FOUNDATION ENGINEERING REPORT

WALDEN SQUARE APARTMENTS
NEW SECOND BUILDING

CAMBRIDGE, MASSACHUSETTS

JULY 7, 2022

Prepared For:

Winn Companies
One Washington Mall, Suite 500
Boston MA, 02108

PROJECT NO. 7160.2.T4

McPHAIL ASSOCIATES, LLC
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July 7, 2022

Winn Companies
One Washington Mall, Suite 500
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Attention: Mr. Matthew Robayna – Senior Project Director

Reference: Walden Square Apartments New Second Building; Cambridge, Massachusetts
Foundation Engineering Report – Executive Summary

Enclosed is our Foundation Engineering Report for the above-referenced project. The following is an executive summary of the report.

It is understood that the project has been revised to include a second, 7-story, podium-style building which will occupy an approximate 8,200 square-foot plan area. It is recommended that the proposed building be founded on conventional footing foundations bearing on existing fill material that is improved by rigid inclusions, a ground improvement method. Footings should be proportioned utilizing an allowable design net bearing pressure of eight (8) kips per square-foot. The lowest level slabs are recommended to consist of conventional soil-supported slabs-on-grade.

Other detailed geotechnical engineering recommendations and criteria for foundation design are documented in the report, as well as foundation construction considerations such as ground improvement methods, preparation of foundation and slab bearing surfaces, dewatering and on-site reuse of excavated soil.

We look forward to continued participation with the design team during the remainder of the project. Should you have any questions concerning the recommendations presented herein, please do not hesitate to call us.

Very truly yours,

McPHAIL ASSOCIATES, LLC

Anna M. Pelletier

Jonathan W. Patch, P.E.

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1.0 - INTRODUCTION

1.1 - GENERAL

This report documents the results of our supplemental subsurface exploration and foundation design study for the proposed second building at the Walden Square Apartments project to be located at 21 Walden Square Road in Cambridge, Massachusetts. Refer to the Project Location Plan, Figure 1, for the general site location.

The supplemental subsurface exploration program was conducted and the foundation engineering services were performed in accordance with our proposal for geotechnical engineering services dated January 21, 2022 and the subsequent authorization of Winn Companies. These services are subject to the limitations contained herein.

1.2 – PURPOSE AND SCOPE

The purpose of the subsurface exploration program and foundation engineering study was to document the subsurface soil and groundwater conditions at the site to provide geotechnical engineering recommendations for economical foundation design for the proposed building.

Foundation design includes foundation support of the proposed building structures and the lowest level slabs, treatment of the lowest level slabs 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). Foundation construction considerations relating to geotechnical aspects of the proposed construction are also presented herein.

1.3 – AVAILABLE INFORMATION

Information available to McPhail Associates, LLC (McPhail) included the following:

- A report entitled “Phase I Initial Site Investigation, Walden Square Apartments, 21 Walden Square Road, Cambridge, Massachusetts” dated March 1997 and prepared by Green Environmental, Inc.
- A report entitled “Phase I Environmental Site Assessment Update, Walden Square Apartments, 102-104 Sherman Street, Cambridge, Massachusetts” dated June 2018 and prepared by Loureiro Engineering Associates, Inc. (Loureiro).
- A drawing entitled “Existing Conditions Plan of Land” dated February 25, 2021 prepared by Vanasse Hangen Brustlin, Inc. (VHB).
- A drawing entitled “Overall Site Plan” dated July 30, 2021 prepared by VHB.
- A Soil Management Plan (SMP) dated March 2021 and prepared by Loureiro.
- A Project Health and Safety Plan (HASP) dated March 24, 2021 and prepared by Loureiro.

- A report entitled “Foundation Engineering Report, Walden Square Apartments, 21 Walden Square Road, Cambridge, Massachusetts” dated May 27, 2021 and prepared by McPhail.

1.4 – ELEVATION DATUM

Elevations cited herein are in feet and are referenced to the Cambridge City Base datum which is 10.84 feet below the National Geodetic Vertical Datum (NGVD).

2.0 – SITE AND PROJECT DESCRIPTION

2.1 – EXISTING SITE CONDITIONS

The site of proposed development is located within the existing Cambridge Housing Authority (CHA) Walden Square Apartments (WSA) complex, which is located east of Sherman Street, west of Raymond Street and occupies an approximate 7.324-acre plan area. The site generally contains six (6) multi-unit, concrete residential buildings varying in height from 3 to 9 stories. The existing buildings are surrounded by bituminous concrete paved driveways and parking areas, with landscaped margins. The site of the proposed second building generally consists of an unpaved playground area and is bordered by an existing 9-story concrete residential building to the east, a 3-story concrete residential building to the north, and landscaped margins to the south and west. Ground surface across the site of the proposed building slopes up gradually from west to east from about Elevation +24.6 to Elevation +27.6 across an approximate 100-foot horizontal distance.

Historically, the brick making industry was active in the northwest area of Cambridge through the early to mid-1900s. Based on our review of historic USGS topographical maps, it appears that clay pits were present either on or in the vicinity of the site. As part of this process, clay was mined from open pits which were later filled when the industry abandoned the operation.

The site is currently listed with the Massachusetts Department of Environmental Protection (DEP) as a listed Disposal Site with Release Tracking Number (RTN) 3-0001656. An Activity and Use Limitation (AUL) was recorded for the site which states that the site formerly consisted of a clay pit that was filled in with fill materials (usually consisting of debris and excess soil from construction sites), industrial refuse, and ash and cinders from incinerators located proximal to the site. It is understood that the AUL requires that a Soil Management Plan be “prepared by a Licensed Site Professional (LSP) and implemented prior to the commencement of any activity which is likely to disturb potentially contaminated soil located at greater than 3 feet below surface grade.” Furthermore, it is understood that a HASP is required if any soil below a depth of three feet is to be disturbed or excavated.

2.2 – PROPOSED DEVELOPMENT

It is understood that the project has been revised to include two proposed buildings instead of one. The originally proposed 7-story, podium-style building is to be in the same general location as previously assessed, however, the footprint has been reduced from approximately 26,000 to 13,500 square feet. The foundation recommendations in the above-referenced report are still considered to be applicable to the first building.

A second, 7-story, podium-style building is now proposed to be constructed as part of the project. The proposed building will occupy an approximate 8,200 square-foot plan area. At this time, it is understood that the proposed building will not contain below-grade space.

3.0 – SUBSURFACE EXPLORATIONS

The approximate location of the subsurface explorations is indicated on the enclosed Subsurface Exploration Plan, Figure 2. The following subsurface explorations were completed at the project site under contract to McPhail:

- Five (5) borings (MA-101(OW) through MA-105) completed on March 14, 2022 through March 18, 2022 by Seaboard Drilling, Inc.

Exploration procedures and soil classification methods are contained in Appendix A.

The borings were drilled to depths ranging from 17 to 78.5 feet below the existing ground surface and, with the exception of MA-104(OW), were terminated within bedrock. Boring logs are contained in Appendix B. Groundwater observation wells were installed within completed borings MA-101(OW) and MA-104(OW). Boring MA-104(OW) was performed in the vicinity of a proposed stormwater infiltration system.

4.0 – SUBSURFACE CONDITIONS

4.1 – SOIL AND BEDROCK CONDITIONS

A detailed description of the subsurface conditions encountered in the explorations is documented on the logs contained in the Appendices as described above. Based on the explorations performed at the site, the following is a description of the generalized subsurface conditions across the site encountered from ground surface downward.

Generalized Subsurface Strata	*Approximate Thickness (Feet)*	*Top of Strata (Elevation)*
Topsoil	0.5 to 1.0	El. +27.6 to El. +24.6 (Where Encountered)
Fill	29 to 40 Or Not Fully Penetrated	El. +27.1 to El. +24.1
Marine Clay	25 to 34	El. -3.6 to El. -13.5
Glaciomarine	Not Encountered to 5	El. -39.4
Glacial Till	Not Encountered to 0.1	El. -38.5
Weathered Bedrock	2.0 to 3.5 Or Not Encountered	El. -39.9 to El. -44.4
Bedrock	Not Fully Penetrated	El. -37.6 to El. -46.4

Topsoil: Topsoil was encountered at ground surface in each location, with the exception of boring MA-103. The topsoil consists of loose to very loose, dark brown, silty sand with some organics.

Fill Material: Fill material was encountered at ground surface in boring MA-103 and underlying the topsoil within the other borings. The fill material consists of very loose to compact, brown to gray, silty sand with trace to some gravel, varying to sand and gravel with some silt, and to a well-graded mixture of slit, sand, and gravel. The fill material also contains ash and cinders and varying amounts of organics, brick, metal, wood, glass, rubber, and plastic. Boring MA-105 encountered a layer of gravel from approximate Elevation +16.4 to Elevation +9.4. Boring MA-104(OW) was terminated within the fill material at a depth of approximately 17 feet below the existing ground surface. Grain size distributions of samples of the fill material are presented in the enclosed Figure 3.

Marine Clay: A marine clay deposit was encountered underlying the fill material and consists of very soft to firm, gray to brown, silty clay with trace to some sand.

