratory test procedures were in general accordance with applicable ASTM Standards. Results of the gradation testing appear on **Figure 3** and **Figure 4** following the text of this report.

Nine (9) samples of topsoil were submitted to the UMass Extension Soil and Plant Nutrient Testing Laboratory for routine and organic matter analysis. Results of the testing are contained in **Appendix E**.



Subsurface Conditions

A detailed description of the subsurface conditions encountered within the borings and test pits is documented on the boring and test pit logs contained in **Appendix B** and **Appendix C**, respectively. Based on these explorations, the following is a description of the generalized subsurface conditions encountered across the site from ground surface downward.

Within the explorations, a surficial layer of topsoil was observed which ranged from 0.3- to 1-foot in thickness. The topsoil generally consists of a very loose, dark brown silt and sand with trace gravel and with root matter. Samples of the topsoil were taken from multiple exploration locations at the request of the Landscape Architect and sent to a laboratory for routine and organic matter analysis. A summary table of the observed thickness of the topsoil layer at each requested location is contained in **Appendix E**.

Underlying the surficial layer of topsoil, the borings encountered fill soil which extends to depths of about 2 to 7 feet below ground surface. The fill generally consists of a loose to dense, dark brown to orange-brown silt and sand with trace to some gravel varying to a gravelly sand with trace to some silt. The fill also contains trace amounts of root matter and clay and, as noted on the test pit logs, contains cobbles as well. Furthermore, the fill within boring MA-6 was also observed to contain a trace of brick and ash. Grain size distributions of samples of the fill are shown on **Figure 3**. Based on a comparison of the grain size distributions of the fill and underlying glacial till deposit, the fill observed in the borings appears to primarily consist of reworked natural glacial till.

A historic topsoil/subsoil layer was encountered underlying the fill within boring MA-1 at an approximate depth of 4 feet below the existing ground surface, extending to the glacial till deposit at a depth of approximately 6 feet. The historic topsoil/subsoil layer was generally observed to consist of a loose, black-brown sandy silt with trace gravel and some root matter.

Underlying the fill and/or historic topsoil/subsoil, a natural glacial till deposit was encountered within each test pit and boring, with the exception of test pit TP-1, at depths of 1.5 to 7 feet below grade. Furthermore, within the vicinity of the proposed building, the natural glacial till deposit was observed generally to vary from about Elevation +991.4 to about Elevation +985.8 except within the southwestern wing of the building where it was observed at Elevation +982. The glacial till deposit was observed to generally consist of a compact to very dense, brown to orange-brown to gray silt and sand with trace to some gravel and trace clay varying to a silty sand with some to trace gravel and trace clay. Additionally, the glacial till deposit was observed to contain cobbles and boulders. Grain size distributions of samples of the glacial till deposit are shown on **Figure 4**.

Borings MA-1, MA-2, MA-6 through MA-8, and MA-101 through MA-108 were terminated in the glacial till deposit at depths of 10 to 27 feet below ground surface. Borings MA-3 through MA-5 were terminated upon auger or split spoon refusal, which is generally assumed to be indicative of cobbles or boulders within the glacial till deposit or potentially



the underlying bedrock surface, at approximate depths varying from 11.5 to 14.7 feet below ground surface.

Groundwater was observed in borings MA-1, MA-3 through MA-6, MA-104, and MA-107 upon completion of drilling at approximate depths ranging from about 6 to 8 feet below ground surface. Groundwater was observed in test pits TP-1 through TP-9 upon completion of excavation at approximate depths ranging from about 4 to 14 feet. Groundwater was not encountered in borings MA-2, MA-101 through MA-103, MA-105, and MA-108 upon completion of drilling.

In addition, stabilized groundwater measurements recorded in the observation wells installed in completed borings MA-104 and MA-106, which are located in the proposed building footprint, indicate that the groundwater level ranges from 1 to 4.8 feet below existing ground surface, corresponding to between approximately Elevation +992.5 and Elevation +988.9. Groundwater Monitoring Reports are presented in **Appendix D**.

Due to the high fines content (i.e. silt and clay) of the fill and glacial till deposits, it is anticipated that groundwater is seasonally perched on the surface of the relatively impervious fill and glacial till deposits. Additionally, it is anticipated that future groundwater levels across the site may vary from those reported herein due to factors such as normal seasonal changes, periods of heavy precipitation and alterations to existing grading and drainage in the vicinity of the site.

Foundation Design Recommendations

Based on the scope of the proposed development and the subsurface conditions encountered at the site, it is recommended that foundation support for the proposed structure consist of conventional spread footing foundations in conjunction with slab-on-grade construction. Additional foundation design recommendations are contained below.

Footing Recommendations

Footings are recommended to bear on the natural, undisturbed glacial till deposit, or on imported Gravel Borrow that is placed and compacted over the natural glacial till deposit. For design purposes, the footings should be proportioned utilizing a maximum design bearing pressure of two (2) tons per square-foot (tsf). All foundations should be designed in accordance with the Code. Recommended minimum footing widths for continuous and isolated spread footings are 24 and 36 inches, respectively. It is noted that "thickened slabs", which are designed to support interior walls, are considered to be footings for the purposes of the recommendations contained herein.

All footings in unheated areas should be provided with a minimum 4-foot thickness of soil cover as frost protection. Interior foundations should be located such that the top of the



foundation concrete is a minimum of six (6) inches below the underside of the lowest level slab.

All foundations should be located such that they bear below a theoretical line drawn upward and outward at 2 to 1 (horizontal to vertical) from the bottom exterior edge of all adjacent footings, structures and utilities.

Based on the results of the explorations, the surface of the natural glacial till deposit generally varies across the proposed building footprint from about Elevation +982 to Elevation +991. Where the surface of the natural glacial till deposit is located below the design bottom of footing elevation, the existing fill will need to be removed and Gravel Borrow will need to be placed and compacted for support of the footings. In consideration of the proposed lowest level slab elevation, the anticipated depth of the footings, and the elevation of the natural glacial till deposit encountered in the explorations, it is anticipated that up to four (4) feet of Gravel Borrow may be required for support of footings at various locations in the building, except at the southwestern wing, where up to ten (10) feet of Gravel Borrow may be required for support of interior footings.

Fill material should be removed at footing locations and within the lateral limits defined herein for the placement of Gravel Borrow. Where proposed footings are to be supported on Gravel Borrow, the lateral limits of the excavation should extend beyond the outside edge of the footing for a horizontal distance equal to the depth from the bottom of the proposed footing to the surface of the natural, undisturbed glacial till deposit, plus two (2) feet in all plan directions. Gravel Borrow should consist of an off-site well-graded natural sand and gravel containing less than eight (8) percent passing the No. 200 sieve.

All Gravel Borrow placed within the footprint of the proposed building for support of the footings and slab-on-grade should be placed in lifts having a compacted thickness of six (6) inches and be compacted to a minimum of 95 percent of its maximum modified Proctor dry density. The placement and compaction of Gravel Borrow should be monitored by a Registered Professional Engineer or his designated representative in accordance with the provisions of the Code.

It is noted that depending on the time of the year when construction is performed, groundwater is anticipated to be encountered at shallow depths across the site and will need to be controlled during the building excavation and a portion of the excavated material may be saturated due to its presence below the groundwater level. Due to the high fines content of the existing fill and glacial till soils in the building footprint, the exposed glacial till will be highly susceptible to disturbance in the presence of groundwater and will become unsuitable as a bearing surface, if it is allowed to become saturated or is saturated when excavated.

The on-site fill and glacial till are not recommended to be reused on-site for support of the proposed footings or slabs due to the high fines content and the perched groundwater level. It is anticipated that portions of the excavated soils may be re-used on-site as ordinary fill, provided they are maintained in a dry condition and can be properly compacted. Reuse of



the on-site soil as ordinary fill outside the building footprint is discussed in more detail in the "Geotechnical Construction Considerations" section of this report.

Slab Recommendations

The proposed lowest level slab at Elevation +994 should be designed as a conventional soil-supported slab-on-grade underlain by a polyethylene vapor barrier spread over a minimum 9-inch thickness of ¾-inch Crushed Stone overlying a single thickness of filter fabric such as Mirafi 140N or equivalent.

Preparation of the building pad should include the removal of all topsoil from the entire proposed building footprint. The soil below the Crushed Stone layer should consist of either proof-rolled existing fill material, the natural glacial till, or imported Gravel Borrow that is placed and compacted over the proof-rolled existing fill material or glacial till to raise the grade to the bottom of the Crushed Stone layer.

Groundwater Considerations

As indicated above, groundwater measurements recorded in the observation wells installed in completed borings MA-104 and MA-106, which are located in the proposed building footprint, indicate that the groundwater level ranges from approximately Elevation +992.5 to Elevation +988.9. The observed groundwater level is noted to be below the proposed lowest level slab. However, surface water runoff that infiltrates into the ground could become perched in the fill or glacial till deposits at a shallow depth below the proposed building.

Therefore, it is recommended that the proposed slab be provided with underslab foundation drainage to protect it against groundwater intrusion. The underslab drainage system should consist of 4-inch diameter perforated PVC pipes embedded within the 9-inch layer of ³/₄-inch crushed stone and have the highest invert a minimum of 12 inches below the underside of the lowest level slab. It is recommended that the pipes be surrounded by a minimum 6-inch thickness of ³/₄-inch crushed stone surrounded by a thickness of filter fabric such as Mirafi 140N, or equivalent. The underslab drains should drain by gravity to a storm drain line which is not subject to surcharge.

To minimize the amount of water that is introduced into the foundation drainage system, it is recommended that area drains, roof drains and down sprouts be tied into a dedicated solid pipe that has a separate connection with the storm drain system. No area drains or roof drains should be directly connected with the foundation drain pipe or tied into the surrounding crushed stone layer. Furthermore, the finished exterior grade should be pitched away from the proposed building to promote surface runoff away from the building.

Furthermore, in consideration of the existing slope located to the north of the proposed building, it is recommended that the site design incorporate provisions to collect and/or divert surface water run-off away from the proposed building. Specifically, it is recommended that the project Site/Civil Engineer design a drainage system along the north



side of the building to capture and divert groundwater and/or surface water runoff around the proposed building to a storm drain line that is not subject to surcharge. It is anticipated that the drainage system could potentially consist of a trench with Crushed Stone encapsulated in filter fabric with perforated piping.

All localized depressions in the lowest level slab (such as elevator pits, etc.) should be provided with properly tied continuous waterstops in all construction joints and membrane waterproofing to protect against groundwater intrusion. Furthermore, the perimeter below-grade foundation walls should receive a troweled-on bitumastic damp proofing.

General Foundation Recommendations

It is understood that the proposed site grade to the west of the southwestern wing of the building will be at approximately Elevation +987, sloping up to approximately Elevation +992 to the east. As such, it is recommended that the perimeter walls around the southwestern wing be designed as unrestrained or cantilevered, retaining walls to allow backfilling to occur within the proposed building footprint up to the proposed slab at Elevation +994. The cantilevered retaining walls should be backfilled with a minimum 12-inch wide layer of Crushed Stone surrounded by separation fabric in conjunction with a perimeter foundation drain located around the interior of the foundation wall to prevent hydrostatic pressures from acting on the walls. The perimeter drainage should consist of a 4-inch diameter perforated PVC pipe located within the 12-inch wide Crushed Stone layer with its invert located not more than 1-foot above the exterior finished ground surface. The perimeter drainage pipes and Crushed Stone surrounding the pipes should be contiguous with the 9-inch thick Crushed Stone drainage layer below the lowest level slab. The perimeter drain should be gravity-drained, with backflow protection, to a storm drain line that is not subject to surcharge.

Below-grade foundation walls receiving lateral support at the top and bottom (i.e. restrained walls) should be designed for a lateral earth pressure corresponding to an equivalent fluid density of 60 pounds per cubic-foot. Similarly, drained cantilevered retaining walls, (i.e. receiving no lateral support at the top) should be designed for a lateral earth pressure corresponding to an equivalent fluid density of 40 pounds per cubic-foot for a level backfill condition. To these values must be added the pressures attributable to earthquake forces per Section 1610.2 of the Code.

Lateral forces can be considered to be transmitted from the structure to the soil by passive pressure against the foundation walls utilizing an equivalent fluid density of 120 pounds per cubic-foot providing that the walls are designed to resist these pressures. Lateral force can also be considered to be transmitted from the structures to the soil by friction on the base of footings using a coefficient of 0.35, to which a safety factor of 1.5 should be applied.



Seismic Design Considerations

For the purposes of determining parameters for structural seismic design, this site is considered to be a Site Class D as defined in Chapter 20 of American Society of Civil Engineers (ASCE) Standard 7-10 "Minimum Design Loads for Buildings and Other Structures". The bearing strata on the proposed site are not considered to be subject to liquefaction during an earthquake based on the criterion of Section 1806.4 of the Code.

Geotechnical Site Considerations

The major geotechnical site considerations are anticipated to include site grading, site retaining walls, preparation of hardscape subgrades, and installation of the proposed below-grade storage tank.

Site Grading

Due to the high fines content of the fill and glacial till deposits, it is anticipated that groundwater is seasonally perched at shallow depths below ground surface on the surface of the relatively impervious fill and glacial till deposits. As such, the proposed grading and site drainage should promote positive drainage.

Additionally, due to the high fines content of the fill and glacial till deposits, the site unreinforced slope surfaces may become unstable in the presence of water. Note that shallow surficial slope failures and/or surficial erosion could occur locally if sufficient vegetation (i.e. grass or other plantings) is not established on the proposed slopes. Erosion control material, such as Flexterra HP-FGM, should be applied to the slopes if they will be left unplanted for an extended period of time.

Furthermore, groundwater break-out through slopes may occur. Groundwater break-out through the slope or surface water runoff could also cause local areas of slope instability which should be addressed on a case-by-case basis. To reduce the impacts of surface water runoff on a slope, a collection trench could be constructed parallel to the top of the slope and consist of an approximately 1-foot wide trench that is encapsulated with filter fabric and backfilled with ³/₄-inch crushed stone. A 6-inch diameter perforated PVC pipe would be placed in the trench which would be directed to a storm drain.

Site Retaining Walls

Cantilevered site retaining walls should be backfilled with free-draining material and provided with weep holes spaced at maximum 10-foot centers. Crushed Stone surrounded by filter fabric should be provided at each weep hole. In conclusion, the results of the slope stability analyses indicate a minimum FOS of 1.5 for the proposed conditions which include a surcharge load from the proposed footings.



It is understood that the current design for the new baseball field will necessitate the construction of a site retaining wall that will retain up to approximately 16 feet of soil. Since the field will effectively be benched into the existing slope, the global stability of the slope and retaining wall should be analyzed during the design phase to confirm that the proposed construction does not result in an unacceptable factor of safety for slope failure. Furthermore, the temporary extents of the excavation required to construct the proposed retaining wall could also result in slope stability issues which should be analyzed.

Preparation of Hardscaped Areas

Preparation of subgrades for hardscape areas such as bituminous asphalt paved areas or concrete walkways should include the removal of all existing site improvements and the surficial deposit of topsoil. The exposed fill subgrade should be proof-rolled with at least four (4) passes of a 10,000-pound drum roller prior to the placement of any fill. All soft or compressible areas detected by the proof-rolling should be excavated and be replaced with compacted ordinary fill.

Specific recommendations regarding subbase materials below sidewalks, bituminous concrete, playing fields, and landscaped areas should be provided by the Project Site/Civil Engineer or Landscape Architect.

Below-Grade Storage Tank

It is recommended that the below-grade storage tank be designed to resist hydrostatic uplift pressure based on a recommended design groundwater level corresponding to the finished ground surface. This will likely require that a hold-down slab or mat be constructed below the proposed tank.

Geotechnical Construction Considerations

The primary foundation construction considerations include on-site reuse of excavated soils, groundwater control and dewatering, footing and slab subgrade preparation and protection, and off-site removal of excess excavated soil.

On-Site Reuse of Excavated Soils

As described above, grain size distributions of representative samples of the fill material indicate that the fines content (i.e. silt and clay) ranges from about 24 to 46 percent. In addition, grain size distributions of representative samples of the glacial till deposit indicate that the fines content ranges from about 34 to 51 percent. Due to the fines content of the on-site soils, excavated material may become unsuitable for re-use if it is not covered and becomes too wet to be properly compacted. Furthermore, when the on-site material is wet it is susceptible to freezing which may also prevent it from being acceptable for on-site reuse. If the earthwork operations are performed during a wet and/or cold period, it is



anticipated that significant portions of the on-site soil may become unsuitable for re-use on-site.

As such, at the present time the on-site fill and glacial till are not recommended to be reused on-site for support of the proposed footings or slabs due to the high fines content and shallow groundwater. It is anticipated that portions of the excavated soils may be re-used on-site as ordinary fill to raise site grades, provided they are maintained in a dry condition and can be properly compacted. It is possible that layers of Gravel Borrow or Crushed Stone may need interbedded in the fill to maintain its usability depending on the excavated soils moisture content.

It is emphasized that excavated material will become unsuitable for re-use if it becomes too wet. Therefore, it is recommended that stockpiles of excavated material intended for reuse be protected against increases in moisture content by securely covering the stockpiles at all times with 6-mil polyethylene for protection from precipitation and also as a dust mitigation measure.

The placement and compaction of on-site material should be completed during relatively dry and non-freezing conditions. If, due to any of the above conditions, the excavated material is unsuitable for reuse, an off-site Gravel Borrow should be used. Protection of excavated materials from increases in moisture content is considered to be the responsibility of the Contractor.

Groundwater Control and Dewatering

Proper control of groundwater and surface water will be necessary to maintain a firm subgrade to support construction traffic. In consideration of the observed depth of the groundwater below the existing ground surface, during excavation to the bearing stratum at the footing locations groundwater perched in the fill or on the surface of the glacial till deposit may be encountered. As such, the volume of groundwater to be accommodated should be able to be controlled by use of sumping and strategically located trenches to direct groundwater away from construction activities. Additionally, runoff may periodically accumulate on the site subgrade during precipitation events. It is recommended that all pumped groundwater be recharged on-site. If pumped groundwater into a nearby storm drain or combined sewer which would require the need for a temporary construction dewatering discharge permit.

As discussed above, the fine-grained nature of the fill and glacial till soils that underlie the project site make them highly susceptible to disturbance during the construction period in the presence of moisture. Furthermore, the groundwater table at the site is believed to be perched on the surface of the relatively impervious fill and glacial till deposits which will further exacerbate the disturbance of the glacial till bearing surfaces. It is considered imperative that the groundwater be cut-off and/or diverted at the perimeter of the proposed excavations to minimize the disturbance of the bearing surfaces and to maximize the



reusability of the excavated on-site soils. Therefore, attention should be given to providing positive drainage to direct surface water away from the excavations at all times.

Footing and Slab Subgrade Preparation and Protection

Prior to construction of the proposed building, it is recommended that the surficial layer of topsoil and all utilities within the footprint of the proposed structure be removed in their entirety. Outside the proposed building footprint, abandoned structures and utilities may be cut off and removed to a depth of at least two (2) feet below finished grades. As indicated above, the proposed footings are recommended to bear directly on the natural glacial till deposit or on compacted Gravel Borrow placed over the natural glacial till deposit following the removal of the existing uncontrolled fill. The existing fill located below the footings, and within the zone of influence of the footings, will need to be excavated and imported Gravel Borrow placed and compacted for support of the footings. Where the depth from the design bottom of footing to the glacial till subgrade is 12 inches or less, ³/₄-inch Crushed Stone could be used in lieu of Gravel Borrow. Crushed Stone should be placed in lifts having a maximum compacted thickness of six (6) inches.

The glacial till subgrade and all footing bearing surfaces should be prepared utilizing a smooth-edged or "toothless" excavator bucket to avoid disturbance of the subgrade or should be hand-cleared of loose and disturbed material. It is noted that the exposed natural glacial till subgrade will be highly susceptible to disturbance due to construction activities and should be protected immediately following excavation. A minimum 3-inch thickness of ³/₄-inch Crushed Stone should be placed over a layer of filter fabric, such as Mirafi 140N or equivalent, laid across the footing subgrade immediately following excavation to the final bearing surface as protection to prevent disturbance of the footing subgrades during subsequent forming operations.

The existing fill, where encountered, may remain in place below the lowest level slab provided it is proof-rolled with a minimum of six (6) passes of a large walk-behind double drum roller. All soft, spongy or "weaving" areas observed during the proof-compaction should be removed and replaced with compacted Gravel Borrow.

Further, it is recommended that excavation equipment not work within the proposed building footprint on the exposed fill or glacial till subgrade if water is present. If excavation or subgrade preparation work is performed in below-freezing temperatures, the fill and glacial till should be considered highly susceptible to frost penetration and will become unsuitable if left unprotected. The Contractor will need to be prepared to protect foundations, slabs and exposed subgrades from frost intrusion. Soil within the building footprint which becomes frozen will need to be removed prior to placement of fill materials or concrete.

The excavation subgrade is likely to become disturbed and unsuitable due to construction equipment traffic, especially during precipitation events. The Contractor may need to place Crushed Stone or other material over the exposed subgrades to make the site trafficable and protect it from disturbance due to equipment operation.



Off-Site Removal of Excess Soil

Worcester County has well documented levels of naturally occurring arsenic in soil and rock which can exceed DEP standards. Should excess excavated soil generated from the proposed construction require off-site removal, current Department of Environmental Protection (DEP) policies and regulations for off-site reuse of excess excavated soil require environmental characterization of the excavated soil prior to its off-site reuse.

Final Comments

It is recommended that McPhail be retained to provide final design assistance to the design team during the design phase of this project. The purpose of our involvement would be to prepare the foundation drainage plan; review the structural foundation drawings, landscape plans and civil drawings for conformance with the recommendations presented herein; and, to prepare the earthwork specification section for inclusion into the Contract Documents for construction.

Additionally, it is recommended that McPhail be retained during the construction period to observe preparation of the foundation bearing surfaces and slab subgrade, construction dewatering, and the placement and compaction of all building-related fill materials in accordance with the provisions of the Code and the provisions of the Contract Documents. Our involvement during the construction phase of the work should minimize costly delays due to unanticipated field problems since our field engineer would be under the direct supervision of our project manager who was responsible for the subsurface exploration program and foundation design recommendations documented herein.

We trust that the above is sufficient for your present requirements. Should you have any questions concerning the foundation design recommendations presented herein, please do not hesitate to call us.

Very truly yours,

McPHAIL ASSOCIATES, LLC

Christopher P. Miller

Jonathan W. Patch, P.E.

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9999	10000000000000000000000000000000000000	R=1000.54		PROPERTY LINES FOR 14-34 HYLAND FROM PLAN BOOK 724 PAGE 27					
	998.44 6 999.999.00 999.999.000x1								
^{3999;6} ^{999;4}	999947			/	/				
200,57 999950	⁹⁹⁹ ×7 100	0,00-1000,00							
224 100	999.6 999.5 999.4	5 1000	18 IVLAND AVE. N/F KIEU TIM BK 2075 PC 127 PID:15 A23.24 0						
14 00:52 TOS	39:0 999:6 900	1000×0 1000×5 6							
5 1000x2 1000		199997.44 \$08915 P	Port Asi			/			
1000x7 900	OFELD SOAL PO	DST/	5001 P. J.						
4880 39.0	99934 9984> (90	^{PXO} PO1000×8							
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9, ₅₂ 999, ₅₃ ,9		5 1.006.4	Ĩ / / / ,	X / / /	/	/			
3 9.0~	- 342 99947 100042		[] [] []						
999:8	T 1000x1 0 5		/ / / /	20 IVLAID AVE. N/F DAVD GALLANT JR. BK 23134 PG 92 PID 15 A23.23 0					/
1000×1 2999 1000×2				/ / X / ,					
) ^{\$\$}					/	
		r = r			/				
				/	1		/		
				<i>`</i>	99 109 AND ALS		~		
		-			M/F M/CAAD. BK 30372 F0 107 PID:15 A23.22 0				
968 ^{×8} 968 ^{×9}									
6x820									
96 <i>0</i> 30 x4	968×7				24 HYLAND A N/F KATE ANNED BIC 54721 PG PID:15 A23.21	VE. 71 234 0			
968×5 968	8*5								
968×2	968×1 96 ¹ /×7								
968×1						28 HYLAND AVE. N/F PATRICK MCKAY BK 47319 P0198 PID:15 A23.20 0			
968×1	967×8					28 HYLAND AVE.			
968*0	968×0 067×3			_LE	EGEND	STEPHEN WEAVER BN 57319 PG 388 PID:15 A23.19 0		PROPERTY LINES FOR 14-34 HYLAND FROM PLAN BOOK 724 PAGE 27	
967×6	-	- APPROXIMATE	_OCATION "	TEST PIT PERFC	RMED BY LEICES	STER DPW O	N DECEN	1BER 5	
	I	AND 6, 2019 f	FOR OTHER	5					
/		- APPROXIMATE DECEMBER 6, 1	_OCATION 2019	HAND AUGER PI	ERFORMED BY N	1cPHAIL ASS	OCIATES	, LLC ON	
	e	- APPROXIMATE		BORING PERFO	RMED BY TECHN	IICAL DRILLIN	IG SERVI	CES, INC.	
5		ON DECEMBER	5 AND 6,	2019 FOR McF	'HAIL ASSOCIATI	ES, LLC		,	
X		– APPROXIMATE ON MARCH 5 A	LOCATION	BORING PERFO 9 FOR McPHAI	RMED BY TECHN L ASSOCIATES.	IICAL DRILLIN LLC	G SERVI	CES, INC.	
	(+999.0) -	- INDICATES ELEV	/ATION OF	GLACIAL TILL EN	NCOUNTERED				
	(1000.0)								
		"EXISTING CON	DITIONS PL	AS PREPARED F AN" TRANSMITT	ED TO MCPHAIL	ASSOCIATES	5, LLC OI), N	
		APRIL 1, 2019 "OVERALL LAND	BY NITSCH SCAPE SIT	1 ENGINEERING, E PLAN" DATED	NOVEMBER 27,	SCALE DRAV 2019 PREP	VING ENT ARED BY	TITLED,	
		FINEGOLD ALEX	ANDER ARG	CHITECTS	11C SCALE				
NSLOW ANF-		5 <u>0</u>	0	<u>50</u>	100		200		
N/F CECESTER 15 A14.1 0									
							ור ור		
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			LEICESTER	۲				MASSA	CHUSETTS
				c C	BUBSURFACE EX	PLORATION I	PLAN		
	McP	HAIL			FC			0T 0	
	ASSOCI	ATES, LLC		FINEGC	JLU ALEXAN	IDEK AR(V	CHITE	615	
2	Geoenvironme	ental Engineers		NA_{\sim}	B Phaii ass.	, OCIATEC	5.110		
" W	2269 Massac	husetts Avenue		IVIC			·, LL\		
009	617/8	68-1420	Date:	JANUARY 2020	Dwn: F.G.	p. Chkd	: C.P.M.	Scale:	" = 50'
80	617/868- www.mcp	-1423 (Fax) hailgeo.com	Project	No:	6743			FIGUR	RE 2
		-	- , , , , , , , , , , , , , , , , , , ,		2, 10				· =



PROJECT No. 6743



PROJECT No. 6743



APPENDIX A:

LIMITATIONS



LIMITATIONS

This report has been prepared on behalf of and for the exclusive use of Finegold Alexander Architects for specific application to the proposed new Leicester School in Leicester, Massachusetts in accordance with generally accepted soil and geotechnical engineering practices. No other warranty, expressed or implied, is made.

In the event that any changes in nature or design of the proposed construction are planned, the conclusions and recommendations contained in this report should not be considered valid unless the changes are reviewed and conclusions of this report modified or verified in writing by McPhail Associates.

The analyses and recommendations presented in this report are based upon the data obtained from the subsurface explorations performed at the approximate locations indicated on the enclosed plan. If variations in the nature and extent of subsurface conditions between the widely spaced explorations become evident during the course of construction, it will be necessary for a re-evaluation of the recommendations of this report to be made after performing on-site observations during the construction period and noting the characteristics of any variations.



APPENDIX B:

BORING LOGS MA-1 THROUGH MA-8 AND MA-101 THROUGH MA-108 PREPARED BY MCPHAIL ASSOCIATES, LLC

Proje	ct:	Lei	cester S	School			Job #	<i>‡</i> :	6743	.2.00		Boring	j No.	
Locat	ion:	70	Winslov	w Avenue			Date	Started:	3-6-1	9		МЛ	_1	
City/S	State:	Lei	cester,	MA			Date	Finished:	: 3-6-1	9			/- I	
Contra	ctor:	Technic	al Drilling	y Services Ca	asing Typ	be: 4 1	/2" HSA				Gro Date	undwater	Observa	tions Notes
Driller/	Helpe	r: Bret	t/Donnie	Ca	asing Har	nmer (l	bs)/Drop	(in): N/A			3-6-19	6.0	961.5	110100
Logged	d By/R	eviewe	d By: K	K. Seaman Sa	ampler Si	ze/Type	e: 24" Sp	lit Spoon						
Surfac	e Elev	ation (f	t): 967.5	Sa	ampler Ha	ammer	(lbs)/Dro	p (in): 140Ll	B/30"					
		0	- to ange				Samp	le						
Depth (ft)	Elev. (ft)	Symb	Depth/El Strata Cha (ft)	Stratum	N-Value RQD	No.	Pen. /Rec. (in)	Depth (ft)	Blows/6" Min/ft		Sampl and E	e Descrip Boring Not	tion tes	
	- 967				46	S1	12/11	0.0-1.0	21 25	Dense, light	brown to orange, S	AND, trace s	silt. (Fill)	
- 1 -	- 966				76	S1A	12/11	1.0-2.0	41 35	Very dense,	orange to gray, Gl	RAVELLY SA	ND, some si	lt. (Fill)
- 2 -	- 965			FILL					17	Dense, brow	n to gray, SILTY S	AND and GR	AVEL. (Fill)	
- 3 -	000				40	S2	24/8	2.0-4.0	22 18					
- 4 -	- 964		4.0 / 963.5						19	Loose bleek		T trace grou	ol with como	root mottor
- 5 -	- 963	<u>ii</u> . <u>i.</u>			9	S3	24/10	4.0-6.0	3	(Historic Top	soil/Subsoil)	. I, trace grav	ei, wiin some	root matter.
	- 962	<u>v. v.</u> r.	6.0 / 961.5						6 15					
- 6 -	- 961								22	Dense, gray	, SILTY SAND, sor	ne gravel. (G	lacial Till)	
- 7 -	- 960				33	S4	24/4	6.0-8.0	18					
- 8 -	300	0.0.0							17 10	Compact br	own to grav-brown	SII T and SA	ND some a	ravel (Glacial
- 9 -	- 959	20.0			10	S5	24/10	8.0-10.0	5	Till)				(
10	- 958	0.0.00							5 9					
	- 957	20.0							10 10	Compact, br Till)	own to gray-brown	SILT and SA	ND, some g	ravel. (Glacial
- 11 -	- 956	0.0.00			16	S6	24/12	10.0-12.0	6					
- 12 -	055	20.0							5	Compact, br	own to gray-brown	SILT and SA	ND, some g	ravel. (Glacial
- 13 -	955	0.0.1 0.(., vo		GLACIAL TILL	18	S7	24/12	12.0-14.0	7 11	Till)				
- 14 -	- 954	20.0							14					
45	- 953													
- 13 -	- 952	0. O.												
- 16 -	- 951													
- 17 -	050	$\frac{1}{2}$												
- 18 -	- 950													
- 19 -	- 949	0.0° 0.0°												
	- 948		20.0 / 947.	5										
20 -	- 947	<u>0.0.7</u>							9 12	Compact, gr	ay, SILT and SANI), some grav	el. (Glacial T	ill)
- 21 -	- 946	20.0		GLACIAL TILL	28	S8	24/6	20.0-22.0	16					
- 22 -	045								18					
0			s I											
BLOWS	5/FT.	DENS	U TY	SUIL CUMPUNENT										
0-4 4-10		V.LOC	SE SE	DESCRIPTIVE TERM	PROF	PORTION	OF TOT	AL SOIL COMF	CONTAIN PONENTS	ING THRE	E			
10-3	0	COMP	ACT	"TRACE" "SOME"		0-10)%	WHIC		RISE AT LE	AST			
30-5 >50	0	DENS V.DEN	SE ISE	"ADJECTIVE" (eg SANDY, SIL	.TY)	20-3	5%	CLAS	SIFIED AS			ASSO	CIATES, L	LC
CC	DHESIV	E SOILS	3	"AND"		35-5	0%	WELL	-GRADE	MIXTURE	: ∪⊢" M	CPHAIL A	SSOCIATI	ES, LLC
BLOWS	5/FT. (CONSIST V.SC	IENCY FT	lotes:							2269	CAMBRIE	HUSETTS	SAVENUE 02140
2-4		SOF	т									TEL: 6 FAX: 6	617-868-14 617-868-14	420 423
4-8 8-15	5	FIR STII	M F											
15-3	0	V.ST	IFF	Noothor: Dorthy Cloudy								Pag	e 1 of :	2
>30		HAF		veather: Partly Cloudy								3		

Lacation: 70 Winslow Avenue Date Startes: 3-6-19 MA-1 Chy/State: Leicester, MA Date Finished: 3-6-19 MA-1 Chy/State: Leicester, MA Date Finished: 3-6-19 Conductor: Tachnal Dilling Sartos Casing Hymmer (BsD/Drop (in): N/A Logged Pytterkened By: K. Saman Sampler StarType: 4/ Spit Spico Tachnal Dilling Sartos Sampler StarType: 4/ Spit Spico Tachnal Dilling Sartos Sampler StarType: 4/ Spit Spico Tachnal Dilling Sartos Casing Hymmer (BsD/Drop (in): N/A Tachnal Dilling Sartos Sampler StarType: 4/ Spit Spico Tachnal Dilling Sartos Sampler StarType: 4/ Spit Spit Sartos Sampler StarType: 4/ Spit Sartos Sampler Sta	Proje	ct:	Lei	cester S	chool			Job	#:	6743	3.2.00		Boring	No.	
Implement Destruction Casing Type: 4 1/2 HS A Groundwater Observations Contractor: Technical Dilling Services Casing Hammer (bis)Drop (in): N/A Implementations Date Implementations Logged byRevelwed By: K Semma Sampler State/Type: 24: Split Spon Implementations Implementations Implementations Depth Eliv Implementations Sampler State/Type: 24: Split Spon Sampler State Sampler State Implementations Depth Eliv Implementations Sampler State Sampler State Sampler State Sampler State 24 044 Implementations Sampler State Sampler State Sampler State Sampler State 24 044 Implementations Implementations Sampler State Sampler State Sampler State 24 044 Implementations Implementations Sampler State Sampler State Sampler State 24 044 Implementations Implementations Sampler State Sampler State Sampler State 25 041 Imp	Locat	ion: State	70 Lei	Winslow	v Avenue MA			Date Date	Started: Finished	3-6-1 3-6-1	19 19		MA	-1	
Contractor: Technical Delling Services Casing Yang: 4.1/2 HSA Date Date Date Notes Logged ByReviewed By: K. Seaman Sampler StarType: 24 Spit Spon Image: 24 Spit Spit Spit Spit Spit Spit Spit Spit	ony/c	nate.						Bato				Gr	oundwater	Observat	ions
Depth Education Observed Factor Sample StartPice V Split Sample Split Sample StartPice V S	Contra	ctor: T	echnic	cal Drilling	Services Ca	sing Typ	be: 41	/2" HSA	(in), N/A			Date	Depth	Elev.	Notes
Decycle developed in the second of		Heiper:		d By: K	Seaman Sa	mnler Si	ize/Type	· 24" Sr	blit Spoon			3-6-19	6.0	961.5	
Convert Convert Sample Sampl	Surface	e Eleva	tion (f	t): 967 5	Sa	mpler H	ammer (Ibs)/Dro	on (in): 1401	B/30"					
Depth Elew B B Stratum Mulate No. Proc. Opph Boow Sample Description and Boring Notes 24 443 Solution DLACIAL TLL 18 99 240 25.0-27.0 0 Compact Space Sp				ං භී		•		Samp							
(10) (10) (2) <th< td=""><td>Depth</td><td>Elev.</td><td>loqu</td><td>h/EL t Chan (ft)</td><td>Stratum</td><td>N-Value</td><td></td><td>Pen.</td><td>Depth</td><td>Blows/6"</td><td></td><td>Sam</td><td>ole Descrip</td><td>tion</td><td></td></th<>	Depth	Elev.	loqu	h/EL t Chan (ft)	Stratum	N-Value		Pen.	Depth	Blows/6"		Sam	ole Descrip	tion	
1 944 044	(ft)	(ft)	sy	Dept Strata		RQD	No.	/Rec. (in)	(ft)	Min/ft		and	Boring Not	es	
Log 943 Column	- 24 -	- 944	0.0.1 0.0.1												
22 942 042.04.04.01.01 10 9 20.2 20.5 0.27.0 0 0 Compart, gay, Sull and SAMD, take gravel (Gaussi Ta). 77 940 40.427.0 Mos Bottom of being at 27 feet below ground without 1	25	- 943	0.00 0.00												
28 -941 -941 -941 -940 9 28 -940 -938 -939 -938 -939 -939 31 -936 -937 -936 -938 -936 -938 -939 31 -936 -938 -939 -938 -939 -936 -938 -936 -938 -939 -939 -939 -939 -939 -939 -939 -939 -939 -939 -939 -939 -938 -939 -930	25	- 942	:0: 			10	00	04/0	05.0.07.0	5 9	Compact, gra	ay, SILT and SA	ND, trace grave	I. (Glacial Till))
27 -	- 26 -	- 941	0.0.(27.0/040.5		18	59	24/2	25.0-27.0	9					
28 - 930 - 933 -	- 27 -	- 940	<u>[0.1. X</u> 0	21.0/940.5	Bottom of boring at 27 feet below					3					
29 -300 130 -938 -37 -936 -38 -934 -37 -935 -38 -934 -37 -933 -36 -932 -37 -931 -38 -932 -39 -928 -40 -927 -41 -926 -42 -922 -38 -922 -39 -922 -39 -922 -44 -927 -41 -926 -42 -927 -43 -924 -42 -925 -39 -924 -42 -925 -39 -922 -44 -923 -44 -924 -39 -924 -43 -924 -39 -924 -39 -925 -39 -926 -22 -927 -41 -926 -927 -928	- 28 -	- 030			ground surface.										
30 - 333 31 - 937 32 - 938 33 - 933 34 - 933 - 34 - 933 - 35 - 933 - 36 - 933 - 37 - 931 - 38 - 932 - 39 - 931 - 37 - 931 - 38 - 929 - 39 - 928 - 40 - 927 - 41 - 926 - 42 - 925 - 43 - 924 - 44 - 923 - 924 - 924 - 44 - 923 - 924 - 925 - 39 - 924 - 44 - 923 - 925 - 924 - 44 - 923 - 920 - 926 - 921 - 926 - 922 - 927 - 43 - 924 - 44 - 923 - 924 - 924 - 925 - 926 - 927 - 927 <	- 29 -	_ 020													
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34 934 934 934 934 934 934 934 934 935 932 933 932 933 9	- 33 -	- 935													
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-35 -932 - <td>- 34 -</td> <td>- 933</td> <td></td>	- 34 -	- 933													
- 36 - 931 - 37 - 930 - 38 - 929 - 39 - 928 - 40 - 927 - 41 - 926 - 42 - 925 - 43 - 924 - 44 - 923 - 44 - 923 - 922 - 924 - 44 - 923 - 924 - 924 - 44 - 923 - 922 - 923 - 923 - 924 - 44 - 923 - 924 - 924 - 45 - 922 - 928 - 928 - 928 - 928 - 924 - 924 - 44 - 923 - 922 - 923 - 924 - 924 - 45 - 922 - 928 - 0.10% - 928 - VLOOSE - 044 - 10.20% - 928 - VLOOSE - 045 - 928 - 928 - VLOOSE - 928 VJOENSE -	- 35 -	- 932													
- 37 - 930 - 930 - 929 - 929 - 929 - 928 - 927 - 41 - 926 - 925 - 924 - 924 - 924 - 924 - 924 - 923 - 924 - 924 - 923 - 924 - 925 - 924 - 924 - 924 - 924 - 925 - 924 - 925 - 924 - 924 - 925 - 926 - 927 - 927 - 928 - 924 - 924 - 924 - 927 - 928	- 36 -	- 931													
- 38 - 929 - 929 - 929 - 929 - 928 - 928 - 929 - 928 - 928 - 927 - 927 - 927 - 927 - 925 - 924 - 922 - 924 - 924 - 924 - 924 - 924 - 924 - 924 - 924 - 924 - 924 - 924 - 924 - 924 - 924 - 924 - 924 - 924 - 924 - 924 - 925 - 924 - 924 - 925 - 924 - 924 - 924 - 925 - 925 - 925 - 925 - 924 - 924 - 924 - 925 - 925 - 925 - 925 - 925 - 926 - 926 - 926 - 926 - 926 - 926 - 926 - 926 - 926 - 926 <td< td=""><td>- 37 -</td><td>- 930</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>	- 37 -	- 930													
- 39 -	- 38 -	- 020													
- 40 - 928 -<	- 39 -	929													
 41 - 927 926 925 925 924 924 923 922 GRANULAR SOILS BLOWS/FT. DENSITY 0.4 V.LOOSE 410 COHESIVE SOILS COHESIVE SOILS BLOWS/FT. CONSISTENCY V.VENSE *AD COHESIVE SOILS BLOWS/FT. CONSISTENCY V.VENSE *AD	- 40 -	- 928													
 42 - 925 - 43 - 924 - 925 - 924 - 923 - 924 - 923 - 924 - 923 - 922 - 9	- 41 -	- 927													
- 43 - 925 - <td>- 42 -</td> <td>- 926</td> <td></td>	- 42 -	- 926													
- 44 - 924 - 923 - <td>- 43 -</td> <td>- 925</td> <td></td>	- 43 -	- 925													
-45 -923 -923 -923 -922		- 924													
- 45 - 922	44	- 923													
GRANULAR SOILS SOIL COMPONENT BLOWS/FT. DENSITY 0-4 V.LOOSE 4-10 LOOSE 10-30 COMPACT 30-50 DENSE >50 V.DENSE "AND" 10-20% 250 V.DENSE "AND" 20-35% COHESIVE SOILS McPHAIL ASSOCIATES, LLC 2269 MASSACHUSE, MADY, SILTY) 20-35% V.DENSE "AND" "AND" 36-50% V.DENSE "AND" "AND" 36-50% Well-GRADED MIXTURE OF" McPHAIL ASSOCIATES, LLC 2269 MASSACHUSETTS AVENUE CABRIDGE, MA 02140 TEL: 617-868-1420 FAX: 617-868-1420 <tr< td=""><td>- 45 -</td><td>- 922</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr<>	- 45 -	- 922													
O-4 V.LOONSE DESCRIPTIVE TERM PROPORTION OF TOTAL SOIL CONTAINING THREE COMPONENTS EACH OF Office Office <thoffice< th=""> <thoffice< th=""> <thoffi< td=""><td>GF BLOWS</td><td>RANULA</td><td>R SOIL</td><td>S</td><td>SOIL COMPONENT</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></thoffi<></thoffice<></thoffice<>	GF BLOWS	RANULA	R SOIL	S	SOIL COMPONENT										
4-10LOOSETRACE"COMPONENTS EACH OF10-30COMPACT"TRACE"0-10%WHICH COMPRISE AT LEAST30-50DENSE"SOME"10-20%25% OF THE TOTAL ARE>50V.DENSE"ADJECTIVE" (eg SANDY, SILTY)20.35%CLASSIFIED AS "A*ADJ"AND"35-50%WELL-GRADED MIXTURE OF"Motes:COMESING COMSISTENCY24SOFT4-8FIRM8-15STIFF15-30V.STIFF>30HARDWeather: Partly CloudyWeather: Partly Cloudy	0-4	<u>,,,,,</u>	V.LOC	SE	DESCRIPTIVE TERM	PROF	PORTION	OF TOT	TAL SOIL				\leq		
30-50DENSE"SOME" "ADJECTIVE" (eg SANDY, SILTY) 20.35%10-20% 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"Image: Comparison of the total and the total and tott	4-10 10-3	0	LOOS	SE ACT	"TRACE"		0-10	%	WHIC		RISE AT LE	AST			>
Instruct "AND" 35-50% WELL-GRADED MIXTURE OF" McPHAIL ASSOCIATES, LLC BLOWS/FT. CONSISTENCY BLOWS/FT. CONSISTENCY VSOFT Notes: 2-4 SOFT 4-8 FIRM 8-15 STIFF 15-30 V.STIFF >30 HARD Weather: Partly Cloudy	30-5 >50	0		SE ISF	"SOME" "ADJECTIVE" (eg SANDY, SIL ⁻	TY)	10-20 20-3)% 5%	25% (CLAS	JE THE T SIFIED AS	UTAL ARE S "A		MC ASSOC	PHA HATES, L	LC
BLOWS/F1. CONSISTENCY Notes: 2269 MASSACHUSETTS ÁVENUE CAMBRIDGE, MA 02140 TEL: 617-868-1420 FAX: 617-868-1423 2-4 SOFT 4-8 FIRM 5-15 FIRM 5-15 FIRM 5-15 FIRM 5-15 Page 2 of 2 15-30 V.STIFF 5-30 Weather: Partly Cloudy Page 2 of 2	CC	DHESIVE	SOIL	3	"AND"		35-50	0%	WELL	-GRADEI) MIXTURE	OF"	McPHAIL AS	SOCIATE	S, LLC
2-4 SOFT TEL: 617-868-1420 4-8 FIRM FAX: 617-868-1423 8-15 STIFF 15-30 V.STIFF >30 HARD	BLOWS <2	5/FT. C(UNSIS V.SC	IENCY N	otes:							220	59 MASSAC CAMBRID	HUSETTS GE, MA 0	AVENUE 2140
8-15 STIFF 15-30 V.STIFF >30 HARD Weather: Partly Cloudy	2-4		SO	T M									TEL: 6 FAX: 6	17-868-14 17-868-14	20 23
15-30 V.STIFF >30 HARD Weather: Partly Cloudy Page 2 of 2	4-0 8-15	5	STI	FF											
	15-3 >30	0	V.ST HAF	IFF RD W	eather: Partly Cloudy								Pag	e 2 of 2	2