Glaciomarine: A glaciomarine deposit was encountered underlying the marine clay deposit in boring MA-101(OW). The glaciomarine deposit consists of compact, gray silty sand and gravel.

Glacial Till: A glacial till deposit was encountered underlying the marine clay deposit in boring MA-103. The glacial till deposit consists of compact, gray silty sand and gravel.

Weathered Bedrock: Weathered bedrock was encountered underlying the marine clay or glaciomarine deposits in borings MA-101(OW) and MA-102. The weathered bedrock consists of slightly weathered, gray, Cambridge Argillite.

Bedrock: Bedrock was encountered underlying the marine clay deposit, glacial till deposit or weathered bedrock in each exploration, with the exception of boring MA-104(OW). NX-sized cores of bedrock were obtained from borings MA-101 and MA-102. The bedrock consists of medium hard, very slightly weathered, extremely to slightly fractured, dark blue-gray, amorphous to fine-grained Cambridge Argillite with very close to close, shallow to steep fractures.

4.2 – GROUNDWATER CONDITIONS

The groundwater level in the observation wells installed in borings MA-101 and MA-104 was observed to range from about Elevation +19 to Elevation +16.7. Additionally, the groundwater level within previously installed monitoring wells MW-2 and MA-3 were observed to range from Elevation +15.9 to Elevation +17.1. Groundwater monitoring reports are contained in Appendix C. 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 of existing drainage patterns.

4.3 – RAWLS INFILTRATION RATES

Based on the laboratory grain-size distributions of soil samples obtained from the borings, the soil texture class was determined using the USDA textural triangle. The soil texture class was then used to determine the Rawls Infiltration Rates. It is understood that the Rawls Infiltration Rates are based on research performed by Rawls, Brakensiek, and Sexton in 1982 which used laboratory permeability testing to develop a relationship between texture class and saturated permeability. Five (5) samples of fill material from the borings were selected for grain size distribution testing. The table contained herein below presents information regarding the soil texture class and corresponding Rawls Infiltration Rates.

Subsurface Exploration	*Sample Depth (ft)*	*Sample Elevation (ft)*	*Strata*	*USDA Soil Texture Class*	*Corresponding Rawls Infiltration Rate (in/hr)*
MA-101(OW)	6 to 8	+18.6	Fill	Sandy Loam	1.02
MA-102	6 to 8	+18.6	Fill	Sandy Loam	1.02
MA-103	2 to 4	+24.5	Fill	Loamy Sand	2.41
MA-104(OW)	6 to 8	+21.6	Fill	Sandy Loam	1.02
MA-105	6 to 8	+20.4	Fill	Silt Loam	0.27

5.0 – GEOTECHNICAL RECOMMENDATIONS

5.1 – FOUNDATION DESIGN RECOMMENDATIONS

Based upon the results of the subsurface explorations, the project site is underlain by uncontrolled fill material and a compressible marine clay deposit which extend to depths ranging from approximately 64 to 65 feet below the existing ground surface. The fill material and marine clay deposit are underlain by natural, glaciomarine or glacial till deposits, weathered bedrock, or bedrock. Foundation support for the proposed building is recommended to be provided by spread footing foundations bearing on rigid inclusions, a type of ground improvement element, in conjunction with slab-on-grade construction. The rigid inclusions are recommended to be installed through the fill and marine clay deposits and be supported in the underlying glacial till deposit or bedrock.

Specific foundation design recommendations for rigid inclusions, design requirements for the lowest level slab, and general foundation design recommendations are outlined below.

The following parameters are recommended for the design of the new foundations:

- Footings, along with haunched or thickened slabs supporting structural load, should be proportioned utilizing an allowable design net bearing pressure of eight (8) kips per square-foot.
    - Note that the thickness of the proposed footings may need to be increased beyond standard design requirements to account for a high concentration of stresses acting on the bottom of the proposed footings from the RI elements.
- The minimum footing width for continuous footings (including haunched or thickened slabs supporting structural load) and isolated footings should be 30 inches and 36 inches, respectively.
- Perimeter foundations and interior foundations below unheated areas should be provided with a minimum 4-foot thickness of soil cover as frost protection. Interior foundations below heated areas should be located such that the top of foundation concrete is a minimum of six 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 existing or proposed footings, structures and/or utilities.
- All foundations should be designed in accordance with the Code.

5.2 – GROUND IMPROVEMENT RECOMMENDATIONS

In general, ground improvement methods would consist of the installation of “columns” of compacted concrete (rigid inclusions, or GeoConcrete Columns a.k.a. GCCs) that extend through unsuitable, compressible soils into the glaciomarine deposit, glacial till deposit, weathered bedrock, or bedrock. The installation process utilized to install/create the rigid inclusions (RIs) increases the lateral stress in the soil matrix beneath the proposed building.

Thus, the potential for large settlements is reduced by improving the unsuitable soils to a stiffer composite soil matrix. Based on the results of the explorations, the RIs would extend into the top of the natural glaciomarine or glacial till deposits, weathered bedrock or bedrock and would likely range up to about 65 feet in length.

Since ground improvement techniques are provided by a design-build consultant, detailed design calculations should be submitted to the Architect for review prior to the beginning of construction. A detailed explanation of the design parameters for capacity and settlement calculations should be included in the design submittal. The design submittal should also include a testing program to demonstrate that the design capacity of the RI elements is being achieved. All calculations and drawings should be prepared and sealed by a Professional Engineer licensed in the Commonwealth of Massachusetts and retained by the Contractor who is to perform the work.

The following general criteria should be utilized in the design of ground improvement:

- Rigid inclusions should extend into the surface of the natural, glaciomarine or glacial till deposits, weathered bedrock or bedrock.
- The maximum allowable bearing pressure supported on a reinforced ground surface which extends into the glaciomarine deposit, glacial till deposit, weathered bedrock or bedrock should be equal to or less than 8 kips per square-foot (ksf).
- Estimated long-term settlement for footings should be less than 1-inch.
- Estimated long-term differential settlement of adjacent footings should be less than 0.5-inch.
- A minimum of one (1) modulus load test should be performed on a rigid inclusion to 150 percent of the maximum design stress to confirm the design parameters. The modulus load test set-up should include installation of a tell-tale to measure the movement at the tip of the element.

RIs are constructed by advancing a hollow mandrel to the design depth, densifying the surrounding soils by displacement. Once reaching the design depth, concrete is pumped through the mandrel, which opens as it is raised. If required, the mandrel can be raised and lowered several times, vertically ramming lifts of concrete to create an expanded base. The RI elements are typically installed in a grid pattern and are used in conjunction with an engineered granular pad to produce an intermediate foundation system for support of foundation loads. The type and thickness of the engineered pad is dependent on the design bearing pressure and is designed by the RI design-build consultant. The design-build consultant should check that the structural design of the footings (i.e., one-way shear, two-way shear, moment, etc.) based on the footing dimensions and reinforcement as shown on the Contract Drawings prepared by the project structural engineer are adequate to resist the concentrated forces from the rigid inclusions acting on the bottom of the footings.

RIs can be installed to a maximum depth of 65 feet below the existing ground surface. Depending on the selected Contractor and their equipment limitations, it may be necessary to lower the working grade to at least Elevation +23 in order to reach the bearing deposit.

5.3 – LOWEST LEVEL SLAB RECOMMENDATIONS

We recommend that the lowest level slabs within the ground level non-parking areas such as the mechanical rooms and residential lobbies be designed as conventional soil-supported slabs-on-grade. In consideration of the presence of the former clay pits that have been backfilled with uncontrolled fill, it is recommended that a ground improvement technique, such as rigid inclusions or aggregate piers (APs), be utilized to minimize the potential for slab settlement. The slabs-on-grade should be underlain by a polyethylene vapor barrier spread over a minimum 6-inch thickness of ¾-inch crushed stone, which is underlain by filter fabric, such as Mirafi 140N or equivalent. Within building areas which will consist of at-grade parking, the slabs-on-grade should be underlain by a minimum 10-inch thickness of off-site gravel borrow.

In consideration that the soil-supported slabs-on-grade are being constructed over uncontrolled fill soil, cosmetic cracking and minor settlement of the slabs may occur over time. Frequent control joints in the lowest level slabs should be used to minimize the potential for cracking.

Preparation of the subgrade for support of the at-grade, open air parking areas should include the removal of any existing surface treatments and proofrolling of the existing fill subgrade below the depth of the required base and subbase courses with at least four (4) passes of a 10-ton vibratory drum roller. All soft or compressible areas detected by the proofrolling should be excavated and replaced with a compacted, off-site gravel borrow.

5.4 – GROUNDWATER CONSIDERATIONS

It is understood that the proposed redevelopment does not include any occupied below-grade space, and therefore underslab and/or perimeter foundation drainage is not anticipated to be necessary.

All pits and depressions extending below the slab (e.g., elevator pits, etc.) should be provided with properly tied continuous waterstops in all construction joints and be waterproofed. Also, pits and depressions below the slab should be designed for hydrostatic uplift pressures corresponding to the groundwater being present 1-foot below the bottom of the proposed slab.