Location: TO Winslow Avenue Date Starte(2): 3-6-19 MA-2 Contractor: Todinal Driing Service: Gasing Yappe: 4,17 HSA Gasing Yap	Proje	ct:	Lei	cester S	School			Job #	#:	6743	3.2.00		Boring	No.		
Contractor Contrac	Locat	ion: State	70' Lei	Winslov cester l	w Avenue MA			Date Date	Started: Finished:	3-6-1 3-6-1	19 19		MA	-2		
Contract Contract During Upper Data Data <thdata< th=""> <thdata< th=""> Data<td>ony/c</td><td></td><td></td><td></td><td></td><td>·</td><td></td><td></td><td></td><td></td><td></td><td>Gro</td><td>undwater</td><td>Observa</td><td>tions</td></thdata<></thdata<>	ony/c					·						Gro	undwater	Observa	tions	
Uniterimper Deskubbility Deskubbility </td <td>Contra</td> <td>ctor:</td> <td>Technic Brot</td> <td>cal Drilling</td> <td>i Services Ca</td> <td>asing Typ</td> <td>0e: 41</td> <td>/2" HSA ha\/Dran</td> <td>(in), N/A</td> <td></td> <td></td> <td>Date</td> <td>Depth</td> <td>Elev.</td> <td>Notes</td>	Contra	ctor:	Technic Brot	cal Drilling	i Services Ca	asing Typ	0e: 41	/2" HSA ha\/Dran	(in), N/A			Date	Depth	Elev.	Notes	
Logged by retry terms by: Classifier Sampler Hammer (Hall) (Hall	Driller/	пере			Coomen St	asing nai amplor Si										
Contract investor (1): 91:0 Stratum Model No. Product (1): 91:0 Sample Sa	Logged	а Бјоу	eviewe	и БУ : К	. Seaman Sa		ammor /	7. 24 Sp (Ibe)/Dro	nii Spoon	D/20"						
Depth (II) Ever (II) B 	Surraci	e Elev		(). 991.0				Some		B/30						
(ft) (ft) S S S Channel in the constraint of grant (ft)	Depth	Elev	. loqu	/EL to Chang t)	Stratum			Samp		DI (01		Sampl	e Descrip	tion		
1 - 991 <th -="" 9<="" td=""><td>(ft)</td><td>(ft)</td><td>Syn</td><td>Depth Strata ((f</td><td>Stratum</td><td>RQD</td><td>No.</td><td>/Rec. (in)</td><td>(ft)</td><td>Blows/6" Min/ft</td><td></td><td>and E</td><td>Boring Not</td><td>es</td><td></td></th>	<td>(ft)</td> <td>(ft)</td> <td>Syn</td> <td>Depth Strata ((f</td> <td>Stratum</td> <td>RQD</td> <td>No.</td> <td>/Rec. (in)</td> <td>(ft)</td> <td>Blows/6" Min/ft</td> <td></td> <td>and E</td> <td>Boring Not</td> <td>es</td> <td></td>	(ft)	(ft)	Syn	Depth Strata ((f	Stratum	RQD	No.	/Rec. (in)	(ft)	Blows/6" Min/ft		and E	Boring Not	es	
2 Correct. Down, Sit. T ard SMD; table growt (48) 3 -998 4.2/077.8 4 -986 4.2/077.8 6 -986 - 7 -985 - 8 -986 - 9 - - 9 - - 9 - - 10 - - - 9 - - - - 11 - - - - - 12 - - - - - - 13 - - - - - - 14 - - - - - - 14 - - - - - - 10 - - - - - - - 11 - - - - - - - - 11 - - - - - - -	- 1 -	- 991 - 990				17	S1	24/20	0.0-2.0	15 11 6 9	Compact, bro	own, SAND, some	silt, trace roo	t matter and	gravel. (Fill)	
4 980 4 Compact Loom to lan. SUIT all SMD, some gravet. (Gaudel TF) 5 986 5 987 Compact Loom to lan. SUIT all SMD, some gravet. (Gaudel TF) 7 986 984 7 Compact Loom to lan. SMD, some sill rate gravet. (Gladel TF) 8 984 984 7 Compact Loom to lan. SMD, some sill rate gravet. (Gladel TF) 9 983 C CLACIAL TLL 20 S5 24/30 8.0.10.0 7 Compact Loom to lan. SMD, some sill and gravet. (Gladel TI) 9 983 C CLACIAL TLL 20 S5 24/30 8.0.10.0 7 Compact Loom to lan. SMD, some sill and gravet. (Gladel TI) 11 981 C 10 982 20 S5 24/30 8.0.10.0 7 Compact Loom to lan. SMD, some sill and gravet. (Gladel TI) 12 980 C 10 10 10 10 2	- 2 -	- 989		4 0 / 097 9	FILL	28	S2	24/22	2.0-4.0	14 13 15	Compact, bro	own, SILT and SAM	ND, trace grav	vel. (Fill)		
5 987 987 14 S3 24/18 4.0.6.0 ** 7 986 6 986 6 7 7 6 987 7 7 7 7 7 986 6 7 <td< td=""><td>- 4 -</td><td>- 900</td><td></td><td>4.0/907.0</td><td></td><td></td><td>Compact, br</td><td>own to tan, SILT ar</td><td>nd SAND, son</td><td>ne gravel. (G</td><td>Blacial Till)</td></td<>	- 4 -	- 900		4.0/907.0			Compact, br	own to tan, SILT ar	nd SAND, son	ne gravel. (G	Blacial Till)					
6 986 986 12 Compact transitions but, SAND, some sitt trace gravel (Oacial TI) 9 983 984 1 20 84 2416 6.0-8.0 6 10 982 983 GLACIAL TILL 20 85 24/20 8.0-10.0 7 1 11 981 GLACIAL TILL 20 85 24/20 8.0-10.0 7 1 12 980 983 GLACIAL TILL 20 85 24/20 8.0-10.0 7 1 14 976 14.01977.8 14.01977.8 14.01977.8 8 110.01977.8 110.01977.8 110.01977.8 10.01977.8 110.01977.8 10.01977.8	- 5 -	- 987														
7 - 985 984 - 984 - 984 - 984 - 984 - 984 - 984 - 984 - 983 - 984 - 983 - 984 - 983 - 984	- 6 -	- 986	0.0.0 0.00							12 7	Compact, br	own to tan, SAND,	some silt, tra	ce gravel (Gl	lacial Till)	
8 - 994 - 10 - 10 - 983 - 10 - 10 - 0	- 7 -	- 985	0.0 0.0			20	S4	24/16	6.0-8.0	9 11						
9 983 983 983 982	- 8 -	- 984	0. 							10 6	Compact, br	own to tan, SAND,	some silt and	gravel. (Gla	cial Till)	
10 982 983 0 0 20 11 981 0 0 0 0 0 12 980 0 0 0 0 0 0 13 979 0 0 0 0 0 0 0 14 978 0 0 0 0 0 0 0 0 14 978 0	- 9 -	- 983	0.0		GLACIAL TILL	20	S5	24/20	8.0-10.0	7 13						
- 11 - 981 - 981	- 10 -	- 982								20						
12 980 980 973 51 56 24/10 12.0-14.0 25 28 28 14 978 60 14.0/977.8 Bottom fo borehole 14' below ground sufface. 10 12.0-14.0 25 28 28 15 977 976 Bottom fo borehole 14' below ground sufface. 10 12.0-14.0 26 28 28 16 976 Bottom fo borehole 14' below ground sufface. 10	- 11 -	- 981														
13 979 51 56 24/10 12.0-14.0 23 33 14 978 977 Bottom fo borehole 14" below ground surface. 10 12.0-14.0 23 32 15 977 977 Bottom fo borehole 14" below ground surface. 1 1 10 10 10 16 976 977 975 1 1 1 1 10 1	- 12 -	- 980	0.0							16	Verv dense	grav SILTY SAND) some grave	I (Glacial Til	1)	
14 978 6-978 32 15 977 Bottom to borehole 14" below ground surface. 32 16 976 Bottom to borehole 14" below ground surface. 32 17 975 Bottom to borehole 14" below ground surface. Bottom to borehole 14" below ground surface. 32 18 974 Bottom to borehole 14" below ground surface. 19 973 973 Bottom to borehole 14" below ground surface. 20 972 971 Bottom to borehole 14" below ground surface. Bottom to b	- 13 -	- 979				51	S6	24/10	12.0-14.0	25 26	tory doneo,	g.ay, o.2 o	, como graro	(Oldolai III	")	
- 15 - 977 a a a a a b a b a b a b a b b a b a b a b a b a b a b a b a<	- 14 -	- 978	<u>a.(.).(</u>	14.0 / 977.8	Bottom fo borehole 14' below					32						
- 16 - 976 - - 976 -	- 15 -	- 977			ground surface.											
- 17 - 975 - - 975 -	- 16 -	- 976														
- 18 - 974	- 17 -	- 975														
- 19 - 973 -<	- 18 -	- 974														
20 972 972 972 972 972 972 972 971 97	- 19 -	- 973														
- 21 - 971 - - 971 - - - 970 - <t< td=""><td>- 20 -</td><td>- 972</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>	- 20 -	- 972														
- 22 + 970 - 969 - <t< td=""><td>- 21 -</td><td>- 971</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>	- 21 -	- 971														
GRANULAR SOILS Soil COMPONENT BLOWS/FT. DENSITY 0-4 V.LOOSE 4-10 LOOSE 10-30 COMPACT "TRACE" 0-10% "SOME" DESCRIPTIVE TERM 10-30 COMPACT "SOME" 0-10% "SOME" 0-20% 25% OF THE TOTAL ARE COHESIVE SOILS "ADJECTIVE" (eg SANDY, SILTY) 20-35% CLASSIFIED AS "A "ADJECTIVE" (eg SANDY, SILTY) 20-35% COHESIVE SOILS "ADJECTIVE" (eg SANDY, SILTY) 22 V.SOFT 24 SOFT 4-8 FIRM 8-15 STIFF 15-30 V.STIFF >30 HARD Weather: Clear Weather: Clear	- 22 -	- 970														
BLOWS/FT.DEINSITY0.4V.LOOSEDESCRIPTIVE TERMPROPORTION OF TOTALSOIL CONTAINING THREE COMPONENTS EACH OF4.10LOOSE"TRACE"0.10%WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"30-50DENSE"ADJECTIVE" (eg SANDY, SILTY)20.35%CLASSIFIED AS "A WELL-GRADED MIXTURE OF"50V.DENSE"AND"35-50%WELL-GRADED MIXTURE OF"BLOWS/FT.CONSISTENCYNotes:Motes:McPHAIL ASSOCIATES, LLC 26% MA 02140<2	GF	RANUL	AR SOIL	S	SOIL COMPONENT	I		I		1	1				_	
4-10LOOSECOMPONENTS EACH OF10-30COMPACT"TRACE"0-10%WHICH COMPRISE AT LEAST30-50DENSE"SOME"10-20%25% OF THE TOTAL ARE>50V.DENSE"ADJECTIVE" (eg SANDY, SILTY)20-35%CLASSIFIED AS "A>50V.DENSE"AND"35-50%WELL-GRADED MIXTURE OF"MCPHAIL ASSOCIATES, LLCBLOWS/FT.CONSISTENCY2V.SOFTNotes:No groundwater observed.2-4SOFTNo groundwater observed.TEL: 617-868-14204-8FIRMFIRMFAX: 617-868-14238-15STIFFMeether: ClearFA>30HARDWeather: ClearFA	0-4	<u>v⊢I.</u>	V.LOC)SE	DESCRIPTIVE TERM	PROF	PORTION	NOF TOT	AL SOIL	CONTAIN		₌	\leq			
30-50 30-50DENSE V.DENSE"SOME" "ADJECTIVE" (eg SANDY, SILTY)10-20% 20-35% 35-50%25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"Image: Comparison of the total and the	4-10 10-3	0		SE ACT	"TRACE"	S EACH OF RISE AT LE	AST			>						
Sole V.DEINGE "AND" 35-50% WELL-GRADED MIXTURE OF" McEcontified etem COHES/F SOILS McPHAIL ASSOCIATES, LLC McPHAIL ASSOCIATES, LLC 2269 MASSACHUSETTS AVENUE SOFT No groundwater observed. CAMBRIDGE, MA 02140 TEL: 617-868-1420 2-4 SOFT No groundwater observed. FAX: 617-868-1420 4-8 FIRM FIRM FIRM 8-15 STIFF Mcether: Clear Page 1 of 1	30-5	0	DENS	SE	"SOME" "ADJECTIVE" (eg SANDY, SIL	OTAL ARE S "A			PHA							
BLOWS/FT. CONSISTENCY Notes: 2269 MASSACHUSETTS AVENUE <2	>30 C(DHESI		S	"AND"		OF"		SSOCIATE	ES, LLC						
4-8 FIRM FAX: 617-868-1423 8-15 STIFF	BLOWS <2 2-4	5/FT.	CONSIS V.SC SOF	TENCY N DFT N FT	lotes: lo groundwater observed.							2269	MASSAC CAMBRID TEL: 6	HUSETTS GE, MA 0 17-868-14	S AVENUE 2140 420	
15-30 V.STIFF >30 HARD Weather: Clear Page 1 of 1	4-8 8-15	5	FIR	M FF									FAX: 6	017-868-14	423	
	15-3 >30	0	V.ST	IFF RD V	Veather: Clear								Pag	e 1 of	1	