5.5 – RESISTANCE TO LATERAL FORCES

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. To these values must be added the pressures attributable to earthquake forces per Section 1610.2 of the Code.

Lateral forces can be transmitted from the structure to the soil by passive pressure on the footings utilizing an equivalent fluid density of 120 pounds per cubic-foot providing that these structural elements are designed to resist these pressures. Lateral forces can also be considered to be transmitted from the structure to the soil by friction on the base of the footings using a frictional coefficient of 0.4 to which a factor of safety of 1.5 should be applied.

5.6 – 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”. Further, 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.

6.0 – FOUNDATION CONSTRUCTION CONSIDERATIONS

6.1 – GENERAL RECOMMENDATIONS

This section addresses geotechnical aspects of the proposed foundation construction which are considered by McPhail to be critical to proper foundation performance of the completed development as well as mitigating potential adverse foundation construction impacts on surrounding buildings, streets, utilities, and other site improvements, as applicable.

Prospective contractors should be provided with the following information regarding the foundation construction considerations; however, each contractor should perform an independent assessment based on his own equipment, personnel, and anticipated procedures with input from specialty foundation subcontractors.

6.2 – REMOVAL OF EXISTING FOUNDATION REMAINS AND UTILITIES

The above-referenced Phase I ESA prepared by Loureiro documents that former structures and clay pits were likely present on-site. As such, the remains of the former structures, as well as miscellaneous debris used to backfill the clay pits, will likely be encountered during the excavation process and during the installation of ground improvement elements. These foundation remains most likely consist of concrete and brick walls, footings, slabs, mass concrete, cobble stone pavers, granite blocks, wood piles, and/or pile caps. Below grade obstructions which are observed to be non-deleterious (i.e., not wood or other material which could decompose over time) may remain in-place where they don’t conflict with proposed structures provided that they are removed to 24 inches beneath the proposed finished grade or utility elevations.

Given these types of potential obstructions within the existing fill deposit, it is recommended that an allowance be included for pre-augering at RI locations and/or excavation to remove obstructions. If substantial foundation remains are encountered, bulk pre-excavation may be required to remove obstructions prior to the RI installation. Excavations performed to remove obstructions should be backfilled with the excavated soil after all oversized material and foundation remains have been removed. Soil used as backfill should be placed in approximate 1-foot thick lifts and thoroughly tamped with the excavator bucket. Organic material, if encountered within the pre-excavation, should not be reused as backfill.

Obstructions encountered during ground improvement installation activities that cannot be removed should be evaluated on a case-by-case basis to determine the necessity to relocate the element or to design the footing to span over the obstruction. It is recommended that a cost allowance for overcoming obstructions to the ground improvement installation be included in the project budget.

Existing foundation remains such as foundation from previous structures, including utilities should be removed where they interfere with new construction. Foundation remains may remain in place where they do not conflict with new construction and outside of the proposed building footprint provided that they are removed to 24 inches beneath the proposed finished grade or slab elevation.

6.3 – PREPARATION AND PROTECTION OF FOUNDATION BEARING SURFACES

All footing bearing surfaces, including footings supported on soil improved by ground improvement methods, should be excavated using an excavator that is equipped with smooth-edged bucket (smooth, toothless cutting edge or a steel plate welded across the teeth) to avoid disturbance of the bearing surface. Further, it is recommended that as soon as the bearing surface is exposed, it be immediately covered with a geotextile fabric, such as Mirafi 140N, followed by a minimum 4-inch thickness of compacted 3/4-inch crushed stone to prevent disturbance of the subgrade during subsequent forming operations.

Note that footings that bear on RIs may require an additional thickness of crushed stone beneath them depending on the submitted design. It is recommended that excavation to design top-of-element elevation for footings and slabs be performed within two (2) hours of RI installation so that the RIs are cut off while still curing to prevent cracking while cutting fully-cured RIs.

6.4 – CONSTRUCTION VIBRATIONS

Ground vibrations will be produced as a result of demolition, the placement and compaction of fill materials, and ground improvement installation procedures. Based on our experience, impacts from these vibrations are not anticipated to result in structural damage to existing, adjacent structures, however, the magnitude of vibrations may be of sufficient magnitude to cause cosmetic cracking of adjacent structures and annoyance of building occupants. As such, although significant adverse effects on surrounding structures related to the foundation construction are not anticipated, preconstruction surveys of adjacent buildings

and structures are recommended prior to any on-site construction activities to document their preconstruction condition. This information would be useful in documenting previously existing problems with regard to responding to third-party claims.

Vibration monitoring should be performed to assess vibrations generated during construction activities. Vibration levels should be controlled such that a maximum allowable peak particle velocity (PPV) of less than 2.0 inches per second (ips) above a frequency of 40 Hz, 1.5 ips between 30 Hz and 40 Hz, 1.0 ips between 20 Hz and 30 Hz, and 0.5 ips below 20 Hz is not exceeded adjacent to the nearby buildings. These criteria are intended to reduce the probability of structural damage to the adjacent below-grade and above-grade structures to within generally acceptable levels.

6.5 – GROUNDWATER CONTROL

In general, it is anticipated that dewatering by means of strategically located sumps and trenches should suffice during foundation construction operations. In addition, trapped surface water is anticipated to accumulate within localized depressions in the ground surface across the site after periods of heavy precipitation and will most likely necessitate localized sumping. It is recommended that surface water and groundwater accumulated on-site during foundation construction be recharged on-site. Surface water should be diverted as necessary to prevent accumulation on the proposed building pads.

6.6 – REUSE OF ON-SITE SOILS

It is anticipated that portions of the excavated fill may be reused on-site as structural fill within the building footprint, to raise the grade below paved areas and as ordinary fill outside the building footprint provided that the fill is maintained in a dry condition and can be properly compacted. Excavated fill material to be reused on-site as structural fill should typically contain less than 20% by weight passing the No. 200 sieve. Excavated soil with greater than 20% by weight passing the No. 200 sieve should be segregated and can be reused on-site as ordinary fill subject to the provisions contained herein.

Structural fill should consist of inorganic excavated on-site fill material and should conform to the following gradation requirements:

U.S. Sieve No.	Percent Passing by Weight
4”	100
1”	60 – 100
#4	25 – 95
#40	5 – 50
#200	0 – 20

It is recommended that stockpiles of excavated material intended for on-site 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 the earthwork operations are performed during a wet and/or cold period, it is anticipated that portions of the on-site soil may become unsuitable for re-use on-site. If, due to any of the above conditions, the excavated material is unsuitable for reuse, an off-site gravel borrow should be used.

All imported structural fill and gravel borrow should consist of a well-graded, natural sand and gravel from an off-site source, conforming to the following gradation requirements:

U.S. Sieve No.	Percent Passing by Weight
3”	100
½”	50 – 85
#4	40 – 75
#50	8 – 28
#200	0 – 8

The on-site existing topsoil may be reused as ordinary fill in landscaped areas, provided it is protected from wet and freezing environments and can be compacted to the recommended densities. All topsoil should be kept segregated from excavated fill and natural soil deposits at all times.

6.7 – OFF-SITE REMOVAL OF EXCESS SOILS

Our scope of services to date specifically excludes geoenvironmental engineering services pursuant to the Massachusetts Oil and Hazardous Materials Release Prevention and Response Act (MGL Chapter 21E) and pursuant to the Massachusetts Contingency Plan (310- CMR 40.0000). 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. Details regarding the off-site removal of soils will be presented in the Soil Management Plan to be prepared by Loureiro.

7.0 – FUTURE WORK

7.1 – DESIGN ASSISTANCE

McPhail has been retained to provide design assistance to the design team during the final design phase of this project. The purpose of this involvement is to review the structural foundation drawings and foundation notes for conformance with the recommendations presented herein and to generate the earthwork and ground improvement geotechnical-related specification sections for inclusion into the Contract Documents for construction.

7.2 – CONSTRUCTION MONITORING

It is recommended that McPhail be retained during the construction period to observe the installation of rigid inclusions, preparation of footing and slab subgrades, placement and compaction of fill material, and to perform vibration monitoring during ground improvement

installation. 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 explorations and foundation design recommendations documented herein.

8.0 – LIMITATIONS

This report has been prepared in accordance with generally accepted soil and geotechnical engineering practices. No other warranty, expressed or implied, is made. If 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.

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 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.