Proje	ct:	Lei	cester S	School			Job #	#: 	6743	.2.00		Boring	j No.	
Locat	ion: State	70 ' Leid	Winslov cester, l	w Avenue MA			Date Date	Started: Finished:	3-5-1 3-5-1	9		MA	-3	
Contra	ctor:	Technic	cal Drilling	y Services Ca	ising Typ	be: 4 1	/2" HSA	<i>(</i> ,),			Gro Date	undwater Depth	Observat Elev.	ions Notes
Driller/	Helpe	r: Bret	t/Donnie	Ca	ising Har	nmer (I	os)/Drop	(in): N/A			3-5-19	6.0	981.5	
Logged	l By/R	eviewe	d By: C	. Miller Sa	impler Si	ze/Type	9: 24" Sp	lit Spoon						
Surface	e Elev	ation (f	t): 987.5	Sa	impler Ha	ammer	(lbs)/Dro	p (in): 140LE	3/30"					
		<u> </u>	L to ange				Samp	le			<u> </u>	. .		
(ft)	(ft)	Symb	Depth/E Strata Ch (ft)	Stratum	N-Value RQD	No.	Pen. /Rec. (in)	Depth (ft)	Blows/6" Min/ft		Sampi and E	e Descrip Boring Not	tion	
- 1 -	- 987 - 986				24	S1	18/16	0.0-1.5	13 13 11	Compact, da	rk brown, SILT and	I SAND, trace	e gravel. (Fill)	
- 2 -	900			FILL	20	S1A	6/6	1.5-2.0	10	Compact, lig	ht brown, SAND ar		some silt. (Fil) traval (Fill)
- 3 -	- 985 - 984		4.0 / 083 5		19	S2	24/23	2.0-4.0	9 10 14	Compact, ligi	nt brown/orange-bi	own, Sierre	AND, liace (ji avel. (Fill)
- 4 -	- 983 - 982		4.07000.0		18	S3	24/24	4.0-6.0	6 8 10	Compact, lig	ht brown, SILTY SA	AND, some gr	ravel. (Glacia	Till)
- 6 -	- 981 - 980				28	S4	24/16	6.0-8.0	12 10 13 15 17	Compact, ligl (Glacial Till)	ht brown/orange-br	rown, SILTY S	SAND, some	gravel.
- 8 -	- 979 - 978			GLACIAL TILL	ge-brown, SILTY S	AND, some g	gravel, occas	onal cobbles.						
- 10 - - 11 - - 12 -	- 977 - 976 - 975													
- 13 - - 14 -	- 974		14 7 / 070 0		24	S6	20/11	13.0-14.7	8 16 8	Dense, oran (Glacial Till) Split spoon re	ge-brown, SILTY S efusal at 14.7' belo	AND, some of wards and sur	gravel, occas face.	onal cobbles.
- 15 -	- 973	<u>, , , , , , , , , , , , , , , , , , , </u>	14.1 / 972.0	Bottom of borehole 14.7' below	\searrow				100/2"					
- 16 -	- 972 - 971			ground surface.										
- 17 - - 18 -	- 970													
- 19 -	- 969 - 968													
- 20 -	- 967													
- 22 -	- 966 - 965													
6			s I											
BLOWS	/FT.	DENS	TY											
0-4 4_10		V.LOO	SE	DESCRIPTIVE TERM	PROF	PORTION	NOF TOT	AL SOIL (ING THREE				
10-30	5	COMPA	ACT	"TRACE"		0-10)%	WHIC 25% C		RISE AT LE	AST			
30-50	D		SE ISF	"ADJECTIVE" (eg SANDY, SIL	TY)	20-3	5%	CLASS	SIFIED AS	S "A		NC ASSOC	PHA CIATES, L	LC
CC) HESI\		S	"AND"		35-5	0%	WELL	-GRADE	MIXTURE	OF"		SSOCIATE	S LLC
BLOWS <2 2-4 4-8	/FT.	CONSIS V.SC SOF FIR	TENCY N DFT F -T M	lotes: rost from 0'-1.25' below ground	surface.						2269	MASSAC CAMBRID TEL: 6 FAX: 6	HUSETTS OGE, MA 0 017-868-14 017-868-14	AVENUE 2140 20 23
8-15 15-30 >30	5	STIF V.ST HAF	FF IFF RD V	Veather: Clear								Pag	e 1 of 1	l

Proje	ct:	Leid	cester S	chool			Job #	<i>‡</i> :	6743	.2.00		Boring	JNo.	
Locat	ion:	70	Winslov	v Avenue			Date	Started:	3-5-1	9		ΜΔ	_1	
City/S	State:	Leid	cester, I	AM			Date	Finished:	3-5-1	9				
Contra	ctor: 1	echnic	al Drilling	Services Ca	asing Typ	be: 4 1	/2" HSA				Gro	undwater	Observat Flev	tions Notes
Driller/	Helper	Bret	t/Donnie	Ca	asing Har	nmer (I	bs)/Drop	(in): N/A			3-5-19	8.0	983.6	110100
Logged	d By/Re	viewe	dBy: C	. Miller Sa	ampler Si	ze/Type	e: 24" Sp	lit Spoon						
Surfac	e Eleva	tion (f	t): 991.6	Sa	ampler Ha	ammer ((lbs)/Dro	p (in): 140L	B/30"					
		0	- to ange				Samp	le			_			
Depth (ft)	Elev. (ft)	Symb	Depth/El Strata Cha (ft)	Stratum	N-Value RQD	No.	Pen. /Rec. (in)	Depth (ft)	Blows/6" Min/ft		Sampl and E	e Descrip Boring Not	ition tes	
- 1 -	- 991 - 990				25	S1	24/22	0.0-2.0	13 13 12 12	Compact, gra	ay brown/brown SI	LTY SAND, s	ome gravel. ((Fill)
- 3 -	- 989 - 988			FILL	16	S2	24/17	2.0-4.0	7 9 7 5	Compact, lig	ht brown, SILTY S	AND, trace gr	avel. (Fill)	
- 4 -	- 987 - 986				5	S3	24/16	4.0-6.0	4 3 2	Loose, brow	n, SILTY SAND, tr	ace gravel. (F	Fill)	
- 6 -	- 985		7.0 / 984.6		7	S4	12/8	6.0-7.0	2 2 5	Loose, brow	n, SILTY SAND, ti	ace gravel. (Fill)	
	- 984				Very dense, Mottling at an	orange brown, SIL pproximately 7' bel	T and SAND	, trace gravel rface.	. (Glacial Till)					
- 9 -	- 983 - 982				orange brown, SIL	T and SAND	, trace gravel	. (Glacial Till)						
- 10 -	- 981			GLACIAL TILL										
- 12 -	- 980	0.00			122	S6	19/12	11.0-12.6	90 71	Very dense, cobbles. (Gla	orange brown, SIL acial Till)	TY SAND, so	ome gravel, w	ith occasional
- 13 -	- 979	<u>>a.f.</u> ta	12.6 / 979.0	Bottom of borehole 12.6' below	┝				51 100/1"	Auger refusa ground surfa	Il 11' below ground ce.	surface. Spli	t spoon refus	al 12.6' below
- 14 -	- 978			ground surface.										
- 15 -	- 977													
- 16 -	- 975													
- 17 -	- 974													
- 19 -	- 973													
- 20 -	- 972													
- 21 -	- 971													
- 22 -	- 970													
GF	RANULA	R SOIL	S	SOIL COMPONENT	1		I							
BLOWS	5/FT.	V.LOO	SE	DESCRIPTIVE TERM	PROF	PORTION	NOF TOT	AL SOIL C				\leq		
4-10 10-3 30-5	0		ACT SE	"TRACE" "SOME" "ADJECTIVE" (eg SANDY, SIL	TY)	0-10 10-2 20-3)% 0% 5%	WHIC 25% C CLASS	H COMPR F THE T SIFIED AS	RISE AT LE OTAL ARE S "A	AST	Mc	PHAI CIATES, L	
- 00 C(DHESIVE	SOILS	3	"AND"		35-5	0%	WELL	-GRADE) MIXTURE	OF" M	CPHAIL A	SSOCIATE	ES, LLC
BLOWS <2 2-4 4-8	5/FT. <u>C</u>	ONSIS V.SO SOF FIR	FENCY N FT T M	otes:							2269	MASSAC CAMBRIE TEL: 6 FAX: 6	HUSETTS OGE, MA 0 517-868-14 517-868-14	AVENUE 2140 420 423
8-15 15-3 >30	0	STIF V.ST HAF	F IFF RD W	/eather: Clear								Pag	e 1 of [·]	1

Proje	ct:	Lei	cester S	School			Job #	<i>‡</i> :	6743	.2.00		Boring	No.	
Locat	ion:	70	Winslov	v Avenue			Date	Started:	3-5-1	9		MΔ	-5	
City/S	State:	Lei	cester, l	MA			Date	Finished:	3-5-1	9			-0	
Contra	ctor:	Technic	al Drilling	Services C	asing Typ	be: 4 1	/2" HSA				Grou Date	undwater Depth	Observat Elev.	ions Notes
Driller/	Helper	: Bret	t/Donnie	С	asing Ha	mmer (II	bs)/Drop	(in): N/A			3-5-19	8.0	988.3	
Logged	d By/Re	eviewe	d By: C	. Miller S	ampler Si	ize/Type	24" Sp	lit Spoon						
Surfac	e Eleva	tion (f	t): 996.3	S	ampler H	ammer (lbs)/Dro	p (in): 140LE	3/30"					
Donth	Floy	loc	iL to lange				Samp	le			Sample	o Docorio	tion	
(ft)	(ft)	Symt	Depth/E Strata Ch (ft)	Stratum	N-Value RQD	No.	Pen. /Rec. (in)	Depth (ft)	Blows/6" Min/ft		and B	e Descrip loring Not	ies	
- 1 -	- 996 - 995				19	S1	24/24	0.0-2.0	13 12 7 8	Compact, br	own, SILTY SAND,	some gravel	, trace root m	natter. (Fill)
- 2 -	- 994 - 993			FILL	18	S2	24/22	2.0-4.0	7 7 11	Compact, gr	ay brown/orange br	rown, SILTY S	SAND, trace	gravel. (Fill)
- 4 - - 5 -	- 992 - 991		5.0 / 991.3		20	S3	24/24	4.0-6.0	9 8 9 11	Compact, gr	ay brown, SILTY S/	AND, some g	ravel. (Fill)	
- 6 - - 7 -	- 990 - 989				39	S4	24/24	6.0-8.0	14 19 19 20	Dense, gray	brown, SILTY SAN	D, some gra	vel. (Glacial T	"ill)
- 8 -	- 988			GLACIAL TILL	30	S5	24/24	8.0-10.0	22 11 12 18	Dense, gray	brown, SILTY SAN	D, some gra	vel. (Glacial T	"ill)
- 10 - - 11 -	- 986				114/11"	S6	17/12	10.0-11.4	26 11 14	Very dense, occasional o	gray/orange brown cobbles. (Glacial Til), SILTY SAN	D, some grav	rel, with
- 12 -	- 985		11.5 / 984.8	Bottom of borehole 11.5' below	-				100/5"	Auger refusa	al 11.5' below groun	d surface.		
- 13 -	- 984 - 983			ground surface.										
- 14 -	- 982													
- 15 -	- 981													
- 16 -	- 980													
- 17 -	- 979													
- 18 -	- 978													
- 19 -	- 977													
- 20 -	- 976													
- 21 -	- 075													
- 22 -	- 974													
6			s											
BLOWS	%/FT.	DENS	TY											
0-4 4-10 10-3 30-5 >50) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	V.LOOSE DESCRIPTIVE TERM PROPORTION OF TOTAL SOIL CONTAINING THREE COMPONENTS EACH OF LOOSE "TRACE" 0-10% WHICH COMPRISE AT LEAS DENSE "SOME" 10-20% 25% OF THE TOTAL ARE V.DENSE "ADJECTIVE" (eg SANDY, SILTY) 20-35% CLASSIFIED AS "A WE SOILS "AND" 35-50% WELL-GRADED MIXTURE O								E AST E OF"M		PHAI CIATES, L		
BLOWS <2 2-4 4-8	S/FT. C	V.SC V.SC SOF FIR	TENCY N DFT -T M	otes:							2269	MASSAC CAMBRIE TEL: 6 FAX: 6	HUSETTS GE, MA 0 17-868-14 17-868-14	AVENUE 2140 20 23
8-15 15-3 >30	0	STIF V.ST HAF	-F IFF RD W	Veather: Clear								Pag	e 1 of 1	1

Proje	ct:	Leid	cester S	School			Job #	<i>‡</i> :	6743	.2.00		Boring	No.	
Locat	ion:	70	Winslov	v Avenue			Date	Started:	3-6-1	9		MΔ	-6	
City/S	state:	Leid	cester, I	MA			Date	Finished:	3-6-1	9			-0	
Contra	ctor: T	echnic	al Drilling	Services	Casing Typ	be: 4 1	/2" HSA				Gro Date	undwater Depth	Observat Elev.	ions Notes
Driller/	Helper:	Bret	t/Donnie	(Casing Har	nmer (I	bs)/Drop	(in): N/A			3-6-19	6.0	987.2	
Logged	l By/Re	viewe	d By: K.	Seaman	Sampler Si	ze/Type	: 24" Sp	lit Spoon						
Surface	e Eleva	tion (f	t): 993.2	:	Sampler Ha	ammer (lbs)/Dro	p (in): 140L	B/30"					
		0	- to ange				Samp	le						
Depth (ft)	Elev. (ft)	Symb	Depth/El Strata Cha (ft)	Stratum	N-Value RQD	No.	Pen. /Rec. (in)	Depth (ft)	Blows/6" Min/ft		Samp and I	le Descrip Boring Not	tion tes	
- 1 -	- 993 - 992				14	S1	24/14	0.0-2.0	12 7 7 6	Compact, br	own, SAND, some	silt, trace gra	ivel, brick and	l ash. (Fill)
- 3 -	- 991 - 990			FILL	17	S2	24/12	2.0-4.0	5 8 9	Compact, gra	ay, SAND, some o	lay, silt, and g	ıravel. (Fill)	
- 4 - - 5 -	- 989 - 988		5.0 / 988.2		34	S3	24/14	4.0-6.0	10 10 24	Dense, gray	; SILTY SAND, so	me clay and g	ravel. (Fill)	
- 6 - - 7 -	- 987 - 986				41	S4	24/12	6.0-8.0	23 18 18 23	Dense, gray	; SILTY SAND, so	me clay and g	ravel. (Glacia	al Till)
- 8 -	- 985 - 984			GLACIAL TILL					23					
- 10 -	- 983				55	S5	24/6	10.0-12.0	29 30	Very dense,	gray, SILTY SANI), some clay a	and gravel. (G	Glacial Till)
- 12 -	- 982	0.0 0.0	12.0 / 981.2						25 29					
- 13 -	- 981 - 980			Bottom of borehole 12' below ground surface.										
- 14 -	- 979													
- 15 -	- 978													
- 16 -	- 977													
- 17 -	- 976 - 975													
- 19 -	- 974													
20 -	- 973													
- 21 -	- 972													
- 22 -	- 971													
GF	RANULA	l R SOIL	S	SOIL COMPONENT										
BLOWS 0-4	/FT.	DENSI V.LOO	TY SE	DESCRIPTIVE TERM	PROF	PORTION		AL SOIL (CONTAIN	ING THRE	ε			
4-10		LOOS	E	"TRACE"		0.10	1%	COMP			AST			>
10-3 30-5 >50	0	DENS V.DEN	SE SE	"SOME" "ADJECTIVE" (eg SANDY, S "AND"	ILTY)	10-10 10-20 20-33	0% 0% 5% 0%	25% C CLASS WELL	OF THE TO SIFIED AS	OTAL ARE	OF"		PHA CIATES, L	
CC BLOWS		SOILS		ates:		00-0			J. U. U L L		M			
<pre><2 2-4 4-8 0.47</pre>		V.SO SOF FIR	FT FT M	0.63.								CAMBRIE TEL: 6 FAX: 6	OGE, MA 0 517-868-14 517-868-14	2140 20 23
0-15 15-3 >30	0	V.ST HAF	' IFF RD W	/eather: Clear								Pag	e 1 of ′	1

Proje	ct:	Lei	cester S	School			Job #	<i>‡</i> :	6743	.2.00		Boring	No.	
Locat	ion:	70	Winslov	v Avenue			Date	Started:	3-6-1	9		MΛ	_7	
City/S	State:	Lei	cester, l	A			Date	Finished:	3-6-1	9				
Contra	ctor: T	echnic	cal Drilling	Services Ca	asing Typ	be: 4 1	/2" HSA				Gro Date	undwater	Observa	tions Notes
Driller/	Helper:	Bret	tt/Donnie	Ca	asing Har	nmer (l	bs)/Drop	(in): N/A			3-6-19	8.0	992.6	
Logged	d By/Re	viewe	d By: K	Seaman Sa	ampler Si	ze/Type	e: 24" Sp	lit Spoon						
Surfac	e Eleva	tion (f	't): 1000.6	Sa Sa	ampler Ha	ammer	(lbs)/Dro	op (in): 140LB	B/30"					
Danath	Flow	ol	L to ange				Samp	le			Comu	- Decembra	4°	
(ft)	elev. (ft)	Symb	Depth/E Strata Ch (ft)	Stratum	N-Value RQD	No.	Pen. /Rec. (in)	Depth (ft)	Blows/6" Min/ft		Sampi and E	e Descrip Boring Not	tes	
- 1 -	- 1000 - 999		2 0 / 998 6	FILL	33	S1	24/20	0.0-2.0	15 16 17 12	Dense, brow	n, SILT and SAND	, some grave	I, trace root r	matter. (Fill)
- 2 -	- 998 - 997				20	S2	24/20	2.0-4.0	7 9 11	Compact, br	own to gray, SILTY	ŚAND, som	e gravel. (Gla	acial Till)
- 4 - - 5 -	- 996								11					
- 6 -	- 995 - 994			GLACIAL TILL										
- 8 -	- 993 - 992								19	Very dense,	gray, SILTY SAND), some grave	el, trace clay.	(Glacial Till)
- 9 - - 10 -	- 991				51	S3	24/4	8.0-10.0	27 27 30					
- 11 -	- 990	0. 	11.0 / 989.6		-									
- 12 -	- 989 - 988													
- 14 -	- 987				35	S4	24/14	13.0-15.0	10 16 19	Dense, gray	, SILT and SAND,	trace clay an	d gravel. (Gla	acial Till)
- 15 - - 16 -	- 985			GLACIAL TILL	22	S5	24/8	15.0-17.0	20 8 10 12	Compact, gr	ay, SILT and SANI	D, trace clay a	and gravel. (C	Glacial Till)
- 17 -	- 984 - 983								12 16 16	Dense, gray	, SILT and SAND,	trace clay an	d gravel. (Gla	acial Till)
- 18 - - 19 -	- 982		<u>19.0 / 981.6</u>		41	S6	24/20	17.0-19.0	22 23					
- 20 -	- 981 - 980			Bottom of borenole 19' below ground surface.										
- 21 - - 22 -	- 979													
GF	- 978 RANULA	 R SOII	s I											
BLOWS	6/FT.	DENS			000					ואור דו יחרי	_			
0-4 4-10		LOOS	SE		PROF	<u>-URTION</u>	<u>N OF [O]</u>	AL SOIL (COMP		EACH OF				
10-3 30-5 >50	0	COMP DENS V.DEN	ACT SE ISE	"TRACE" "SOME" "ADJECTIVE" (eg SANDY, SIL "AND"	TY)	0-10 10-2 20-3 35-5)% 0% 5% 0%	WHIC 25% C CLASS WELL	h compf of the t Sified as -gradei	RISE AT LE OTAL ARE 3 "A 0 MIXTURE	AST	MC	PHA CIATES, L	
CC BLOWS <2 2-4 4-8	DHESIVE	SOILS SNSIS V.SC SOI FIR	S TENCY N DFT FT M	otes:							M 2269	CPHAIL AS MASSAC CAMBRIE TEL: 6 FAX: 6	SSOCIATE HUSETTS OGE, MA 0 517-868-14 517-868-14	ES, LLC 3 AVENUE 02140 420 423
0-15 15-3 >30	0	V.ST HAF	IFF RD W	/eather: Clear								Pag	e 1 of	1

Proje	ct:	Lei	cester S	School			Job #	# :	6743	3.2.00		Boring	No.	
Locat	ion: State:	70 Lei	Winslov cester,	w Avenue MA			Date Date	Started: Finished:	3-6-´ 3-6-´	19 19		MA	-8	
Contra	ctor:	Technic	cal Drilling	y Services Ca	asing Typ	be: 4 1	/2" HSA	(in): N/A			Gr Date	oundwater Depth	Observat Elev.	tions Notes
Driller				Coomon St	amnlor Si		03/1010p	lit Speen						
Surface		tion (f	и су . М		mpler U	ammor /	//Drc	ni Spoon	ייחמ/כ					
Surrac			υ. 1001. Φ				0		5,50					
Depth	Elev.	lodi	EL to thang)	Otration			Samp	le			Samp	ole Descrip	tion	
(ft)	(ft)	Sym	Depth/ Strata C (ft	Stratum	N-Value RQD	No.	/Rec. (in)	Depth (ft)	Blows/6" Min/ft		and	Boring Not	ies	
- 1 -	- 1000				25	S1	24/20	0.0-2.0	13 13 12 10	Compact, bro	own, SILT and SA	AND, some gra	vel. (Fill)	
- 3 -	- 998		4 0 / 007 0		31	S2	24/14	2.0-4.0	13 14 17 27	Dense, brow Auger refusa	n, SAND, some s al at 4.3' below gro	silt and gravel. ound surface.	(Fill)	
- 4 -	- 997	AX (4.0/997.0						37 10	Compact, bro	own to gray, SILT	and SAND, so	ome gravel, tr	ace clay.
- 5 -	- 996	X 4.07997.0 37 Compact, (Glacial Time) Compact, (Glacial Time) 26 S3 24/10 4.0-6.0 12 (Glacial Time) Compact, (Glacial Time) 10 Compact, (Glacial Time) 14 12 12												
- 6 -	- 995	0.0							12					
- 7 -	- 994				dense, gray, SIL1	「and SAND, so	ome gravel, ti	race clay.						
- 8 -	- 993	: 0. (<u>)</u> 0							17					
- 9 -	- 992			GLACIAL TILL										
- 10 -	- 991	20.0												
- 11 -	- 990									Or many set and				
- 12 -	- 989				28	S5	24/14	11.0-13.0	7 11 17	Till)	ay-brown, Sie'r a	nu SAND, traci	e ciay and gr	avei. (Giaciai
- 13 -	- 988		13.0 / 988.0						17	Dense, gray,	, SILT and SAND	, trace clay and	d gravel. (Gla	cial Till)
- 14 -	- 987	0.0			43	S6	24/12	13.0-15.0	16 27 12					
- 15 -	- 986			GLACIAL TILL					13	Dense, gray,	, SILT and SAND	, trace clay and	d gravel. (Gla	cial Till)
- 16 -	- 985	0.0.0	17.0/984/		34	S7	24/20	15.0-17.0	15 19 21					
- 17 -	- 984	(0.1. 3	17.07 904.0	Bottom of borehole 17' below					21					
- 18 -	- 983			ground surface.										
- 19 -	- 982													
- 20 -	- 981													
- 21 -	- 980													
- 22 -	- 979													
GF BLOWS		R SOIL	.s ITY	SOIL COMPONENT										
0-4	<u>,, ,, ,</u>	V.LOC	SE	DESCRIPTIVE TERM	PROF	PORTION	N OF TOT	AL SOIL C	CONTAIN		∎	\leq		
4-10 10-3		LOOS	SE ACT	"TRACE"		0-10)%	COMP WHICI	ONENTS	S EACH OF RISE AT LE	AST			>
30-5	0		SE	"SOME" "ADJECTIVE" (eg SANDY, SIL	TY)	10-2 20-3	0% 5%	25% C CLASS	OF THE T	OTAL ARE S "A			PHA	LC
- 30 C(L DHESIV		S	"AND"		35-5	0%	WELL	-GRADEI		OF"	MCPHAIL AS	SSOCIATE	ES, LLC
BLOWS <2 2-4 4-8	/FT.C	DENSE "ADJECTIVE" (eg SANDY, SILTY) 20-35% CLASSIFIED AS "A HESIVE SOILS "AND" 35-50% WELL-GRADED MI T. CONSISTENCY Notes: No groundwater observed. SOFT FIRM FIRM										9 MASSAC CAMBRID TEL: 6 FAX: 6	HUSETTS OGE, MA 0 17-868-14 17-868-14	AVENUE 2140 120 123
8-15 15-3	5 0	STII V.ST	FF									Dec	01.05	1
>30		HAF	RD V	Veather: Clear								rag	e i ui	1

Proje	ct:	Lei	cester S	School			Job #	# :	6743	.2.01		Boring	No.	
Locat	ion:	70	Winslow	w Avenue			Date	Started:	12-6	-19 10		MA-'	101	
City/S	state:	Lei	cester,	IVIA			Date	rinished:	12-6	-19				tions
Contra	ctor: T	DS		Ca	asing Typ	be: 4 1	/2" HSA				Date	Depth	Elev.	Notes
Driller/	Helper			Ci	asing Har	mmer (II	os)/Drop	(in): N/A						
Logged	d By/Re	viewe	d By: N	1.WHITE Sa	ampler Si	ze/Type	24" Sp	lit Spoon						
Surface	e Eleva	tion (f	t): 994.7	Si	ampler Ha	ammer	ibs)/Dro	op (in): 140Ll	B/30"					
Depth	Elev.	lodi	/EL to Changé ()	Otrature			Samp	le			Samp	le Descrip	tion	
(ft)	(ft)	Sym	Depth/ Strata C (ft	Stratum	N-Value RQD	No.	Pen. /Rec. (in)	Depth (ft)	Blows/6" Min/ft		and	Boring Not	tes	
- 1 -	- 994	·	0.8 / 993.9	TOPSOIL	34	S1	24/18	0.0-2.0	2 21	Dense, brow	n, SAND, some s	ilt, trace grave	I. (Fill)	
	- 993								13 9					
	- 992					~~			5 6	Compact, br	own, SILTY SAND), trace gravel	. (Fill)	
- 3 -	- 001				12	S2	24/16	2.0-4.0	6					
- 4 -	000			FILL					1	Very loose, b	prown, SILTY SAN	ID, trace grave	el. (Fill)	
- 5 -	- 990				2	S3	24/10	4.0-6.0	1 1					
- 6 -	- 989								1	Very loose. I	prown/dark brown.	SAND, some	silt, trace or	avel. (Fill)
- 7 -	- 988				4	S4	24/20	6.0-8.0	2	, ,-	,		5	. ,
- 8 -	- 987		8.0 / 986.7	,					10	Derre '		and CANID		
- 9 -	- 986				39	S5	24/20	8.0-10.0	11	Dense, brow	nvgray/reα, SiLT a	IIIU SAND, SO	me gravei. (G	ыастаг т Ш)
- 10 -	- 985	0.0 0.0 0.0							28 33					
	- 984	:0: 			50	86	24/24	10.0.10.0	21 24	Very dense,	brown, SILT and S	SAND, some g	gravel. (Glaci	al Till)
	- 983	0.0	12 0 / 082	7	53	30	24/24	10.0-12.0	29 37					
12	- 982	0.0	12.01 902.	Bottom of borehole 12 feet below					01					
- 13 -	- 021			ground suildte.										
- 14 -	901													
- 15 -	- 980													
- 16 -	- 979													
- 17 -	- 978													
- 18 -	- 977													
- 19 -	- 976													
- 20 -	- 975													
- 21 -	- 974													
- 22 -	- 973													
	- 972		<u> </u>											
GH BLOWS	FT.	R SUIL DENS	.s ITY	SOIL COMPONENT										
0-4 4-10	,	V.LOC	SE SE	DESCRIPTIVE TERM	PROF	PORTION	OF TOT	T <u>AL</u> SOIL (COMP	CONTAIN PONENTS	ING THREE EACH OF	■			
10-3	0	COMP	ACT	"TRACE" "SOME"		0-10 10-2	1% D%	WHIC 25% (H COMPF OF THE T	RISE AT LE OTAL ARF	AST	Ma		
>50		V.DEN	ISE	"ADJECTIVE" (eg SANDY, SIL "AND"	TY)	20-3	5% 7%	CLAS	SIFIED AS	S "A) MIXTI IRF	OF"	ASSO	CIATES, L	LC
CC BLOWS		SOILS		Jotos		55-5	070	¥¥ LLL			N			
<2		V.SC)FT	10ICS.							220		GE, MA 0	2140
2-4 4-8		SOI	M									FAX: 6	517-868-14	423
8-15 15-3	5 0	STI V ST	FF											
>30	-	HAF	RD V	Veather: Cloudy								Pag	e 1 of '	1

Proje	ct:	Lei	cester S	School			Job #	<i>‡</i> :	6743	3.2.01		Boring	j No.	
Locat	ion:	70	Winslov	v Avenue			Date	Started:	12-5	-19		ΜΔ_ [,]	102	
City/S	state:	Lei	cester, I	MA			Date	Finished:	12-5	-19				
Contra	ctor: ٦	DS		Ca	asing Typ	be: 4 1	1/2" HSA				Gro Date	Depth	Elev.	tions Notes
Driller/	Helper			Ca	asing Har	nmer (l	bs)/Drop	(in): N/A						
Logged	d By/Re	viewe	d By: M	.WHITE Sa	ampler Si	ze/Type	9: 24" Sp	lit Spoon						
Surfac	e Eleva	tion (f	it): 995.0	Sa	ampler Ha	ammer	(lbs)/Dro	p (in): 140L	B/30"					
Denth	Flev	0	EL to nange				Samp	le			Samp	le Descrin	ation	
(ft)	(ft)	Syml	Depth/E Strata Ch (ft)	Stratum	N-Value RQD	No.	Pen. /Rec. (in)	Depth (ft)	Blows/6" Min/ft		and E	Boring Not	tes	
1	- 004	······	0.8 / 994.2	TOPSOIL	8	S1	24/22	0.0-2.0	2 3	Loose, brow	m, SILTY SAND, s	ome gravel, w	ith trace root	ts. (Fill)
	994				Ű	01		0.0 2.0	5 8					
2 -	- 993			FILL					6	Compact, br	own, SILT and SA	ND, trace gra	vel. (Fill)	
- 3 -	- 992				19	S2	24/24	2.0-4.0	11					
- 4 -	- 991		4.0/991.0						15 5	Compact, br	own, SILT and SA	ND, trace gra	vel. (Glacial	Till)
- 5 -	- 990	`ن! ا			16	S3	24/16	4.0-6.0	6 10					
- 6 -	- 989	o.O.(14					
- 7 -	- 988	0.0			58	S4	24/24	6.0-8.0	19 27	Very dense,	brown/gray, SIL1	and SAND, tra	ace gravel. (0	Jacial I III)
, ,	007								31 35					
- 8 -	- 987	0.0							24 20	Very dense,	brown/dark brown	, SILTY SANE), trace grave	el. (Glacial Till)
- 9 -	- 986	0.0.0.0 0.0.0			62	S5	24/24	8.0-10.0	33					
- 10 -	- 985	<u>, , , , , , , , , , , , , , , , , , , </u>	10.0 / 985.0	Bottom of borehole 10 feet below					32					
- 11 -	- 984			ground surface.										
- 12 -	- 983													
- 13 -	- 982													
- 14 -	- 981													
- 15 -	- 980													
- 16 -	- 979													
- 17 -	- 978													
- 18 -	- 977													
- 19 -	- 976													
- 20 -	- 975													
- 21 -	- 974													
- 22 -	- 973													
GF		R SOIL	S	SOIL COMPONENT	1		I							
BLOWS	b/⊢1.	V.LOC	DSE	DESCRIPTIVE TERM	<u>PRO</u> F	PORTIO	<u>N OF TO</u> T	AL SOIL	CONTAIN	ING THRE	E	\leq		
4-10			SE	"TRACE"		0-10)%	COMF WHIC	PONENTS H COMPF	EACH OF	AST			>
30-5	0	DEN	SE	"SOME" "AD.IECTIVE" (eq.SANDV SII	TY)	10-2 20-3	0% 5%	25% C	OF THE T	OTAL ARE		Mc	PHA	L
>50 CC	DHESIVE	V.DEN	ISE S	"AND"	,	35-5	0%	WELL	-GRADE		OF"		STATES, L	112 2011 0
BLOWS	FT. C	ONSIS		otes:							2269			S AVENUE
2-4		SOI	FT									TEL: 6	617-868-14 617-868-14	420 423
4-8 8-15	5	FIR STI	RM FF											
15-3 >30	0	V.ST HAF	TIFF RD W	/eather: Cloudy								Pag	e 1 of	1
: 50				,										

Project:		Leicester School			Job # : 674					3.2.01 Boring No.					
Location: 70 Win		Winslow	w Avenue			Date Started: 12-			-19		MA-103				
City/State: Leicester, MA							Date	rinished:	12-5	-19					
Contra	ctor: ⊺	DS		C	Casing Type: 4 1/2" HSA							Depth	Elev.	Notes	
Driller/	Helper:			C	Casing Hammer (Ibs)/Drop (in): N/A										
Logged	d By/Re	viewe	d By: N	I.WHITE S	Sampler Si	9: 24" Sp									
Surfac	e Eleva	tion (f	t): 995.2	5	Sampler Hammer (Ibs)/Drop (in): 140LB/30"										
Denth	Flov	<u> </u>	EL to lange		Sample					Samp	Sample Description				
(ft)	(ft)	Symb	Depth/E Strata Ch (ft)	Stratum	N-Value RQD No. Pen. /Rec. (in) Depth (ft) Blows/6"							and Boring Notes			
	- 995	$\overline{\mathbf{X}}$	0.5/994.7	TOPSOIL	- 。	S 1	24/24	0020	1 3	Loose, brown, SILTY SAND, trace gravel. (Fill)					
	- 994	\bigotimes			0	01	2-1/2-1	0.0 2.0	6 7						
- 2 -	- 993	\bigotimes		FILL					6	Compact, gra	ay/brown, SILT an	d SAND, som	e gravel. (Fill)	
- 3 -	- 992	\bigotimes			19	S2	24/16	2.0-4.0	10 9						
- 4 -	- 991		4.0 / 991.2						11 8	Compact br	own SILT and SA	ND some gra	vel (Glacial	Till)	
- 5 -	- 000	\circ			26	S3	24/18	4.0-6.0	12	Compact, Di		ito, como gra	inon (ondorda	,	
6	- 990	0.0 0.0							14 14						
	- 989	o O d							16 17	Dense, brow	n/red, SILTY SAN	D, some grav	el. (Glacial T	ill)	
- 7 -	- 988			GLACIAL TILL	36	S4	24/16	6.0-8.0	19						
- 8 -	- 987								23 25	Very dense,	brown/red, SILT a	nd SAND, tra	ce gravel. (G	lacial Till)	
- 9 -	- 986	0.0			59	S5	24/24	8.0-10.0	29 30						
- 10 -	005	: <u>: : : :</u>	10.0 / 985.2	2					35						
- 11 -	900			Bottom of borehole 10 feet below ground surface.	N										
10	- 984														
- 12 -	- 983														
- 13 -	- 982														
- 14 -	- 981														
- 15 -	- 980														
- 16 -	- 979														
- 17 -	- 978														
- 18 -	- 077														
- 19 -	977														
- 20 -	- 07E														
- 21	915														
21	- 974														
22	- 973														
GF BLOWS			S	SOIL COMPONENT				I							
0-4 V.LOOSE <u>DESCRIPTIVE TERM</u>				DESCRIPTIVE TERM	PROPORTION OF TOTAL SOIL CONTAINING THREE						≡	\leq			
4-10 LOOSE 10-30 COMPACT		SE ACT	"TRACE"		0-10	1%	COMF	ONENTS	EACH OF	AST			>		
30-50 DENSE		SE	"SOME" "ADJECTIVE" (ea SANDY SI	LTY)	10-2 20-3	0% 5%	25% C CLAS	OF THE T	OTAL ARE S "A		MC	PHA	L		
>50 V.DENSE		ISE S	"AND"	•••	35-5	0%	WELL	-GRADE) MIXTURE	OF"		SECONT			
BLOWS	/FT. C			lotes:							226			S AVENUE	
<2 2-4		v.SC SOF	л- I -Т										517-868-14	420	
4-8	.	FIR	M									FAX: t	14-208-14	+20	
8-15 15-30 V		V.ST	IFF									Pan	e 1 of	1	
>30		HAF	RD V	Veather: Partly Cloudy								ray		•	

Project:		Lei		School	Job #: 6743.2.0					3.2.01	Boring No.				
City/State: Leiceste			cester,	MA			Date	Finished	12-0 : 12-6	-19	MA	-104	I(OV	V)	
Contra Driller/ Logged Surface	ctor: Helper d By/Re e Eleva	TDS : eviewe ation (f	d By: N t): 993.7	Ca Ca 1.WHITE Sa Sa	Casing Type: 4 1/2" HSA Casing Hammer (Ibs)/Drop (in): N/A Sampler Size/Type: 24" Split Spoon Sampler Hammer (Ibs)/Drop (in): 140LB/30"								Observat Elev. 987.7 988.9 992.5	ions Notes	
_		Ы	- to ange				Samp	le							
Depth (ft)	Elev. (ft)	Symb	Depth/El Strata Cha (ft)	Stratum	N-Value RQD	No.	Pen. /Rec. (in)	Depth (ft)	Blows/6" Min/ft		and Boring Notes				
- 1 -	- 993 - 992		0.5 / 993.2	TOPSOIL	18	S1	24/18	0.0-2.0	3 4 14 15	Compact, brown,	own, SILTY SAND, some gravel. (Fill)				
- 2 -	- 991			FILL	13	S2	24/14	2.0-4.0	6 6 7	Compact, brown,	npact, brown, SILTY SAND, trace gravel. (Fill)				
- 4 -	- 989 - 989		4.07989.7		18	S3	24/20	4.0-6.0	10 3 7 11 12	Compact, brown,	SILT and SAN	ID, some grav	vel. (Glacial 1	Fill)	
- 6 -	- 987 - 986				38	S4	24/24	6.0-8.0	16 17 21 23	Dense, brown, S	AND, some silt	i, trace gravel	. (Glacial Till))	
- 9 -	- 985 - 984				43	S5	24/14	8.0-10.0	14 21 22 23	Dense, brown/red	d, SILT and SA	ND, trace gra	avel. (Glacial	Till)	
- 10 -	- 983 - 982			GLACIAL TILL	31	S6	24/20	10.0-12.0	5 12 19 28	Dense, brown/red	d, SILT and SA	ND, some gr	avel. (Glacia	l Till)	
- 12 -	- 981 - 980				57	S7	24/24	12.0-14.0	23 27 30 34	Very dense, gray	/, SANDY SILT	, trace gravel	. (Glacial Till))	
- 14 - - 15 -	- 979 - 978		16.0 / 977.	7	44	S8	24/24	14.0-16.0	12 23 21 25	Dense, gray, SIL	nnse, gray, SILTY SAND, trace gravel. (Glacial Till)				
- 10 -	- 977 - 976			Bottom of borehole 16 feet below ground surface.											
- 18 - - 19 -	- 975														
- 20 - - 21 -	- 974														
- 22 -	- 972 - 971		<u> </u>												
GRANULAF BLOWS/FT. 0-4 4-10 0-30 10-30 0 30-50 -50 >50 -7 COHESIVE BLOWS/FT. CC -2 2-4 4-8 8-15 -15		R SOIL DENS V.LOC LOOS COMP, DENS V.DEN SOILS ONSIS V.SC SOI FIR STII	S ITTY ISE SE ACT SE ISE ISE S TENCY N FT II FT	SOIL COMPONENT DESCRIPTIVE TERM "TRACE" "SOME" "ADJECTIVE" (eg SANDY, SIL" "AND" Notes: Installed groundwater observation	PROPORTION OF TOTAL SOIL CONTAINING THREE 0-10% WHICH COMPRISE AT LEAST 10-20% 25% OF THE TOTAL ARE ', SILTY) 20-35% CLASSIFIED AS "A 35-50% WELL-GRADED MIXTURE OF"						т М 2269	MCPHAIL ASSOCIATES, LLC 2269 MASSACHUSETTS AVENUE CAMBRIDGE, MA 02140 TEL: 617-868-1420 FAX: 617-868-1423			
15-30 >30		V.ST HAF	iff Rd V	Weather: Cloudy									Page 1 of 1		