FIGURES

FIGURE 1A

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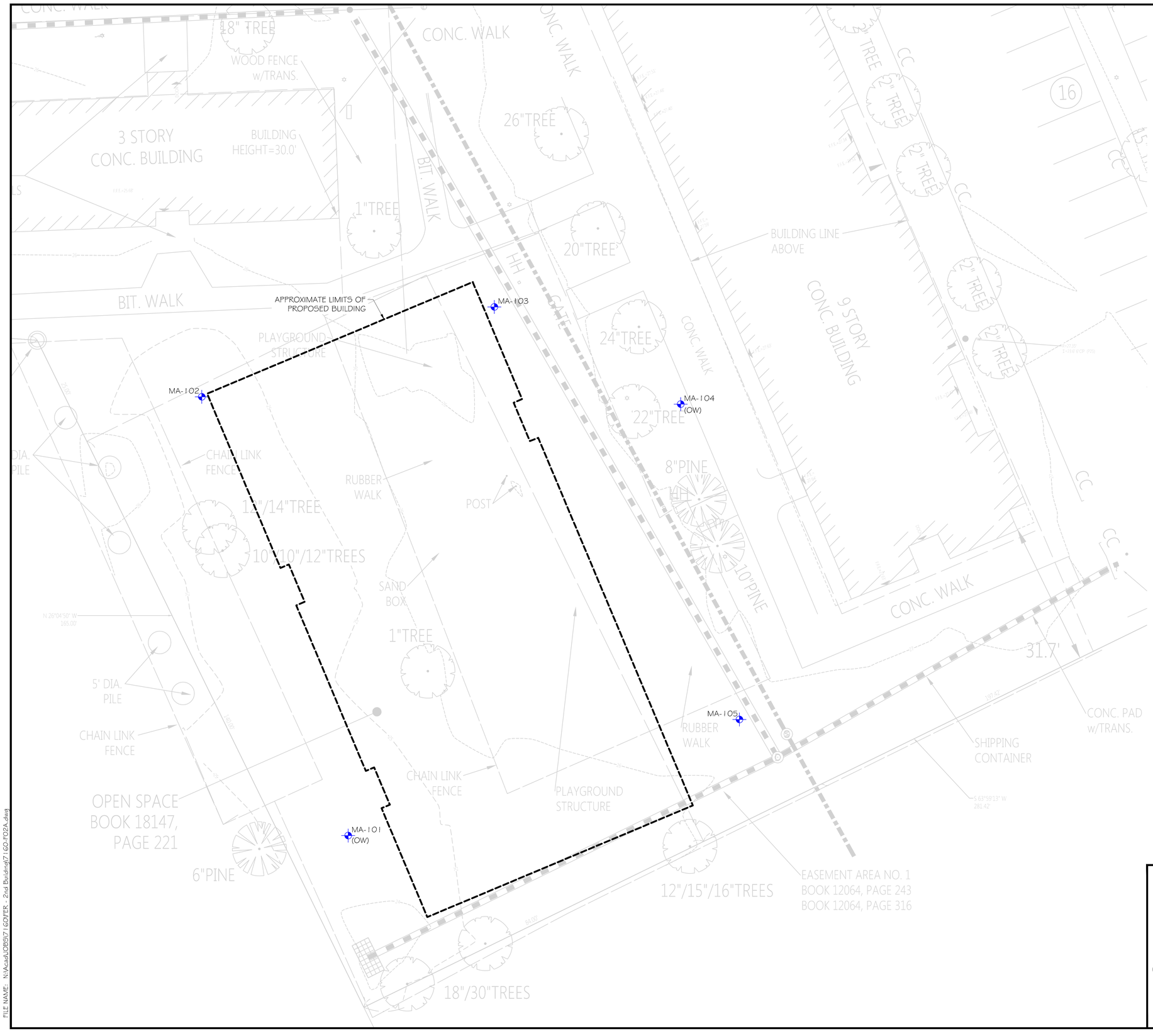
SCALE 1:25,000

PROJECT LOCATION PLAN

WALDEN SQUARE APARTMENTS

SECOND BUILDING

CAMBRIDGE MASSACHUSETTS



LEGEND

— APPROXIMATE LOCATION OF BORING PERFORMED BY SEABOARD DRILLING INC. DURING THE PERIOD OF MARCH 14 TO 18, 2022 FOR McPHAIL ASSOCIATES, LLC

(OW) — INDICATES OBSERVATION WELL INSTALLED WITHIN COMPLETED BOREHOLE

REFERENCE: THIS PLAN WAS PREPARED FROM A 40-SCALE DRAWING ENTITLED, "EXISTING CONDITIONS PLAN OF LAND" DATED FEBRUARY 25, 2021 PREPARED BY VHB AND A 40-SCALE DRAWING ENTITLED, "OVERALL SITE PLAN" DATED JULY 30, 2021 PREPARED BY VHB

GRAPHIC SCALE

10 0 10 20 40

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WALDEN SQUARE APARTMENTS - SECOND BUILDING

CAMBRIDGE MASSACHUSETTTS

SUBSURFACE EXPLORATION PLAN

FOR

WINN COMPANIES

BY

McPHAIL ASSOCIATES, LLC

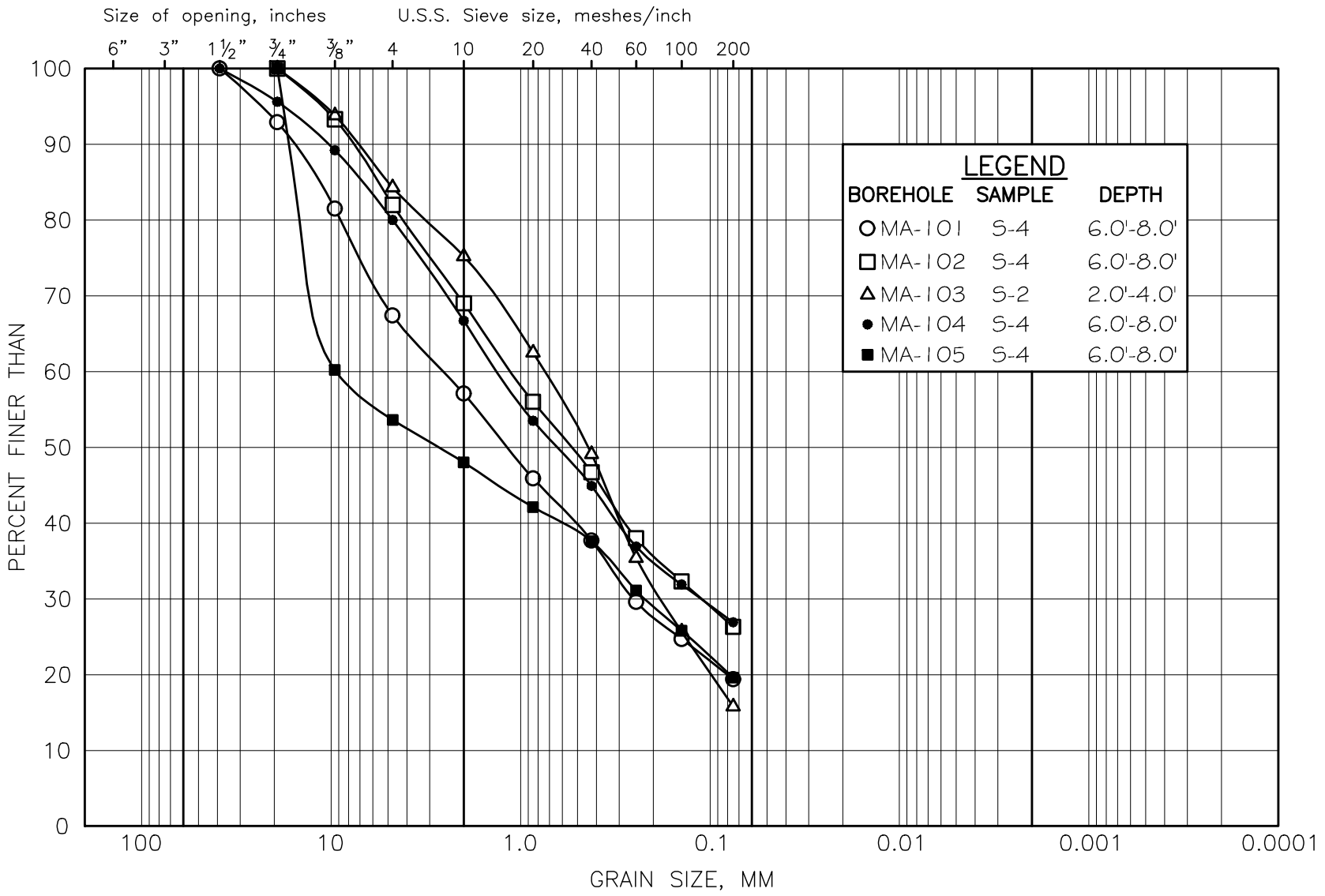
Date: APRIL 2022	Dwn: M.B.S.	Chkd: J.W.P.	Scale: 1" = 10'
Project No: 7160			FIGURE 2A

FILE NAME: N:\Acad\JOBS\7160\FER - 2nd Building\7160-FIG2A.dwg

FILE NAME: N:\Acad\JOBS\7160\FER - 2nd Building\7160-F03A_Sieve.dwg

PROJECT No. 7160

M.I.T. GRAIN SIZE SCALE



COBBLE SIZE	COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE	SILT SIZE	CLAY SIZE
	GRAVEL SIZE			SAND SIZE			FINE GRAINED	

McPHAIL ASSOCIATES, LLC

GRAIN SIZE DISTRIBUTION
FILL

FIGURE 3A

APPENDIX A:

EXPLORATION AND LABORATORY TESTING PROCEDURES

The borings were performed using a track-mounted drill rig and advanced utilizing NW casing and the wet rotary drilling methods. Standard 2-inch O.D. split-spoon samples and standard penetration test results were obtained continuously through the fill deposit to a depth of 8 feet and then at minimum 5-foot intervals for the remainder of the boring depths. The split-spoon sampling was performed in general accordance with the standard procedures described in ASTM D1586.