Project: Leid		cester S	School	Job #: 6743					B.2.01 Boring No.							
Location: 70 Winslow			Winslov	v Avenue	Date Started: 12-5-19							MA-105				
City/State: Leicester, MA							Date	Finished:	: 12-5	-19						
Contra	ctor: 1	DS		Ca	Casing Type: 4 1/2" HSA							oundwater	Observa Elev	tions Notes		
Driller/	Helper	:		Ca	ising Har	mmer (l	bs)/Drop	(in): N/A								
Logged	d By/Re	viewe	d By: M	.WHITE Sa	mpler Si	ize/Type	9: 24" Sp									
Surfac	e Eleva	tion (f	t): 994.2	Sa	mpler Ha	ammer	(Ibs)/Dro									
Denth	Flev	loo	EL to nange		Sample							Sample Description				
(ft)	(ft)	Syml	Depth/E Strata Ch (ft)	Stratum	N-Value RQD	No.	Pen. /Rec. (in)	Depth (ft)	Blows/6" Min/ft		and					
	- 994		0.4 / 993.8	TOPSOIL	0.0-2.0	2 2	Loose, brow	/n, SILTY SAND,	trace gravel. (F	-ill)						
	- 993					51	24/10	0.0-2.0	4							
- 2 -	- 992			FILL					4	Compact, br	own, SILTY SAN	D, trace grave	. (Fill)			
- 3 -	- 991				17	S2	24/16	2.0-4.0	10							
- 4 -	- 990		4.0 / 990.2						10 6	Dense, brov	vn, SILTY SAND,	some gravel. (Glacial Till)			
- 5 -	- 989	2:0: 2:0:0 1:0:0			21	S3	24/12	4.0-6.0	9 12							
- 6 -	- 088	0.0							15	Dana har		ID		D.		
- 7 -	300				45	S4	24/24	6.0-8.0	20	Dense, prov	wu, Si∟i and SAN	u, some grave	a. (Giaciai I II	IJ.		
	- 987								25 29							
0	- 986	20.0			40	05	24/14	0.0.10.0	10 17	Dense, brov	vn, SILT and SAN	ID, some grave	el. (Glacial Till	1)		
- 9 -	- 985	0.0.1 0.00			40	55	24/14	8.0-10.0	23							
- 10 -	- 984	0.0							17	Very dense,	brown, SILTY SA	AND, trace grav	vel. (Glacial T	īll)		
- 11 -	- 983				54	S6	24/12	10.0-12.0	23 31							
- 12 -	- 982	0.0° 0.0°		GLACIAL TILL 32 43 Very dense, brown,							brown./red, SILT	and SAND, so	ome gravel. (C	Glacial Till)		
- 13 -	- 981				156	S7	24/10	12.0-14.0	56 100/2"		Very dense, brown/gray, SILTY SAND, trace gravel. (Glacial Till)					
- 14 -	- 980								32	Very dense,						
- 15 -	- 979				59	S8	24/24	14.0-16.0	26 33							
- 16 -	- 978								45 28	Very dense brown/dark brown SII TV SAND, trace gravel (Closic						
- 17 -	- 977				75	S9	24/24	16.0-18.0	33					,,		
- 18 -	070) 							42 50			ou = :				
- 10	- 9/6	0.0 0.0			111	S10	24/24	18.0-20.0	52 50	Very dense,	brown/dark brow	m, SILTY SANI	D, trace grave	el. (Glacial Till)		
	- 975	:0: 	20.0 / 974 2			2.0			61 83							
- 20 -	- 974			Bottom of borehole 20 feet below												
- 21 -	- 973			ground Sullace.												
- 22 -	- 972															
GF	RANULA	I R SOIL	S	SOIL COMPONENT	1				1	1		_		_		
BLOWS 0-4	5/FT.	DENS V.LOC	ITY DSE	DESCRIPTIVE TERM							E					
4-10 LOOSE		SE	"TRACE"	0_10)%	COMF WHIC	PONENTS	SEACH OF	AST			>				
30-50 DEM		DEN	SE	"SOME" "AD IECTIVE" (ag SANDY SH"	6 25% OF THE TOTAL ARE				Mc	PHA	L					
>50 V.DENSE		ISE	"AND" 20-35% CLASSIFIED AS A "AND" 35-50% WELL-GRADED MIXTURE OF"							OF"	ASSO	CIATES, L				
BLOWS	BLOWS/FT. CONSISTENC		TENCY N	Notes:							220	MCPHAIL A		ES, LLC S AVENUE		
<2 2-4		V.SC SOI)⊢ I FT									TEL:	лон, MA 0 617-868-14	12140 420 422		
4-8		FIR	M									FAX: (14-808-14	+23		
8-15 15-3	, 0	V.ST	IFF									Page 1 of 1				
>30 HARD				/eather: Sunny								i ay	5 1 01	•		
Proje	ct:	Leic	ester S	School			Job #	#: 	6743	8.2.01		Boring	No.			
--	--	---	--------------------------------	--	--	---	---	---	----------------------------	------------------	--	--	--	----------------------------		
Locat	tion: State:	70 V Leic	Vinslov ester, I	v Avenue MA			Date Date	Started: Finished	12-6 : 12-6	-19 -19	MA	-106	S(OV	V)		
Contra Driller/ Logged Surfact	ctor: /Helpei d By/Re e Eleva	TDS r: eviewed ation (ft)	By: M : 991.8	Ca Ca I.WHITE Sa Sa	asing Typ asing Har ampler Si ampler Ha	oe: 4 1 mmer (I ize/Type ammer (/2" HSA bs)/Drop 9: 24" Sp (Ibs)/Dro) (in): N/A Ilit Spoon O p (in): 140L	.B/30"	-	Gro Date 12-6-19 1-2-20 1-6-20	Undwater Depth 5.0 1.9 1.0	Observati Elev. 986.8 989.9 990.8	ions Notes		
			to nge				Sample									
Depth (ft)	Elev. (ft)	Symbo	Depth/EL Strata Cha (ft)	Stratum	N-Value RQD	No.	Pen. /Rec. (in)	Depth (ft)	Blows/6" Min/ft		Sample Description and Boring Notes					
- 1 -	- 991		<u>).5 / 991.3</u>	TOPSOIL	18	S1	24/18	0.0-2.0	3 7 11 11	Compact, bro	wwn, SAND, some	silt, trace grav	rel. (Fill)			
- 2 -	- 989			FILL	30	S2	24/10	2.0-4.0	8 18 12	Compact, bro	own, SILTY SAND,	some gravel.	(Fill)			
- 4 -	- 988				19	S3	24/4	4.0-6.0	8 10 9	Compact, bro	own, SAND and Gf	RAVEL, some	silt. (Fill)			
- 6 - - 7 -	- 986		5.0 / 985.8		33	S4	24/12	6.0-8.0	10 13 15 18	Dense, brow	n, SILTY SAND an	d GRAVEL. ((Glacial Till)			
- 8 -	- 983			GLACIAL TILL	21	S5	24/24	8.0-10.0	8 9 12	Compact, bro	wm, SILTY SAND,	trace gravel.	(Glacial Till)			
- 10 - - 11 -	- 981		20/070 8		60	S6	24/24	10.0-12.0	24 24 28 32 42	Very dense, g	gray, SILTY SAND	, trace gravel.	(Glacial Till)			
- 12 - - 13 -	- 979		2.07979.0	Bottom of borehole 12 feet below ground surface.					42							
- 14 -	- 978															
- 15 -	- 977 - 976															
- 16 - - 17 -	- 975															
- 18 -	- 974															
- 19 -	- 973															
- 20 -	- 972															
- 21 - - 22 -	- 970															
	- 969															
GF BLOWS	RANULA S/FT.	AR SOILS DENSIT	Y	SOIL COMPONENT												
0-4 4-10 10-3 30-5 >50 CC) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	V.LOOS LOOSE COMPAC DENSE V.DENS E SOILS		DESCRIPTIVE TERM PROPORTION OF TOTAL SOIL CONTAINING THREE COMPONENTS EACH OF "TRACE" 0-10% WHICH COMPRISE AT LEAST "SOME" 10-20% 25% OF THE TOTAL ARE "ADJECTIVE" (eg SANDY, SILTY) 20-35% CLASSIFIED AS "A "AND" 35-50% WELL-GRADED MIXTURE OF"					MCF ASSOC	PHAI HATES, L	S, LLC					
2-4 4-8 9 15	<u>,,,,,,</u> ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	V.SOF SOFT FIRM	T In	otes: istalled groundwater observation	n well with	10' of sc	reen and	2' of solid.			2269	CAMBRID CAMBRID TEL: 6 FAX: 6	GE, MA 02 GE, MA 02 17-868-14 17-868-14	AVENUE 2140 20 23		
15-3 >30	0	V.STIF HARE	F D W	/eather: Cloudy								Page	e 1 of 1			

Proje	ct:	Lei	cester S	School			Job #	# :	6743	3.2.01		Boring	j No.	
Locat	ion:	70	Winslow	v Avenue			Date	Started:	12-6	-19		MA -'	107	
City/S	state:	Lei	cester, l	VIA			Date	rinished:	12-6	-19	0			tions
Contra	ctor: ⊺	DS		Ca	asing Typ	be: 4 1	/2" HSA				Date	Depth	Elev.	Notes
Driller/	Helper:			C:	asing Ha	mmer (l	bs)/Drop	(in): N/A		F	12-6-19	8.0	980.0	
Logged	d By/Re	viewe	d By: M	I.WHITE Sa	ampler Si	ize/Type	9: 24" Sp	olit Spoon		ŀ				
Surfac	e Eleva	tion (f	t): 988.0	Sa	Sampler Hammer (Ibs)/Drop (in): 140LB/30"									
Depth	Elev.	lođ	(EL to Change ()	Stratum			Samp	le			Sampl	Sample Description		
(ft)	(ft)	Syn	Depth. Strata C (fi	Stratum	N-Value RQD	No.	/Rec. (in)	Depth (ft)	Blows/6" Min/ft		and Boring Notes			
			0.6 / 987.4	TOPSOIL					2 5	Loose, browr	n, SILTY SAND, tra	ace gravel. (F	Fill)	
- 1 -	- 987				10	S1	24/16	0.0-2.0	5					
- 2 -	- 986	\bigotimes							2	Loose, browr	n/gray, SILTY SAN	D, trace grav	vel. (Fill)	
- 3 -	- 985			FILL	7	S2	24/12	2.0-4.0	3 4					
- 4 -	- 984	\bigotimes							5 2	Loose, browr	n, SILT and SAND	, trace grave	. (Glacial Till)
- 5 -	- 983	\bigotimes			4	S3	24/4	4.0-6.0	2 2					
- 6 -	- 982	\bigotimes	6.0 / 982.0						2	Looso brown		and gravel ((
- 7 -	- 981				4	S4	24/16	6.0-8.0	2	LUUSE, DIOWI	I, ULT I OAND, [[ace graver. (C	Jiaciai Till)	
8	- 980	0.0 0.0 1							2 6					
	- 070	من م			10	.85	24/18	8.0-10.0	8 8	Compact, gra	ay/brown, SAND a	nd GRAVEL,	some silt. (G	Glacial Till)
9	919	0.0		GLACIAL TILL			27/10	0.0-10.0	11 14					
- 10 -	- 978								30	Dense, gray/	brown, SAND, sor	ne silt and gra	avel. (Glacial	Till)
- 11 -	- 977	0.0.10 0.0.10			48	S6	24/24	10.0-12.0	23 25					
- 12 -	- 976	D	12.0 / 976.0	Bottom of borehole 12 feet below					25					
- 13 -	- 975			ground surface.										
- 14 -	- 974													
- 15 -	- 973													
- 16 -	- 972													
- 17 -	- 971													
- 18 -	- 970													
- 19 -	- 969													
- 20 -	- 968													
- 21 -	- 967													
- 22 -	- 966													
GF	RANULA	R SOIL	S	SOIL COMPONENT								_		_
BLOWS 0-4	5/FT.	DENS V.LOO	ITY DSE	DESCRIPTIVE TERM	PRO	PORTION	<u>\ </u>	AL SOIL	CONTAIN	ING THREE				
4-10		LOOS	SE	"TRACE"		0_10)%	COMF WHIC	ONENTS	SEACH OF	AST			>
30-5	0 0	DENS	SE	"SOME" "AD.IECTIVE" (eq SANDV SIL	TY)	10-2	0% 5%	25% C	OF THE T	OTAL ARE		Mc	PHA	L
>50 CC	DHESIVE	V.DEN	ISE S	"AND"	,	20-3 35-5	0%	WELL	-GRADE	D MIXTURE	OF"		STATES, I	
BLOWS	/FT. C			otes:							2269			S AVENUE
2-4		sof	-T									TEL: 6	617-868-1 617-868-1	420 423
4-8 8-15	5	FIR STIF	M FF											
15-3	0	V.ST		eather: Cloudy								Pag	e 1 of	1
>30		ΠAh		Caller. Olduy										

Proje	ct:	Lei	eicester School				Job #	t: Storts di	6743	3.2.01	Boring No.				
Locat City/S	ion: State:	70 Lei	vvinsio\ cester,	w Avenue MA			Date	Finished	12-5 12-5	-19 -19		MA- ′	108		
Contra Driller/ Logged Surface	ctor: 'Helper d By/Re e Eleva	TDS : eviewe htion (f	d By: M t): 992.5	Ca Ca 1.WHITE Sa Sa	asing Typ asing Har ampler Si ampler Ha	be: 4 1 mmer (I ize/Type ammer	/2" HSA bs)/Drop e: 24" Sp (Ibs)/Dro	i (in): N/A lit Spoon I p (in): 140L	B/30"		Gro Date	Depth	Observat	tions Notes	
			to				Samp	le							
Depth (ft)	Elev. (ft)	Symbo	Depth/EL Strata Chai (ft)	Stratum	N-Value RQD	No.	Pen. /Rec. (in)	Depth (ft)	Blows/6" Min/ft		Samp and	le Descrip Boring Not	tion tes		
- 1 -	- 992		0.6 / 991.9	TOPSOIL	10	S1	24/22	0.0-2.0	2 5	Compact, bro	own, SILT and SA	ND, some gra	vel. (Fill)		
- 2 -	- 991		2.0 / 990.5	FILL					5 7						
- 3 -	- 990 - 989				11	S2	24/18	2.0-4.0	5 7 9 10	Compact, bro	own, SILTY SANI	D, trace gravel	. (Glacial Till)		
- 4 -	- 988 - 987				19	S3	24/24	4.0-6.0	5 8 11	Compact, bro	own, SILTY SANI	D, trace gravel	. (Glacial Till)		
- 6 -	- 986 - 985			GLACIAL TILL	56	S4	24/24	6.0-8.0	17 20 36 30	Very dense,	brown, SILTY SA	ND, some gra	vel. (Glacial T	īill)	
- 8 -	- 984 - 983		10.0 / 082 /		78	S5	24/24	8.0-10.0	30 33 45 47	Very dense, Slight mottling	brown, SILT & SA g observed in soi	ND, trace gra	vel. (Glacial 1	Fill)	
- 10 - - 11 -	- 982		10.07982.3	Bottom of borehole 10 feet below ground surface.					47						
- 12 - - 13 -	- 980														
- 14 -	- 979														
- 15 -	- 978														
- 16 -	- 976														
- 1/ - - 18 -	- 975														
- 19 -	- 974														
- 20 -	- 973														
- 21 -	- 971														
- 22 -	- 970														
GF BLOWS	RANULA 5/FT.	R SOIL DENS	.S ITY	SOIL COMPONENT											
0-4 4-10 10-3 30-5 >50	0-4 V.LOOSE 4-10 LOOSE 10-30 COMPACT 30-50 DENSE >50 V.DENSE "ADJECTIVE" (eg SANI			DESCRIPTIVE TERM "TRACE" "SOME" "ADJECTIVE" (eg SANDY, SIL "AND"	<u>PROF</u> TY)	<u>0-10</u> 0-10 10-2 20-3 35-5	<u>N OF TOT</u> 0% 0% 5% 0%	<u>AL</u> SOIL COMF WHIC 25% (CLAS WELL	CONTAIN PONENTS CH COMPF OF THE T SIFIED AS GRADEL	ING THREE EACH OF RISE AT LE OTAL ARE S "A D MIXTURE	AST OF"	MCPHAIL ASSOCIATES, LLC			
BLOWS <2 2-4 4-8	S/FT.C	ONSIS V.SC SOI FIR	TENCY DFT =T M	lotes:							226	9 MASSAC CAMBRID TEL: 6 FAX: 6	HUSETTS OGE, MA 0 517-868-14 517-868-14	AVENUE 2140 120 123	
8-15 15-3 >30	0	STII V.ST HAF	⊦⊦ IFF RD V	Veather: Sunny								Pag	e 1 of ′	1	



APPENDIX C:

TEST PIT LOGS TP-1 THROUGH TP-9 PREPARED BY MCPHAIL ASSOCIATES, LLC





















APPENDIX D:

GROUNDWATER MONITORING REPORTS



Groundwater Monitoring Report

Well I.D.: MA-104 (OW)

Project Name: Leicester School Project No.: 6743 Location: Leicester, MA

Road Box EL.: +993.7

Date	Time	Elapsed Time	Depth from Road Box (feet)	Groundwater EL. (feet)	McPhail Rep	Comments
12/06/19	1:30 PM	Initial	6.0	+987.7	M. White	Well Installed @ 15' w/ 10' of screen
01/02/20	4:45 PM	27 Day(s)	4.8	+988.9	M. White	
01/06/20	4:20 PM	31 Day(s)	1.2	+992.5	M. White	



Groundwater Monitoring Report

Well I.D.: MA-106 (OW)

Project Name: Leicester School Project No.: 6743 Location: Leicester, MA

Road Box EL.: +991.8

Date	Time	Elapsed Time	Depth from Road Box (feet)	Groundwater EL. (feet)	McPhail Rep	Comments
12/06/19	2:30 PM	Initial	5.0	+986.8	M. White	Well Installed @ 12' w/ 10' of screen
01/02/20	5:05 PM	27 Day(s)	1.9	+989.9	M. White	
01/06/20	4:30 PM	31 Day(s)	1.0	+990.8	M. White	



APPENDIX E:

TOPSOIL THICKNESS TABLE AND CHEMICAL TEST RESULTS PREPARED BY UMASS EXTENSION SOIL AND PLANT NUTRIENT TESTING LABORATORY



Topsoil Thickness Summary Table

Exploration No.	Observed Thickness in Feet
MA-101	0.7
MA-105	0.3
TP-6	1.0
TP-7	0.5
TP-8	1.0
H-1	0.5
H-2	0.5
H-3	1.0
H-4	1.0

*Exploration Locations Requested by Warner Larson Landscape Architects



Soil and Plant Nutrient Testing Laboratory

203 Paige Laboratory 161 Holdsworth Way University of Massachusetts Amherst, MA 01003 Phone: (413) 545-2311 e-mail: soiltest@umass.edu website: soiltest.umass.edu

Sample Information:

Sample ID: LMS MA-101

Order Number:	48506
Lab Number:	S191219-202
Area Sampled:	1000 sq ft
Received:	12/19/2019
Reported:	12/26/2019

Christopher Miller McPhail Associates, LLC 2269 Massachusetts Ave Cambridge, MA 02140

Soil Test Report

Prepared For:

cmiller@mcphailgeo.com 617-686-1420

Results

Analysis	Value Found	Optimum Range	Analysis	Value Found	Optimum Range
Soil pH (1:1, H2O)	5.6		Cation Exch. Capacity, meq/100g	16.4	
Modified Morgan extractable, ppm			Exch. Acidity, meq/100g	9.4	
Macronutrients			Base Saturation, %		
Phosphorus (P)	1.3	4-14	Calcium Base Saturation	31	50-80
Potassium (K)	133	100-160	Magnesium Base Saturation	9	10-30
Calcium (Ca)	1035	1000-1500	Potassium Base Saturation	2	2.0-7.0
Magnesium (Mg)	181	50-120	Scoop Density, g/cc	0.86	
Sulfur (S)	20.4	>10	Optional tests		
Micronutrients *			Soil Organic Matter (LOI), %	10.4	
Boron (B)	0.0	0.1-0.5			
Manganese (Mn)	8.8	1.1-6.3			
Zinc (Zn)	0.9	1.0-7.6			
Copper (Cu)	0.3	0.3-0.6			
Iron (Fe)	14.9	2.7-9.4			
Aluminum (Al)	277	<75			
Lead (Pb)	2.2	<22			

* Micronutrient deficiencies rarely occur in New England soils; therefore, an Optimum Range has never been defined. Values provided represent the normal range found in soils and are for reference only.

Nutrient	Very Low	Low	Optimum	Above Optimum
Phosphorus (P):				
Potassium (K):				
Calcium (Ca):				
Magnesium (Mg):				



Recommendations for Nursery Trees & Shrubs, Deciduous-Establishment

Limestone (Target pH	I of 6.0) Nitrogen, N	Phosphorus, P2O5	Potassium, K2O
]	lbs / 1000 sq ft	
125	1 - 1.5	3	1

Comments:

-The lead level in this soil is below the optimum range of <22 ppm listed on your test results. However, many variables affect this result, and safety thresholds vary by location and soil use. There may still be a potential risk of lead exposure for soils used for growing food or as play areas for children. Our Total Sorbed Metals test provides an accurate measurement of soil lead. For more information about lead levels in soil, see the fact sheet entitled "Soil Lead: Testing, Interpretation, & Recommendations," listed under General References at the end of this report.

Recommendations for Nursery Trees & Shrubs, Deciduous-Maintenance

Limestone (Tai	rget pH of 6.0) N	litrogen, N	Phosphorus, P2O5	Potassium, K2O
			lbs / 1000 sq ft	
125		1.5 - 2.5	2	1

Comments:

-Do not topdress with more than 50 lb limestone per 1000 sq ft at one time. Split the above application between early spring and midautumn.



Recommendations for Sports Turf/Golf Fairway-Establishment

Limestone (Target pl	H of 6.5) Nitrogen, N	Phosphorus, P2O5	Potassium, K2O
	l	lbs / 1000 sq ft	
175	2 - 4	2.5	1

Comments:

-For instructions on converting nutrient recommendations to fertilizer applications in lawns, see Reference "Step-by-Step Fertilizer Guide for Lawns" (listed below).

-For best results, split the N, P2O5, and K2O recommendations above into three to four applications over the course of the growing season at six to eight week intervals, beginning in mid- to late-April.

-Many fertilizer sources and rates may be combined to provide acceptable turfgrass fertilty.

-The lead level in this soil is below the optimum range of <22 ppm listed on your test results. However, many variables affect this result, and safety thresholds vary by location and soil use. There may still be a potential risk of lead exposure for soils used for growing food or as play areas for children. Our Total Sorbed Metals test provides an accurate measurement of soil lead. For more information about lead levels in soil, see the fact sheet entitled "Soil Lead: Testing, Interpretation, & Recommendations," listed under General References at the end of this report.

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Soil Lead: Testing, Interpretation & Recommendations	http://ag.umass.edu/soil-plant-nutrient-testing-laboratory/fact-sheets/soil-lead-fact-sheet
For current information and order forms, please visit	http://soiltest.umass.edu/
UMass Extension Nutrient Management	http://ag.umass.edu/agriculture-resources/nutrient-management



Soil and Plant Nutrient Testing Laboratory

203 Paige Laboratory 161 Holdsworth Way University of Massachusetts Amherst, MA 01003 Phone: (413) 545-2311 e-mail: soiltest@umass.edu website: soiltest.umass.edu

Sample Information:

Sample ID: LMS MA-105

Order Number:	48506
Lab Number:	S191219-203
Area Sampled:	1000 sq ft
Received:	12/19/2019
Reported:	12/26/2019

Christopher Miller McPhail Associates, LLC 2269 Massachusetts Ave Cambridge, MA 02140

Soil Test Report

Prepared For:

cmiller@mcphailgeo.com 617-686-1420

Results

Analysis	Value Found	Optimum Range	Analysis	Value Found	Optimum Range
Soil pH (1:1, H2O)	6.0		Cation Exch. Capacity, meq/100g	10.6	
Modified Morgan extractable, ppm			Exch. Acidity, meq/100g	5.3	
Macronutrients			Base Saturation, %		
Phosphorus (P)	1.0	4-14	Calcium Base Saturation	39	50-80
Potassium (K)	93	100-160	Magnesium Base Saturation	9	10-30
Calcium (Ca)	822	1000-1500	Potassium Base Saturation	2	2.0-7.0
Magnesium (Mg)	119	50-120	Scoop Density, g/cc	1.10	
Sulfur (S)	15.5	>10	Optional tests		
Micronutrients *			Soil Organic Matter (LOI), %	4.3	
Boron (B)	0.0	0.1-0.5			
Manganese (Mn)	8.4	1.1-6.3			
Zinc (Zn)	0.5	1.0-7.6			
Copper (Cu)	0.1	0.3-0.6			
Iron (Fe)	23.4	2.7-9.4			
Aluminum (Al)	114	<75			
Lead (Pb)	1.2	<22			

* Micronutrient deficiencies rarely occur in New England soils; therefore, an Optimum Range has never been defined. Values provided represent the normal range found in soils and are for reference only.

Nutrient	Very Low	Low	Optimum	Above Optimum
Phosphorus (P):				
Potassium (K):				
Calcium (Ca):				
Magnesium (Mg):				



Recommendations for Nursery Trees & Shrubs, Deciduous-Establishment

Limestone (Target pH	of 6.0) Nitrogen, N	Phosphorus, P2O5	Potassium, K2O
	I	lbs / 1000 sq ft	
0	1 - 1.5	3	2

Comments:

-The lead level in this soil is below the optimum range of <22 ppm listed on your test results. However, many variables affect this result, and safety thresholds vary by location and soil use. There may still be a potential risk of lead exposure for soils used for growing food or as play areas for children. Our Total Sorbed Metals test provides an accurate measurement of soil lead. For more information about lead levels in soil, see the fact sheet entitled "Soil Lead: Testing, Interpretation, & Recommendations," listed under General References at the end of this report.

Recommendations for Nursery Trees & Shrubs, Deciduous-Maintenance

Limestone (Ta	arget pH of 6.0) Nitroge	ı, N	Phosphorus, P2O5	Potassium, K2O
		– lbs / 1000 sq ft		
0	1.5 - 2.	5	2	1

Comments:



Recommendations for Sports Turf/Golf Fairway-Establishment

Limestone (Target p	oH of 6.5) Nitrogen, N	Phosphorus, P2O5	Potassium, K2O
	ll	bs / 1000 sq ft	
100	2 - 4	2.5	2

Comments:

-For instructions on converting nutrient recommendations to fertilizer applications in lawns, see Reference "Step-by-Step Fertilizer Guide for Lawns" (listed below).

-For best results, split the N, P2O5, and K2O recommendations above into three to four applications over the course of the growing season at six to eight week intervals, beginning in mid- to late-April.

-Many fertilizer sources and rates may be combined to provide acceptable turfgrass fertilty.

-The lead level in this soil is below the optimum range of <22 ppm listed on your test results. However, many variables affect this result, and safety thresholds vary by location and soil use. There may still be a potential risk of lead exposure for soils used for growing food or as play areas for children. Our Total Sorbed Metals test provides an accurate measurement of soil lead. For more information about lead levels in soil, see the fact sheet entitled "Soil Lead: Testing, Interpretation, & Recommendations," listed under General References at the end of this report.

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For current information and order forms, please visit	http://soiltest.umass.edu/
UMass Extension Nutrient Management	http://ag.umass.edu/agriculture-resources/nutrient-management



Soil Test Report

cmiller@mcphailgeo.com

Prepared For: Christopher Miller McPhail Associates, LLC 2269 Massachusetts Ave Cambridge, MA 02140

617-686-1420

Soil and Plant Nutrient Testing Laboratory

203 Paige Laboratory 161 Holdsworth Way University of Massachusetts Amherst, MA 01003 Phone: (413) 545-2311 e-mail: soiltest@umass.edu website: soiltest.umass.edu

Sample Information:

Sample ID: LMS TP-6

Order Number:	48506
Lab Number:	S191219-204
Area Sampled:	1000 sq ft
Received:	12/19/2019
Reported:	12/26/2019
Reported:	12/26/2019

Results			_		
Analysis	Value Found	Optimum Range	Analysis	Value Found	Optimum Range
Soil pH (1:1, H2O)	5.3		Cation Exch. Capacity, meq/100g	13.3	
Modified Morgan extractable, ppm			Exch. Acidity, meq/100g	10.1	
Macronutrients			Base Saturation, %		
Phosphorus (P)	0.9	4-14	Calcium Base Saturation	20	50-80
Potassium (K)	55	100-160	Magnesium Base Saturation	3	10-30
Calcium (Ca)	519	1000-1500	Potassium Base Saturation	1	2.0-7.0
Magnesium (Mg)	55	50-120	Scoop Density, g/cc	0.79	
Sulfur (S)	17.1	>10	Optional tests		
Micronutrients *			Soil Organic Matter (LOI), %	8.3	
Boron (B)	0.0	0.1-0.5			
Manganese (Mn)	7.0	1.1-6.3			
Zinc (Zn)	0.9	1.0-7.6			
Copper (Cu)	0.2	0.3-0.6			

Micronutrient deficiencies rarely occur in New England soils; therefore, an Optimum Range has never been defined. Values provided represent the normal range found in soils and are for reference only.

2.7 - 9.4

<75

<22

11.5

354

3.8

Soil Test Interpretation

Iron (Fe)

Aluminum (Al)

Lead (Pb)

Nutrient	Very Low	Low	Optimum	Above Optimum
Phosphorus (P):				
Potassium (K):				
Calcium (Ca):				
Magnesium (Mg):				



Recommendations for Nursery Trees & Shrubs, Deciduous-Establishment

Limestone (Targe	t pH of 6.0) Nitrogen, N	Phosphorus, P2O5	Potassium, K2O
		lbs / 1000 sq ft	25
150	1 - 1.5	3	2.5

Comments:

-The lead level in this soil is below the optimum range of <22 ppm listed on your test results. However, many variables affect this result, and safety thresholds vary by location and soil use. There may still be a potential risk of lead exposure for soils used for growing food or as play areas for children. Our Total Sorbed Metals test provides an accurate measurement of soil lead. For more information about lead levels in soil, see the fact sheet entitled "Soil Lead: Testing, Interpretation, & Recommendations," listed under General References at the end of this report.

Recommendations for Nursery Trees & Shrubs, Deciduous-Maintenance

Limestone (Targe	et pH of 6.0) Nitrogen, N	Phosphorus, P2O5	Potassium, K2O
		lbs / 1000 sq ft	
150	1.5 - 2.5	2	2

Comments:

-Do not topdress with more than 50 lb limestone per 1000 sq ft at one time. Split the above application between early spring and midautumn.



Recommendations for Sports Turf/Golf Fairway-Establishment

Limestone (Target	pH of 6.5) Nitrogen, N	Phosphorus, P2O5	Potassium, K2O
	I	lbs / 1000 sq ft	
200	2 - 4	2.5	4

Comments:

-For instructions on converting nutrient recommendations to fertilizer applications in lawns, see Reference "Step-by-Step Fertilizer Guide for Lawns" (listed below).

-For best results, split the N, P2O5, and K2O recommendations above into three to four applications over the course of the growing season at six to eight week intervals, beginning in mid- to late-April.

-Many fertilizer sources and rates may be combined to provide acceptable turfgrass fertilty.

-The lead level in this soil is below the optimum range of <22 ppm listed on your test results. However, many variables affect this result, and safety thresholds vary by location and soil use. There may still be a potential risk of lead exposure for soils used for growing food or as play areas for children. Our Total Sorbed Metals test provides an accurate measurement of soil lead. For more information about lead levels in soil, see the fact sheet entitled "Soil Lead: Testing, Interpretation, & Recommendations," listed under General References at the end of this report.

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UMass Extension Nutrient Management	http://ag.umass.edu/agriculture-resources/nutrient-management



Soil Test Report

cmiller@mcphailgeo.com

Prepared For: Christopher Miller McPhail Associates, LLC 2269 Massachusetts Ave Cambridge, MA 02140

617-686-1420

Soil and Plant Nutrient Testing Laboratory

203 Paige Laboratory 161 Holdsworth Way University of Massachusetts Amherst, MA 01003 Phone: (413) 545-2311 e-mail: soiltest@umass.edu website: soiltest.umass.edu

Sample Information:

Sample ID: LMS TP-7

Order Number:	48506
Lab Number:	S191219-205
Area Sampled:	1000 sq ft
Received:	12/19/2019
Reported:	12/26/2019
Area Sampled: Received: Reported:	1000 sq ft 12/19/2019 12/26/2019

Results					
Analysis	Value Found	Optimum Range	Analysis	Value Found	Optimum Range
Soil pH (1:1, H2O)	5.6		Cation Exch. Capacity, meq/100g	10.8	
Modified Morgan extractable, ppm			Exch. Acidity, meq/100g	7.9	
Macronutrients			Base Saturation, %		
Phosphorus (P)	0.9	4-14	Calcium Base Saturation	22	50-80
Potassium (K)	78	100-160	Magnesium Base Saturation	3	10-30
Calcium (Ca)	467	1000-1500	Potassium Base Saturation	2	2.0-7.0
Magnesium (Mg)	40	50-120	Scoop Density, g/cc	0.79	
Sulfur (S)	15.4	>10	Optional tests		
Micronutrients *			Soil Organic Matter (LOI), %	7.5	
Boron (B)	0.0	0.1-0.5			
Manganese (Mn)	6.0	1.1-6.3			
Zinc (Zn)	0.9	1.0-7.6			
Copper (Cu)	0.2	0.3-0.6			
Iron (Fe)	8.9	2.7-9.4			
Aluminum (Al)	407	<75			
Lead (Pb)	1.9	<22			

* Micronutrient deficiencies rarely occur in New England soils; therefore, an Optimum Range has never been defined. Values provided represent the normal range found in soils and are for reference only.

Nutrient	Very Low	Low	Optimum	Above Optimum
Phosphorus (P):				
Potassium (K):				
Calcium (Ca):				
Magnesium (Mg):				



Recommendations for Nursery Trees & Shrubs, Deciduous-Establishment

Limestone (Target	pH of 6.0) Nitrogen, N	Phosphorus, P2O5	Potassium, K2O
		lbs / 1000 sq ft	
100	1 - 1.5	3	<u> </u>

Comments:

-The lead level in this soil is below the optimum range of <22 ppm listed on your test results. However, many variables affect this result, and safety thresholds vary by location and soil use. There may still be a potential risk of lead exposure for soils used for growing food or as play areas for children. Our Total Sorbed Metals test provides an accurate measurement of soil lead. For more information about lead levels in soil, see the fact sheet entitled "Soil Lead: Testing, Interpretation, & Recommendations," listed under General References at the end of this report.

Recommendations for Nursery Trees & Shrubs, Deciduous-Maintenance

Limestone (Ta	rget pH of 6.0)	Nitrogen, N	Phosphorus, P2O5	Potassium, K2O
			lbs / 1000 sq ft	
100		1.5 - 2.5	2	1

Comments:

-Do not topdress with more than 50 lb limestone per 1000 sq ft at one time. Split the above application between early spring and midautumn.



Soil and Plant Nutrient Testing Laboratory 203 Paige Laboratory

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Recommendations for Sports Turf/Golf Fairway-Establishment

Limestone (Target pl	H of 6.5) Nitrogen, N	Phosphorus, P2O5	Potassium, K2O
		lbs / 1000 sq ft	
150	2 - 4	2.5	2

Comments:

-Your magnesium level is low. Dolomitic limestone is recommended.

-For instructions on converting nutrient recommendations to fertilizer applications in lawns, see Reference "Step-by-Step Fertilizer Guide for Lawns" (listed below).

-For best results, split the N, P2O5, and K2O recommendations above into three to four applications over the course of the growing season at six to eight week intervals, beginning in mid- to late-April.

-Many fertilizer sources and rates may be combined to provide acceptable turfgrass fertilty.

-The lead level in this soil is below the optimum range of <22 ppm listed on your test results. However, many variables affect this result, and safety thresholds vary by location and soil use. There may still be a potential risk of lead exposure for soils used for growing food or as play areas for children. Our Total Sorbed Metals test provides an accurate measurement of soil lead. For more information about lead levels in soil, see the fact sheet entitled "Soil Lead: Testing, Interpretation, & Recommendations," listed under General References at the end of this report.

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Soil and Plant Nutrient Testing Laboratory

203 Paige Laboratory 161 Holdsworth Way University of Massachusetts Amherst, MA 01003 Phone: (413) 545-2311 e-mail: soiltest@umass.edu website: soiltest.umass.edu

Sample Information:

Sample ID: LMS_TP-8

Order Number:	48506
Lab Number:	S191219-206
Area Sampled:	1000 sq ft
Received:	12/19/2019
Reported:	12/26/2019

cmiller@mcphailgeo.com 617-686-1420

Soil Test Report

Prepared For: Christopher Miller McPhail Associates, LLC 2269 Massachusetts Ave Cambridge, MA 02140

Results

Analysis	Value Found	Optimum Range	Analysis	Value Found	Optimum Range
Soil pH (1:1, H2O)	5.8		Cation Exch. Capacity, meq/100g	10.1	
Modified Morgan extractable, ppm			Exch. Acidity, meq/100g	6.0	
Macronutrients			Base Saturation, %		
Phosphorus (P)	0.8	4-14	Calcium Base Saturation	35	50-80
Potassium (K)	46	100-160	Magnesium Base Saturation	5	10-30
Calcium (Ca)	717	1000-1500	Potassium Base Saturation	1	2.0-7.0
Magnesium (Mg)	56	50-120	Scoop Density, g/cc	0.94	
Sulfur (S)	52.7	>10	Optional tests		
Micronutrients *			Soil Organic Matter (LOI), %	5.6	
Boron (B)	0.0	0.1-0.5			
Manganese (Mn)	5.0	1.1-6.3			
Zinc (Zn)	0.4	1.0-7.6			
Copper (Cu)	0.2	0.3-0.6			
Iron (Fe)	29.4	2.7-9.4			
Aluminum (Al)	270	<75			
Lead (Pb)	1.4	<22			

* Micronutrient deficiencies rarely occur in New England soils; therefore, an Optimum Range has never been defined. Values provided represent the normal range found in soils and are for reference only.

Nutrient	Very Low	Low	Optimum	Above Optimum
Phosphorus (P):				
Potassium (K):				
Calcium (Ca):				
Magnesium (Mg):				



Recommendations for Nursery Trees & Shrubs, Deciduous-Establishment

Limestone (Target pH of	6.0) Nitrogen, N	Phosphorus, P2O5	Potassium, K2O
		lbs / 1000 sq ft	
0	1 - 1.5	3	3

Comments:

-The lead level in this soil is below the optimum range of <22 ppm listed on your test results. However, many variables affect this result, and safety thresholds vary by location and soil use. There may still be a potential risk of lead exposure for soils used for growing food or as play areas for children. Our Total Sorbed Metals test provides an accurate measurement of soil lead. For more information about lead levels in soil, see the fact sheet entitled "Soil Lead: Testing, Interpretation, & Recommendations," listed under General References at the end of this report.