The explorations were monitored by McPhail field representatives who performed field layout, prepared field logs, obtained and visually classified soil samples, monitored groundwater conditions in the open boreholes and observation wells, and determined the required exploration depth based upon the actual subsurface conditions encountered.

Field locations of the explorations were determined by taping from existing site features included on the available drawings. Unless noted otherwise, the existing ground surface elevation at each exploration location was determined by a level survey performed by our field staff utilizing vertical control information on the available drawings.

At the completion of the field work, soil samples were returned to our laboratory for more detailed classification, analysis and testing. The laboratory testing consisted of sieve analyses to determine the gradations and confirm the visual classifications of the fill material. Laboratory test procedures were in general accordance with applicable ASTM Standards.

SOIL CLASSIFICATION SYSTEM

The soil classifications contained herein were determined using the Modified Massachusetts Institute of Technology (MIT) Soil Classification System, which utilizes the following definitions and descriptive terms to describe the soil components, percentage of soil components, and soil densities:

Soil Type	Grain Size Range (millimeters)
Gravel	60 – 2
Sand	2 – 0.06
Silt	0.06 – 0.002
Clay	<0.002

Descriptive Term	Proportion of Total (%)
“Trace”	0 - 10
“Some”	10 - 20
ADJECTIVE (e.g., sandy, silty)	20 - 35
“And”	35 - 50

Granular Soils	
Density	Penetration Resistance (blows per foot)
Very Loose	0 - 4
Loose	4 - 10
Compact	10 - 30
Dense	30 - 50
Very Dense	>50

Cohesive Soils		
Density	Penetration Resistance (blows per foot)	Undrained Shear Strength (pounds per foot)
Very Soft	0 - 2	0 - 250
Soft	2 - 4	250 - 500
Firm	4 - 8	500 - 1000
Stiff	8 - 15	1000 - 2000
Very Stiff	15 - 30	2000 - 4000
Hard	>30	>4000

APPENDIX B:

BORING LOGS

Project:	Walden Square 2nd Building	**Job #:**	7160.2.T4
Location:	Cambridge	**Date Started:**	3-16-22
City/State:	Cambridge, MA	**Date Finished:**	3-16-22

Boring No.

MA-101 (OW)

Contractor: Seaboard
Driller/Helper: Dale/Mike
Logged By/Reviewed By: CAS
Surface Elevation (ft): 24.6

Casing Type: 4" Casing
Casing Hammer (lbs)/Drop (in): 140/30
Sampler Size/Type: 24" Split Spoon
Sampler Hammer (lbs)/Drop (in): 140/30

Groundwater Observations

Date	Depth	Elev.	Notes
3-16-22	6	18.6	
3-17-22	7.0	17.6	

Depth (ft)	Elev. (ft)	Symbol	Depth/EL to Strata Change (ft)	Stratum	Sample N-Value / RQD	Sample No.	Sample Pen./Rec. (in)	Sample Depth (ft)	Sample Blows/6" / Min/ft	Sample Description and Boring Notes
			0.5 / 24.1	TOPSOIL						
1	24				5	S1	24/8	0.0-2.0	1 1 4 4	Loose, dark brown, silty SAND, some gravel, with brick. (Fill)
2	23									
3	22				6	S2	24/8	2.0-4.0	4 3 3 2	Loose, white to dark brown, silty SAND, some gravel, with ash and cinders. (Fill)
4	21									
5	20				2	S3	24/10	4.0-6.0	3 1 1 2	Very loose, white to light brown, silty SAND, some gravel, with ash and cinders. (Fill)
6	19									
7	18				3	S4	24/10	6.0-8.0	1 2 1 2	Very loose, white to light brown, SAND and GRAVEL, some silt, with ash and cinders. (Fill)
8	17									
9	16									
10	15									
11	14				4	S5	24/8	10.0-12.0	3 2 2 1	Very loose to loose, dark gray, silty SAND, some gravel, with ash and cinders. (Fill)
12	13			FILL						
13	12									
14	11									
15	10									
16	9				4	S6	24/10	15.0-17.0	4 3 1 1	Very loose to loose, dark gray, clayey SILT and SAND, with brick. (Fill)
17	8									
18	7									
19	6									
20	5									
21	4				3	S7	24/8	20.0-22.0	2 1 2 1	Soft, gray, silty CLAY, some sand, with organics. (Fill))
22	3									
	2									

GRANULAR SOILS	
BLOWS/FT.	DENSITY
0-4	V.LOOSE
4-10	LOOSE
10-30	COMPACT
30-50	DENSE
>50	V.DENSE

COHESIVE SOILS	
BLOWS/FT.	CONSISTENCY
<2	V.SOFT
2-4	SOFT
4-8	FIRM
8-15	STIFF
15-30	V.STIFF
>30	HARD

SOIL COMPONENT

DESCRIPTIVE TERM	PROPORTION OF TOTAL
"TRACE"	0-10%
"SOME"	10-20%
"ADJECTIVE" (eg SANDY, SILTY)	20-35%
"AND"	35-50%

SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"

Notes:
15 foot well with 10 feet of screen installed

Weather: Clear

McPHAIL ASSOCIATES, LLC
2269 MASSACHUSETTS AVENUE
CAMBRIDGE, MA 02140
TEL: 617-868-1420
FAX: 617-868-1423

Project:	Walden Square 2nd Building	**Job #:**	7160.2.T4
Location:	Cambridge	**Date Started:**	3-16-22
City/State:	Cambridge, MA	**Date Finished:**	3-16-22

Boring No.

MA-101 (OW)

Contractor: Seaboard
Driller/Helper: Dale/Mike
Logged By/Reviewed By: CAS
Surface Elevation (ft): 24.6

Casing Type: 4" Casing
Casing Hammer (lbs)/Drop (in): 140/30
Sampler Size/Type: 24" Split Spoon
Sampler Hammer (lbs)/Drop (in): 140/30

Groundwater Observations

Date	Depth	Elev.	Notes
3-16-22	6	18.6	
3-17-22	7.0	17.6	

Depth (ft)	Elev. (ft)	Symbol	Depth/EL to Strata Change (ft)	Stratum	Sample N-Value / RQD	Sample No.	Sample Pen./Rec. (in)	Sample Depth (ft)	Sample Blows/6" / Min/ft	Sample Description and Boring Notes
24	1									
25	0									
26	-1				4	S8	24/6	25.0-27.0	4 3 1 1	Very loose to loose, dark gray, silty SAND, trace gravel, with brick and metal. (Fill)
27	-2									
28	-3									
29	-4									
30	-5			FILL						
31	-6				8	S9	24/6	30.0-32.0	3 5 3 2	Loose, dark gray, silty SAND, some clay, with brick. (Fill)
32	-7									
33	-8									
34	-9									
35	-10									
36	-11		36.0 / -11.4		9	S10	12/8	35.0-36.0	4 5	Loose, dark gray, silty SAND, trace clay, with wood. (Fill)
37	-12				10	S10A	12/10	36.0-37.0	5 5	Firm, dark gray, silty CLAY, some sand. (Marine Clay)
38	-13									
39	-14									
40	-15									
41	-16			MARINE CLAY	6	S11	24/20	40.0-42.0	5 3 3 2	Firm, gray, silty CLAY, some sand. (Marine Clay)
42	-17									
43	-18									
44	-19									
45	-20									
	-21									Very soft, gray, silty CLAY, trace sand. (Marine Clay)

GRANULAR SOILS	
BLOWS/FT.	DENSITY
0-4	V.LOOSE
4-10	LOOSE
10-30	COMPACT
30-50	DENSE
>50	V.DENSE

COHESIVE SOILS	
BLOWS/FT.	CONSISTENCY
<2	V.SOFT
2-4	SOFT
4-8	FIRM
8-15	STIFF
15-30	V.STIFF
>30	HARD

SOIL COMPONENT

DESCRIPTIVE TERM	PROPORTION OF TOTAL
"TRACE"	0-10%
"SOME"	10-20%
"ADJECTIVE" (eg SANDY, SILTY)	20-35%
"AND"	35-50%

SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"

Notes:
15 foot well with 10 feet of screen installed

Weather: Clear

McPHAIL ASSOCIATES, LLC
2269 MASSACHUSETTS AVENUE
CAMBRIDGE, MA 02140
TEL: 617-868-1420
FAX: 617-868-1423

Project:	Walden Square 2nd Building	**Job #:**	7160.2.T4
Location:	Cambridge	**Date Started:**	3-16-22
City/State:	Cambridge, MA	**Date Finished:**	3-16-22

Boring No.