Recommendations for Nursery Trees & Shrubs, Deciduous-Maintenance

Limestone (Tai	rget pH of 6.0) Nitrogen, N	Phosphorus, P2O5	Potassium, K2O
]	lbs / 1000 sq ft	
0	1.5 - 2.5	2	2.5

Comments:



Recommendations for Sports Turf/Golf Fairway-Establishment

Limestone (Target	pH of 6.5) Nitrogen, N	Phosphorus, P2O5	Potassium, K2O
	lt	os / 1000 sq ft	
100	2 - 4	2.5	5

Comments:

-For instructions on converting nutrient recommendations to fertilizer applications in lawns, see Reference "Step-by-Step Fertilizer Guide for Lawns" (listed below).

-For best results, split the N, P2O5, and K2O recommendations above into three to four applications over the course of the growing season at six to eight week intervals, beginning in mid- to late-April.

-Many fertilizer sources and rates may be combined to provide acceptable turfgrass fertilty.

-The lead level in this soil is below the optimum range of <22 ppm listed on your test results. However, many variables affect this result, and safety thresholds vary by location and soil use. There may still be a potential risk of lead exposure for soils used for growing food or as play areas for children. Our Total Sorbed Metals test provides an accurate measurement of soil lead. For more information about lead levels in soil, see the fact sheet entitled "Soil Lead: Testing, Interpretation, & Recommendations," listed under General References at the end of this report.

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Soil and Plant Nutrient Testing Laboratory

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Sample Information:

Sample ID: LMS_H-1

Order Number:	48506
Lab Number:	S191219-207
Area Sampled:	1000 sq ft
Received:	12/19/2019
Reported:	12/26/2019

Christopher Miller McPhail Associates, LLC 2269 Massachusetts Ave

Soil Test Report

Prepared For:

cmiller@mcphailgeo.com 617-686-1420

Cambridge, MA 02140

Results

Analysis	Value Found	Optimum Range	Analysis	Value Found	Optimum Range
Soil pH (1:1, H2O)	6.2		Cation Exch. Capacity, meq/100g	8.1	
Modified Morgan extractable, ppm			Exch. Acidity, meq/100g	3.7	
Macronutrients			Base Saturation, %		
Phosphorus (P)	1.7	4-14	Calcium Base Saturation	45	50-80
Potassium (K)	59	100-160	Magnesium Base Saturation	8	10-30
Calcium (Ca)	729	1000-1500	Potassium Base Saturation	2	2.0-7.0
Magnesium (Mg)	81	50-120	Scoop Density, g/cc	1.23	
Sulfur (S)	9.0	>10	Optional tests		
Micronutrients *			Soil Organic Matter (LOI), %	4.0	
Boron (B)	0.1	0.1-0.5			
Manganese (Mn)	3.6	1.1-6.3			
Zinc (Zn)	0.7	1.0-7.6			
Copper (Cu)	0.1	0.3-0.6			
Iron (Fe)	16.9	2.7-9.4			
Aluminum (Al)	73	<75			
Lead (Pb)	1.1	<22			

* Micronutrient deficiencies rarely occur in New England soils; therefore, an Optimum Range has never been defined. Values provided represent the normal range found in soils and are for reference only.

Nutrient	Very Low	Low	Optimum	Above Optimum
Phosphorus (P):				
Potassium (K):				
Calcium (Ca):				
Magnesium (Mg):				



Recommendations for Nursery Trees & Shrubs, Deciduous-Establishment

Limestone (Target pH of 6.0)	Nitrogen, N	Phosphorus, P2O5	Potassium, K2O
		lbs / 1000 sq ft	
0	1 - 1.5	3	2.5

Comments:

-The lead level in this soil is below the optimum range of <22 ppm listed on your test results. However, many variables affect this result, and safety thresholds vary by location and soil use. There may still be a potential risk of lead exposure for soils used for growing food or as play areas for children. Our Total Sorbed Metals test provides an accurate measurement of soil lead. For more information about lead levels in soil, see the fact sheet entitled "Soil Lead: Testing, Interpretation, & Recommendations," listed under General References at the end of this report.

Recommendations for Nursery Trees & Shrubs, Deciduous-Maintenance

Limestone (Ta	rget pH of 6.0) Nitrogen, N	Phosphorus, P2O5	Potassium, K2O
		lbs / 1000 sq ft	
0	1.5 - 2.5	2	2

Comments:



Recommendations for Sports Turf/Golf Fairway-Establishment

Limestone (Targe	et pH of 6.5) Nitrogen, N	Phosphorus, P2O5	Potassium, K2O
		lbs / 1000 sq ft	
50	2 - 4	2.5	4

Comments:

-For instructions on converting nutrient recommendations to fertilizer applications in lawns, see Reference "Step-by-Step Fertilizer Guide for Lawns" (listed below).

-For best results, split the N, P2O5, and K2O recommendations above into three to four applications over the course of the growing season at six to eight week intervals, beginning in mid- to late-April.

-Many fertilizer sources and rates may be combined to provide acceptable turfgrass fertilty.

-The lead level in this soil is below the optimum range of <22 ppm listed on your test results. However, many variables affect this result, and safety thresholds vary by location and soil use. There may still be a potential risk of lead exposure for soils used for growing food or as play areas for children. Our Total Sorbed Metals test provides an accurate measurement of soil lead. For more information about lead levels in soil, see the fact sheet entitled "Soil Lead: Testing, Interpretation, & Recommendations," listed under General References at the end of this report.

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For current information and order forms, please visit	http://soiltest.umass.edu/
UMass Extension Nutrient Management	http://ag.umass.edu/agriculture-resources/nutrient-management


Soil and Plant Nutrient Testing Laboratory

203 Paige Laboratory 161 Holdsworth Way University of Massachusetts Amherst, MA 01003 Phone: (413) 545-2311 e-mail: soiltest@umass.edu website: soiltest.umass.edu

Sample Information:

Sample ID: LMS_H-2

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2269 Massachusetts Ave Cambridge, MA 02140

Soil Test Report

Prepared For: Christopher Miller McPhail Associates, LLC

cmiller@mcphailgeo.com 617-686-1420

Results

Analysis	Value Found	Optimum Range	Analysis	Value Found	Optimum Range
Soil pH (1:1, H2O)	6.3		Cation Exch. Capacity, meq/100g	10.9	
Modified Morgan extractable, ppm			Exch. Acidity, meq/100g	4.3	
Macronutrients			Base Saturation, %		
Phosphorus (P)	1.3	4-14	Calcium Base Saturation	47	50-80
Potassium (K)	127	100-160	Magnesium Base Saturation	10	10-30
Calcium (Ca)	1029	1000-1500	Potassium Base Saturation	3	2.0-7.0
Magnesium (Mg)	136	50-120	Scoop Density, g/cc	1.01	
Sulfur (S)	14.4	>10	Optional tests		
Micronutrients *			Soil Organic Matter (LOI), %	5.3	
Boron (B)	0.1	0.1-0.5			
Manganese (Mn)	7.5	1.1-6.3			
Zinc (Zn)	0.5	1.0-7.6			
Copper (Cu)	0.2	0.3-0.6			
Iron (Fe)	11.8	2.7-9.4			
Aluminum (Al)	105	<75			
Lead (Pb)	0.9	<22			

* Micronutrient deficiencies rarely occur in New England soils; therefore, an Optimum Range has never been defined. Values provided represent the normal range found in soils and are for reference only.

Soil Test Interpretation

Nutrient	Very Low	Low	Optimum	Above Optimum
Phosphorus (P):				
Potassium (K):				
Calcium (Ca):				
Magnesium (Mg):				



Recommendations for Nursery Trees & Shrubs, Deciduous-Establishment

Limestone (Target pH	of 6.0) Nitrogen, N	Phosphorus, P2O5	Potassium, K2O
		lbs / 1000 sq ft	
0	1 - 1.5	3	1

Comments:

-The lead level in this soil is below the optimum range of <22 ppm listed on your test results. However, many variables affect this result, and safety thresholds vary by location and soil use. There may still be a potential risk of lead exposure for soils used for growing food or as play areas for children. Our Total Sorbed Metals test provides an accurate measurement of soil lead. For more information about lead levels in soil, see the fact sheet entitled "Soil Lead: Testing, Interpretation, & Recommendations," listed under General References at the end of this report.

Recommendations for Nursery Trees & Shrubs, Deciduous-Maintenance

Limestone (7	Farget pH of 6.0)	Nitrogen, N	Phosphorus, P2O5	Potassium, K2O
			lbs / 1000 sq ft	
0		1.5 - 2.5	2	1

Comments:

-The lead level in this soil is below the optimum range of <22 ppm listed on your test results. However, many variables affect this result, and safety thresholds vary by location and soil use. There may still be a potential risk of lead exposure for soils used for growing food or as play areas for children. Our Total Sorbed Metals test provides an accurate measurement of soil lead. For more information about lead levels in soil, see the fact sheet entitled "Soil Lead: Testing, Interpretation, & Recommendations," listed under General References at the end of this report.



Recommendations for Sports Turf/Golf Fairway-Establishment

Limestone (Target	pH of 6.5) Nitrogen, N	Phosphorus, P2O5	Potassium, K2O
		lbs / 1000 sq ft	
75	2 - 4	2.5	1

Comments:

-For instructions on converting nutrient recommendations to fertilizer applications in lawns, see Reference "Step-by-Step Fertilizer Guide for Lawns" (listed below).

-For best results, split the N, P2O5, and K2O recommendations above into three to four applications over the course of the growing season at six to eight week intervals, beginning in mid- to late-April.

-Many fertilizer sources and rates may be combined to provide acceptable turfgrass fertilty.

-The lead level in this soil is below the optimum range of <22 ppm listed on your test results. However, many variables affect this result, and safety thresholds vary by location and soil use. There may still be a potential risk of lead exposure for soils used for growing food or as play areas for children. Our Total Sorbed Metals test provides an accurate measurement of soil lead. For more information about lead levels in soil, see the fact sheet entitled "Soil Lead: Testing, Interpretation, & Recommendations," listed under General References at the end of this report.

References:

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For current information and order forms, please visit	http://soiltest.umass.edu/
UMass Extension Nutrient Management	http://ag.umass.edu/agriculture-resources/nutrient-management

3 of 3



Soil Test Report

cmiller@mcphailgeo.com

Prepared For: Christopher Miller McPhail Associates, LLC 2269 Massachusetts Ave Cambridge, MA 02140

617-686-1420

Results

Soil and Plant Nutrient Testing Laboratory

203 Paige Laboratory 161 Holdsworth Way University of Massachusetts Amherst, MA 01003 Phone: (413) 545-2311 e-mail: soiltest@umass.edu website: soiltest.umass.edu

Sample Information:

Sample ID: LMS_H-3

Order Numl	per: 48506
Lab Numbe	r: \$191219-209
Area Sample	ed: 1000 sq ft
Received:	12/19/2019
Reported:	12/26/2019

Analysis	Value Found	Optimum Range	Analysis	Value Found	Optimum Range
Soil pH (1:1, H2O)	5.6		Cation Exch. Capacity, meq/100g	13.4	
Modified Morgan extractable, ppm			Exch. Acidity, meq/100g	7.8	
Macronutrients			Base Saturation, %		
Phosphorus (P)	0.8	4-14	Calcium Base Saturation	37	50-80
Potassium (K)	72	100-160	Magnesium Base Saturation	4	10-30
Calcium (Ca)	982	1000-1500	Potassium Base Saturation	1	2.0-7.0
Magnesium (Mg)	62	50-120	Scoop Density, g/cc	0.87	
Sulfur (S)	23.7	>10	Optional tests		
Micronutrients *			Soil Organic Matter (LOI), %	7.2	
Boron (B)	0.1	0.1-0.5			
Manganese (Mn)	18.0	1.1-6.3			
Zinc (Zn)	1.0	1.0-7.6			
Copper (Cu)	0.2	0.3-0.6			
Iron (Fe)	21.5	2.7-9.4			
Aluminum (Al)	173	<75			
Lead (Pb)	1.6	<22			

* Micronutrient deficiencies rarely occur in New England soils; therefore, an Optimum Range has never been defined. Values provided represent the normal range found in soils and are for reference only.

Soil Test Interpretation

Nutrient	Very Low	Low	Optimum	Above Optimum
Phosphorus (P):				
Potassium (K):				
Calcium (Ca):				
Magnesium (Mg):				



Recommendations for Nursery Trees & Shrubs, Deciduous-Establishment

Limestone (Target pH of 6.0)	Nitrogen, N	Phosphorus, P2O5	Potassium, K2O
		lbs / 1000 sq ft	
100	1 - 1.5	3	2.5

Comments:

-The lead level in this soil is below the optimum range of <22 ppm listed on your test results. However, many variables affect this result, and safety thresholds vary by location and soil use. There may still be a potential risk of lead exposure for soils used for growing food or as play areas for children. Our Total Sorbed Metals test provides an accurate measurement of soil lead. For more information about lead levels in soil, see the fact sheet entitled "Soil Lead: Testing, Interpretation, & Recommendations," listed under General References at the end of this report.

Recommendations for Nursery Trees & Shrubs, Deciduous-Maintenance

Limestone (Tar	get pH of 6.0)	Nitrogen, N	Phosphorus, P2O5	Potassium, K2O
			lbs / 1000 sq ft	
100		1.5 - 2.5	2	2

Comments:

-Do not topdress with more than 50 lb limestone per 1000 sq ft at one time. Split the above application between early spring and midautumn.

-The lead level in this soil is below the optimum range of <22 ppm listed on your test results. However, many variables affect this result, and safety thresholds vary by location and soil use. There may still be a potential risk of lead exposure for soils used for growing food or as play areas for children. Our Total Sorbed Metals test provides an accurate measurement of soil lead. For more information about lead levels in soil, see the fact sheet entitled "Soil Lead: Testing, Interpretation, & Recommendations," listed under General References at the end of this report.



Recommendations for Sports Turf/Golf Fairway-Establishment

Limestone (Target	pH of 6.5) Nitrogen, N	Phosphorus, P2O5	Potassium, K2O
	lb	s / 1000 sq ft	
150	2 - 4	2.5	4

Comments:

-For instructions on converting nutrient recommendations to fertilizer applications in lawns, see Reference "Step-by-Step Fertilizer Guide for Lawns" (listed below).

-For best results, split the N, P2O5, and K2O recommendations above into three to four applications over the course of the growing season at six to eight week intervals, beginning in mid- to late-April.

-Many fertilizer sources and rates may be combined to provide acceptable turfgrass fertilty.

-The lead level in this soil is below the optimum range of <22 ppm listed on your test results. However, many variables affect this result, and safety thresholds vary by location and soil use. There may still be a potential risk of lead exposure for soils used for growing food or as play areas for children. Our Total Sorbed Metals test provides an accurate measurement of soil lead. For more information about lead levels in soil, see the fact sheet entitled "Soil Lead: Testing, Interpretation, & Recommendations," listed under General References at the end of this report.

References:

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Soil and Plant Nutrient Testing Laboratory

203 Paige Laboratory 161 Holdsworth Way University of Massachusetts Amherst, MA 01003 Phone: (413) 545-2311 e-mail: soiltest@umass.edu website: soiltest.umass.edu

Sample Information:

Sample ID: LMS_H-4

Order Number:	48506
Lab Number:	S191219-210
Area Sampled:	1000 sq ft
Received:	12/19/2019
Reported:	12/26/2019

Cambridge, MA 02140 cmiller@mcphailgeo.com

Soil Test Report

Prepared For: Christopher Miller McPhail Associates, LLC 2269 Massachusetts Ave

617-686-1420 **Results**

Value Found	Optimum Range	Analysis	Value Found	Optimum Range
5.9		Cation Exch. Capacity, meq/100g	13.3	
		Exch. Acidity, meq/100g	6.5	
		Base Saturation, %		
0.8	4-14	Calcium Base Saturation	37	50-80
145	100-160	Magnesium Base Saturation	12	10-30
975	1000-1500	Potassium Base Saturation	3	2.0-7.0
193	50-120	Scoop Density, g/cc	0.98	
19.5	>10	Optional tests		
		Soil Organic Matter (LOI), %	7.1	
0.1	0.1-0.5			
9.0	1.1-6.3			
0.4	1.0-7.6			
0.2	0.3-0.6			
14.8	2.7-9.4			
154	<75			
2.0	<22			
	Value Found 5.9 0.8 145 975 193 19.5 0.1 9.0 0.4 0.2 14.8 154 2.0	Value Optimum Range 5.9	Value FoundOptimum RangeAnalysis 5.9 Cation Exch. Capacity, meq/100g Exch. Acidity, meq/100g Base Saturation, % 0.8 4-14 145 $100-160$ 975 $1000-1500$ 975 $1000-1500$ 193 $50-120$ 19.5 >10 0.1 $0.1-0.5$ 9.0 $1.1-6.3$ 0.4 $1.0-7.6$ 0.2 $0.3-0.6$ 14.8 $2.7-9.4$ 154 <75 2.0 <22	Value FoundOptimum RangeAnalysisValue Found 5.9 Cation Exch. Capacity, meq/100g13.3 5.9 Cation Exch. Capacity, meq/100g13.3 6.8 4-14Exch. Acidity, meq/100g6.5Base Saturation, %Calcium Base Saturation37 145 100-160Magnesium Base Saturation12 975 1000-1500Potassium Base Saturation3 193 $50-120$ Scoop Density, g/cc0.98 19.5 >10Optional testsSoil Organic Matter (LOI), %7.1 0.1 $0.1-0.5$ Soil Organic Matter (LOI), %7.1 0.1 $0.1-7.6$ 0.2 $0.3-0.6$ 14.8 $2.7-9.4$ 154 <75 <2.0 <22 <22

* Micronutrient deficiencies rarely occur in New England soils; therefore, an Optimum Range has never been defined. Values provided represent the normal range found in soils and are for reference only.

Soil Test Interpretation

Nutrient	Very Low	Low	Optimum	Above Optimum
Phosphorus (P):				
Potassium (K):				
Calcium (Ca):				
Magnesium (Mg):				



Recommendations for Nursery Trees & Shrubs, Deciduous-Establishment

Limestone (Target pH	of 6.0) Nitrogen, N	Phosphorus, P2O5	Potassium, K2O
		lbs / 1000 sq ft	
0	1 - 1.5	3	1

Comments:

-The lead level in this soil is below the optimum range of <22 ppm listed on your test results. However, many variables affect this result, and safety thresholds vary by location and soil use. There may still be a potential risk of lead exposure for soils used for growing food or as play areas for children. Our Total Sorbed Metals test provides an accurate measurement of soil lead. For more information about lead levels in soil, see the fact sheet entitled "Soil Lead: Testing, Interpretation, & Recommendations," listed under General References at the end of this report.

Recommendations for Nursery Trees & Shrubs, Deciduous-Maintenance

Limestone (7	Farget pH of 6.0)	Nitrogen, N	Phosphorus, P2O5	Potassium, K2O
			lbs / 1000 sq ft	
0		1.5 - 2.5	2	1

Comments:

-The lead level in this soil is below the optimum range of <22 ppm listed on your test results. However, many variables affect this result, and safety thresholds vary by location and soil use. There may still be a potential risk of lead exposure for soils used for growing food or as play areas for children. Our Total Sorbed Metals test provides an accurate measurement of soil lead. For more information about lead levels in soil, see the fact sheet entitled "Soil Lead: Testing, Interpretation, & Recommendations," listed under General References at the end of this report.



Recommendations for Sports Turf/Golf Fairway-Establishment

Limestone (Target p	oH of 6.5) Nitrogen, N	Phosphorus, P2O5	Potassium, K2O
		lbs / 1000 sq ft	
125	2 - 4	2.5	1

Comments:

-For instructions on converting nutrient recommendations to fertilizer applications in lawns, see Reference "Step-by-Step Fertilizer Guide for Lawns" (listed below).

-For best results, split the N, P2O5, and K2O recommendations above into three to four applications over the course of the growing season at six to eight week intervals, beginning in mid- to late-April.

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