MA-101 (OW)

Contractor: Seaboard
Driller/Helper: Dale/Mike
Logged By/Reviewed By: CAS
Surface Elevation (ft): 24.6

Casing Type: 4" Casing
Casing Hammer (lbs)/Drop (in): 140/30
Sampler Size/Type: 24" Split Spoon
Sampler Hammer (lbs)/Drop (in): 140/30

Groundwater Observations

Date	Depth	Elev.	Notes
3-16-22	6	18.6	
3-17-22	7.0	17.6	

Depth (ft)	Elev. (ft)	Symbol	Depth/EL to Strata Change (ft)	Stratum	Sample N-Value / RQD	Sample No.	Sample Pen./Rec. (in)	Sample Depth (ft)	Sample Blows/6" / Min/ft	Sample Description and Boring Notes
47	-22				n/a	S12	24/20	45.0-47.0	WOR WOH 1 2	
48	-23									
49	-24									
50	-25									
51	-26				n/a	S13	24/22	50.0-52.0	WOR WOH/18"	Very soft, gray, silty CLAY. (Marine Clay)
52	-27									
53	-28									
54	-29									
55	-30			MARINE CLAY						
56	-31				2	S14	24/24	55.0-57.0	1 1 1 1	Very soft to soft, gray, silty CLAY. (Marine Clay)
57	-32									
58	-33									
59	-34									
60	-35									
61	-36				n/a	S15	24/18	60.0-62.0	WOR/24"	Very soft, gray, silty CLAY. (Marine Clay)
62	-37									
63	-38									
64	-39		64.0 / -39.4							
65	-40									
66	-41				14	S16	24/10	65.0-67.0	8 6 8 14	Compact, gray, silty SAND and GRAVEL. (Glaciomarine)
67	-42			GLACIOMARINE						
68	-43									
	-44		69.0 / -44.4	WEATHERED BEDROCK						

GRANULAR SOILS	
BLOWS/FT.	DENSITY
0-4	V.LOOSE
4-10	LOOSE
10-30	COMPACT
30-50	DENSE
>50	V.DENSE

COHESIVE SOILS	
BLOWS/FT.	CONSISTENCY
<2	V.SOFT
2-4	SOFT
4-8	FIRM
8-15	STIFF
15-30	V.STIFF
>30	HARD

SOIL COMPONENT

DESCRIPTIVE TERM	PROPORTION OF TOTAL
"TRACE"	0-10%
"SOME"	10-20%
"ADJECTIVE" (eg SANDY, SILTY)	20-35%
"AND"	35-50%

SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"

Notes:
15 foot well with 10 feet of screen installed

Weather: Clear

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2269 MASSACHUSETTS AVENUE
CAMBRIDGE, MA 02140
TEL: 617-868-1420
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Project:	Walden Square 2nd Building	**Job #:**	7160.2.T4
Location:	Cambridge	**Date Started:**	3-16-22
City/State:	Cambridge, MA	**Date Finished:**	3-16-22

Boring No.

MA-101 (OW)

Contractor: Seaboard
Driller/Helper: Dale/Mike
Logged By/Reviewed By: CAS
Surface Elevation (ft): 24.6

Casing Type: 4" Casing
Casing Hammer (lbs)/Drop (in): 140/30
Sampler Size/Type: 24" Split Spoon
Sampler Hammer (lbs)/Drop (in): 140/30

Groundwater Observations

Date	Depth	Elev.	Notes
3-16-22	6	18.6	
3-17-22	7.0	17.6	

Depth (ft)	Elev. (ft)	Symbol	Depth/EL to Strata Change (ft)	Stratum	Sample N-Value / RQD	Sample No.	Sample Pen./Rec. (in)	Sample Depth (ft)	Sample Blows/6" / Min/ft	Sample Description and Boring Notes
70	-45									
71	-46		71.0 / -46.4	WEATHERED BEDROCK						
72	-47								1.0	Medium hard, very slightly weathered, extremely to slightly fractured, dark blue-gray amorphous to fine-grained ARGILLITE; very close to close, shallow to steep fractures.
73	-48								5.0	
74	-49				10%	RC1	60/18	71.0-76.0	6.0	
75	-50			BEDROCK					6.5	
76	-51								3.5	
77	-52								6.0	Medium hard, very slightly weathered, moderately to slightly fractured, dark blue-gray amorphous to fine-grained ARGILLITE; close, shallow to steep fractures.
78	-53		78.5 / -53.9		37%	RC2	30/18	76.0-78.5	6.0	
79	-54			Bottom of borehole 78.5 feet below ground surface					4.5/6"	
80	-55									
81	-56									
82	-57									
83	-58									
84	-59									
85	-60									
86	-61									
87	-62									
88	-63									
89	-64									
90	-65									
91	-66									
	-67									

GRANULAR SOILS	
BLOWS/FT.	DENSITY
0-4	V.LOOSE
4-10	LOOSE
10-30	COMPACT
30-50	DENSE
>50	V.DENSE

COHESIVE SOILS	
BLOWS/FT.	CONSISTENCY
<2	V.SOFT
2-4	SOFT
4-8	FIRM
8-15	STIFF
15-30	V.STIFF
>30	HARD

SOIL COMPONENT

DESCRIPTIVE TERM	PROPORTION OF TOTAL
"TRACE"	0-10%
"SOME"	10-20%
"ADJECTIVE" (eg SANDY, SILTY)	20-35%
"AND"	35-50%

SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"

Notes:
15 foot well with 10 feet of screen installed

Weather: Clear

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Project:	Walden Square 2nd Building	**Job #:**	7160.2.T4
Location:	Cambridge	**Date Started:**	3-17-22
City/State:	Cambridge, MA	**Date Finished:**	3-17-22

Boring No. MA-102

Contractor: Seaboard
Driller/Helper: Dale/Mike
Logged By/Reviewed By: CAS
Surface Elevation (ft): 24.6

Casing Type: 4" Casing
Casing Hammer (lbs)/Drop (in): 140/30
Sampler Size/Type: 24" Split Spoon
Sampler Hammer (lbs)/Drop (in): 140/30

Groundwater Observations

Date	Depth	Elev.	Notes
3-16-22	7	17.6	

Depth (ft)	Elev. (ft)	Symbol	Depth/EL to Strata Change (ft)	Stratum	Sample N-Value / RQD	Sample No.	Sample Pen./Rec. (in)	Sample Depth (ft)	Sample Blows/6" / Min/ft	Sample Description and Boring Notes
	24		0.5 / 24.1	TOPSOIL						
1					9	S1	24/10	0.0-2.0	3 5 4 6	Loose, brown, silty SAND, some gravel. (Fill)
2	23									
3	22				11	S2	24/16	2.0-4.0	5 6 5 4	Compact, white to black, gravelly SAND, some silt, with wood, ash, and cinders. (Fill)
4	21									
5	20				8	S3	24/10	4.0-6.0	3 6 2 2	Loose, dark brown, silty SAND, some gravel, with ash, cinders, and brick. (Fill)
6	19									
7	18				5	S4	24/12	6.0-8.0	3 2 3 3	Loose, gray to black, well-graded SILT, SAND, and GRAVEL, some clay, with ash, cinders, and brick. (Fill)
8	17									
9	16									
10	15									
11	14				4	S5	24/10	10.0-12.0	6 2 2 3	Very loose to loose, dark gray-brown, silty SAND, trace gravel, trace clay, with ash and cinders. (Fill)
12	13			FILL						
13	12									
14	11									
15	10									
16	9				6	S6	24/12	15.0-17.0	3 4 2 1	Loose, dark gray, silty SAND, trace gravel, trace clay, with ash and cinders. (Fill)
17	8									
18	7									
19	6									
20	5									
21	4				10	S7	24/10	20.0-22.0	5 7 3 1	Loose to compact, dark gray to black, silty SAND, some gravel, some clay. (Fill)
22	3									
	2									

GRANULAR SOILS	
BLOWS/FT.	DENSITY
0-4	V.LOOSE
4-10	LOOSE
10-30	COMPACT
30-50	DENSE
>50	V.DENSE

COHESIVE SOILS	
BLOWS/FT.	CONSISTENCY
<2	V.SOFT
2-4	SOFT
4-8	FIRM
8-15	STIFF
15-30	V.STIFF
>30	HARD

SOIL COMPONENT

DESCRIPTIVE TERM	PROPORTION OF TOTAL
"TRACE"	0-10%
"SOME"	10-20%
"ADJECTIVE" (eg SANDY, SILTY)	20-35%
"AND"	35-50%

SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"

Notes:

Weather: Clear

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Project:	Walden Square 2nd Building	**Job #:**	7160.2.T4
Location:	Cambridge	**Date Started:**	3-17-22
City/State:	Cambridge, MA	**Date Finished:**	3-17-22

Boring No.

MA-102

Contractor: Seaboard
Driller/Helper: Dale/Mike
Logged By/Reviewed By: CAS
Surface Elevation (ft): 24.6

Casing Type: 4" Casing
Casing Hammer (lbs)/Drop (in): 140/30
Sampler Size/Type: 24" Split Spoon
Sampler Hammer (lbs)/Drop (in): 140/30

Groundwater Observations

Date	Depth	Elev.	Notes
3-16-22	7	17.6	

Depth (ft)	Elev. (ft)	Symbol	Depth/EL to Strata Change (ft)	Stratum	Sample N-Value / RQD	Sample No.	Sample Pen./Rec. (in)	Sample Depth (ft)	Sample Blows/6" / Min/ft	Sample Description and Boring Notes
24	1									
25	0									
26	-1				6	S8	24/12	25.0-27.0	6 5 1 2	Compact, dark gray, SAND, some gravel, some silt. (Fill)
27	-2									
28	-3									
29	-4									
30	-5									
31	-6			FILL	11	S9	24/10	30.0-32.0	6 7 4 2	Compact, dark gray, gravelly SAND, some silt. (Fill)
32	-7									
33	-8									
34	-9									
35	-10									
36	-11				14	S10	24/12	35.0-37.0	11 9 5 4	Compact, dark gray, gravelly, silty SAND, with trace brick. (Fill)
37	-12									
38	-13		38.0 / -13.4							
39	-14									
40	-15									
41	-16				6	S11	24/16	40.0-42.0	3 3 3 4	Firm, gray, silty CLAY, trace sand. (Marine Clay)
42	-17			MARINE CLAY						
43	-18									
44	-19									
45	-20									
	-21									Firm, gray, silty CLAY. (Marine Clay)

GRANULAR SOILS	
BLOWS/FT.	DENSITY
0-4	V.LOOSE
4-10	LOOSE
10-30	COMPACT
30-50	DENSE
>50	V.DENSE

COHESIVE SOILS	
BLOWS/FT.	CONSISTENCY
<2	V.SOFT
2-4	SOFT
4-8	FIRM
8-15	STIFF
15-30	V.STIFF
>30	HARD

SOIL COMPONENT

DESCRIPTIVE TERM	PROPORTION OF TOTAL
"TRACE"	0-10%
"SOME"	10-20%
"ADJECTIVE" (eg SANDY, SILTY)	20-35%
"AND"	35-50%

SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"

Notes:

Weather: Clear

McPHAIL ASSOCIATES, LLC
2269 MASSACHUSETTS AVENUE
CAMBRIDGE, MA 02140
TEL: 617-868-1420
FAX: 617-868-1423

Project:	Walden Square 2nd Building	**Job #:**	7160.2.T4
Location:	Cambridge	**Date Started:**	3-17-22
City/State:	Cambridge, MA	**Date Finished:**	3-17-22

Boring No.

MA-102

Contractor: Seaboard
Driller/Helper: Dale/Mike
Logged By/Reviewed By: CAS
Surface Elevation (ft): 24.6

Casing Type: 4" Casing
Casing Hammer (lbs)/Drop (in): 140/30
Sampler Size/Type: 24" Split Spoon
Sampler Hammer (lbs)/Drop (in): 140/30

Groundwater Observations

Date	Depth	Elev.	Notes
3-16-22	7	17.6	

Depth (ft)	Elev. (ft)	Symbol	Depth/EL to Strata Change (ft)	Stratum	Sample N-Value / RQD	Sample No.	Sample Pen./Rec. (in)	Sample Depth (ft)	Sample Blows/6" / Min/ft	Sample Description and Boring Notes
47	-22				6	S12	24/8	45.0-47.0	3 2 4 1	
48	-23									
49	-24									
50	-25									
51	-26				n/a	S13	24/18	50.0-52.0	WOR/24"	Very soft, gray, silty CLAY, trace sand. (Marine Clay)
52	-27									
53	-28									
54	-29									
55	-30			MARINE CLAY						
56	-31				n/a	S14	24/18	55.0-57.0	WOR/18" WOH	Very soft, gray, silty CLAY, trace sand. (Marine Clay)
57	-32									
58	-33									
59	-34									
60	-35									
61	-36				n/a	S15	24/24	60.0-62.0	WOH/24"	Very soft, gray, silty CLAY, trace sand. (Marine Clay)
62	-37									
63	-38				n/a		/	62.0		
64	-39									Change to bedrock detected at 64.5 feet due to increased density, hardness, and drill cuttings. Drill refused at 68 feet
65	-40		64.5 / -39.9							
66	-41			WEATHERED BEDROCK						
67	-42									
68	-43		68.0 / -43.4							
	-44			BEDROCK						

GRANULAR SOILS	
BLOWS/FT.	DENSITY
0-4	V.LOOSE
4-10	LOOSE
10-30	COMPACT
30-50	DENSE
>50	V.DENSE

COHESIVE SOILS	
BLOWS/FT.	CONSISTENCY
<2	V.SOFT
2-4	SOFT
4-8	FIRM
8-15	STIFF
15-30	V.STIFF
>30	HARD

SOIL COMPONENT

DESCRIPTIVE TERM	PROPORTION OF TOTAL
"TRACE"	0-10%
"SOME"	10-20%
"ADJECTIVE" (eg SANDY, SILTY)	20-35%
"AND"	35-50%

SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"

Notes:

Weather: Clear

McPHAIL ASSOCIATES, LLC
2269 MASSACHUSETTS AVENUE
CAMBRIDGE, MA 02140
TEL: 617-868-1420
FAX: 617-868-1423

Project:	Walden Square 2nd Building	**Job #:**	7160.2.T4
Location:	Cambridge	**Date Started:**	3-17-22
City/State:	Cambridge, MA	**Date Finished:**	3-17-22

Boring No.

MA-102

Contractor: Seaboard
Driller/Helper: Dale/Mike
Logged By/Reviewed By: CAS
Surface Elevation (ft): 24.6

Casing Type: 4" Casing
Casing Hammer (lbs)/Drop (in): 140/30
Sampler Size/Type: 24" Split Spoon
Sampler Hammer (lbs)/Drop (in): 140/30

Groundwater Observations

Date	Depth	Elev.	Notes
3-16-22	7	17.6	

Depth (ft)	Elev. (ft)	Symbol	Depth/EL to Strata Change (ft)	Stratum	Sample N-Value / RQD	Sample No.	Sample Pen./Rec. (in)	Sample Depth (ft)	Sample Blows/6" / Min/ft	Sample Description and Boring Notes
70	-45								4.0	
71	-46			BEDROCK	n/a	RC1	48/22	68.0-72.0	3.00	Medium hard, very slightly weathered, slightly fractured, dark blue-gray amorphous to fine-grained ARGILLITE; very close to close, shallow to steep fractures.
72	-47		72.0 / -47.4						1.5	
73	-48			Bottom of borehole 72 feet below ground surface					4	
74	-49									
75	-50									
76	-51									
77	-52									
78	-53									
79	-54									
80	-55									
81	-56									
82	-57									
83	-58									
84	-59									
85	-60									
86	-61									
87	-62									
88	-63									
89	-64									
90	-65									
91	-66									
	-67									

GRANULAR SOILS	
BLOWS/FT.	DENSITY
0-4	V.LOOSE
4-10	LOOSE
10-30	COMPACT
30-50	DENSE
>50	V.DENSE

COHESIVE SOILS	
BLOWS/FT.	CONSISTENCY
<2	V.SOFT
2-4	SOFT
4-8	FIRM
8-15	STIFF
15-30	V.STIFF
>30	HARD

SOIL COMPONENT

DESCRIPTIVE TERM	PROPORTION OF TOTAL
"TRACE"	0-10%
"SOME"	10-20%
"ADJECTIVE" (eg SANDY, SILTY)	20-35%
"AND"	35-50%

SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"

Notes:

Weather: Clear

McPHAIL ASSOCIATES, LLC
2269 MASSACHUSETTS AVENUE
CAMBRIDGE, MA 02140
TEL: 617-868-1420
FAX: 617-868-1423

Project:	Walden Square 2nd Building	**Job #:**	7160.2.T4
Location:	Cambridge	**Date Started:**	3-18-22
City/State:	Cambridge, MA	**Date Finished:**	3-18-22

Boring No.

MA-103

Contractor: Seaboard
Driller/Helper: Dale/Mike
Logged By/Reviewed By: CAS
Surface Elevation (ft): 26.5

Casing Type: 4" Casing
Casing Hammer (lbs)/Drop (in): 140/30
Sampler Size/Type: 24" Split Spoon
Sampler Hammer (lbs)/Drop (in): 140/30

Groundwater Observations

Date	Depth	Elev.	Notes

Depth (ft)	Elev. (ft)	Symbol	Depth/EL to Strata Change (ft)	Stratum	Sample N-Value / RQD	Sample No.	Sample Pen./Rec. (in)	Sample Depth (ft)	Sample Blows/6" / Min/ft	Sample Description and Boring Notes
1	26			FILL	7	S1	24/13	0.0-2.0	2 2 5 2	Loose, light to dark brown, silty SAND, trace gravel, with topsoil. (FILL)
2	25				12	S2	24/5	2.0-4.0	7 7 5 3	Loose, dark brown, gravelly SAND, some silt, with ash and cinders. (FILL)
3	24				6	S3	24/6	4.0-6.0	5 3 3 4	Loose, dark brown, silty SAND, trace gravel, with ash and cinders. (FILL)
4	23				8	S4	24/0	6.0-8.0	3 4 4 2	No recovery.
5	22									
6	21				25	S5	24/10	10.0-12.0	10 15 10 12	Compact, dark brown to black silty SAND, trace gravel, with ash, cinders, and trace brick. (FILL)
7	20									
8	19				7	S6	24/6	15.0-17.0	7 3 4 4	Loose, dark gray to black, silty SAND, trace gravel, with brick, wood, ash, and cinders. (FILL) Started using casing.
9	18									
10	17				10	S7	24/0	20.0-22.0	11 5 5 5	No recovery.
11	16									
12	15									
13	14									
14	13									
15	12									
16	11									
17	10									
18	9									
19	8									
20	7									
21	6									
22	5									
	4									

GRANULAR SOILS	
BLOWS/FT.	DENSITY
0-4	V.LOOSE
4-10	LOOSE
10-30	COMPACT
30-50	DENSE
>50	V.DENSE

COHESIVE SOILS	
BLOWS/FT.	CONSISTENCY
<2	V.SOFT
2-4	SOFT
4-8	FIRM
8-15	STIFF
15-30	V.STIFF
>30	HARD

SOIL COMPONENT

DESCRIPTIVE TERM	PROPORTION OF TOTAL
"TRACE"	0-10%
"SOME"	10-20%
"ADJECTIVE" (eg SANDY, SILTY)	20-35%
"AND"	35-50%

SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"

Notes:

Weather: Clear

McPHAIL ASSOCIATES, LLC
2269 MASSACHUSETTS AVENUE
CAMBRIDGE, MA 02140
TEL: 617-868-1420
FAX: 617-868-1423

Project:	Walden Square 2nd Building	**Job #:**	7160.2.T4
Location:	Cambridge	**Date Started:**	3-18-22
City/State:	Cambridge, MA	**Date Finished:**	3-18-22

Boring No.

MA-103

Contractor: Seaboard
Driller/Helper: Dale/Mike
Logged By/Reviewed By: CAS
Surface Elevation (ft): 26.5

Casing Type: 4" Casing
Casing Hammer (lbs)/Drop (in): 140/30
Sampler Size/Type: 24" Split Spoon
Sampler Hammer (lbs)/Drop (in): 140/30

Groundwater Observations

Date	Depth	Elev.	Notes

Depth (ft)	Elev. (ft)	Symbol	Depth/EL to Strata Change (ft)	Stratum	Sample N-Value / RQD	Sample No.	Sample Pen. /Rec. (in)	Sample Depth (ft)	Sample Blows/6" / Min/ft	Sample Description and Boring Notes
24	3									
25	2									
26	1				25	S8	24/4	25.0-27.0	11 10 15 11	Compact, dark gray to black, silty SAND, trace gravel, with rubber, plastic, ash, and cinders. (FILL)
27	0									
28	-1									
29	-2									
30	-3									
31	-4				3	S9	24/7	30.0-32.0	4 2 1 2	Very loose, light to dark gray, gravelly SAND, with glass, wood, brick, ash, and cinders. (FILL)
32	-5			FILL						
33	-6									
34	-7									
35	-8									
36	-9				6	S10	24/18	35.0-37.0	4 2 4 3	Firm, gray, silty CLAY, with brick, ash, and cinders. (FILL)
37	-10									
38	-11									
39	-12									
40	-13		40.0 / -13.5							
41	-14				3	S11	24/17	40.0-42.0	3 2 1 2	Soft, gray, silty CLAY. (MARINE CLAY)
42	-15									
43	-16			MARINE CLAY						
44	-17									
45	-18									
	-19									Very soft, gray, silty CLAY. (MARINE CLAY)

GRANULAR SOILS	
BLOWS/FT.	DENSITY
0-4	V.LOOSE
4-10	LOOSE
10-30	COMPACT
30-50	DENSE
>50	V.DENSE

COHESIVE SOILS	
BLOWS/FT.	CONSISTENCY
<2	V.SOFT
2-4	SOFT
4-8	FIRM
8-15	STIFF
15-30	V.STIFF
>30	HARD

SOIL COMPONENT

DESCRIPTIVE TERM	PROPORTION OF TOTAL
"TRACE"	0-10%
"SOME"	10-20%
"ADJECTIVE" (eg SANDY, SILTY)	20-35%
"AND"	35-50%

SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"

Notes:

Weather: Clear

McPHAIL ASSOCIATES, LLC
2269 MASSACHUSETTS AVENUE
CAMBRIDGE, MA 02140
TEL: 617-868-1420
FAX: 617-868-1423

Project:	Walden Square 2nd Building	**Job #:**	7160.2.T4
Location:	Cambridge	**Date Started:**	3-18-22
City/State:	Cambridge, MA	**Date Finished:**	3-18-22

Boring No.

MA-103

Contractor: Seaboard
Driller/Helper: Dale/Mike
Logged By/Reviewed By: CAS
Surface Elevation (ft): 26.5

Casing Type: 4" Casing
Casing Hammer (lbs)/Drop (in): 140/30
Sampler Size/Type: 24" Split Spoon
Sampler Hammer (lbs)/Drop (in): 140/30

Groundwater Observations

Date	Depth	Elev.	Notes

Depth (ft)	Elev. (ft)	Symbol	Depth/EL to Strata Change (ft)	Stratum	Sample N-Value / RQD	Sample No.	Sample Pen./Rec. (in)	Sample Depth (ft)	Sample Blows/6" / Min/ft	Sample Description and Boring Notes
47	-20				n/a	S12	24/24	45.0-47.0	WOH/18"	
48	-21								1	
49	-22									
50	-23									
51	-24				n/a	S13	24/8	50.0-52.0	WOH/24"	Very soft, gray, silty CLAY. (MARINE CLAY)
52	-25									
53	-26									
54	-27									
55	-28									
56	-29			MARINE CLAY	n/a	S14	24/8	55.0-57.0	WOH/24"	Very soft, gray, silty CLAY. (MARINE CLAY)
57	-30									
58	-31									
59	-32									
60	-33									
61	-34				2	S15	24/22	60.0-62.0	1 1 1 1	Very soft, gray, silty CLAY. (MARINE CLAY)
62	-35									
63	-36									
64	-37									
65	-38		65.0 / -38.5							
66	-39		65.1 / -38.6 65.2 / -38.7	GLACIAL TILL BEDROCK Bottom of borehole 65.2 feet below ground surface	50/1"	S16	24/1	65.0-67.0	50/1"	Compact, gray, silty SAND and GRAVEL. (GLACIAL TILL) Used a 2' splitspoon to grab a small sample after hitting bedrock.
67	-40									
68	-41									
	-42									

GRANULAR SOILS	
BLOWS/FT.	DENSITY
0-4	V.LOOSE
4-10	LOOSE
10-30	COMPACT
30-50	DENSE
>50	V.DENSE

COHESIVE SOILS	
BLOWS/FT.	CONSISTENCY
<2	V.SOFT
2-4	SOFT
4-8	FIRM
8-15	STIFF
15-30	V.STIFF
>30	HARD

SOIL COMPONENT

DESCRIPTIVE TERM	PROPORTION OF TOTAL
"TRACE"	0-10%
"SOME"	10-20%
"ADJECTIVE" (eg SANDY, SILTY)	20-35%
"AND"	35-50%

SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"

Notes:

Weather: Clear

McPHAIL ASSOCIATES, LLC
2269 MASSACHUSETTS AVENUE
CAMBRIDGE, MA 02140
TEL: 617-868-1420
FAX: 617-868-1423

Project:	Walden Square 2nd Building	**Job #:**	7160.2.T4
Location:	Cambridge	**Date Started:**	3-14-22
City/State:	Cambridge, MA	**Date Finished:**	3-14-22

Boring No. MA-104 (OW)

Contractor: Seaboard
Driller/Helper: Dale/Zach
Logged By/Reviewed By: CAS
Surface Elevation (ft): 27.6

Casing Type: 3.75" HSA
Casing Hammer (lbs)/Drop (in): N/A
Sampler Size/Type: 24" Split Spoon
Sampler Hammer (lbs)/Drop (in): 140/30

Groundwater Observations

Date	Depth	Elev.	Notes
3-14-22	10	17.6	
3-15-22	9.58	18.0	
3-16-22	8.64	18.9	
3-17-22	9.67	17.9	

Depth (ft)	Elev. (ft)	Symbol	Depth/EL to Strata Change (ft)	Stratum	Sample N-Value / RQD	Sample No.	Sample Pen./Rec. (in)	Sample Depth (ft)	Sample Blows/6" / Min/ft	Sample Description and Boring Notes
1	27		0.5 / 27.1	TOPSOIL	8	S1	24/8	0.0-2.0	3 4 4 4	Loose, gray-brown, silty SAND and GRAVEL. (Fill)
2	26									
3	25				12	S2	24/12	2.0-4.0	4 3 9 6	Compact, brown to dark brown, silty SAND, some gravel. (Fill)
4	24									
5	23				14	S3	24/8	4.0-6.0	4 6 8 8	Compact, brown to dark brown, silty SAND and GRAVEL, with ash, cinders, and brick. (Fill)
6	22									
7	21				11	S4	24/12	6.0-8.0	4 6 5 4	Compact, dark brown to black, well-graded SILT, SAND, and GRAVEL, with ash, cinders, and brick. (Fill)
8	20									
9	19			FILL						
10	18									
11	17				25	S5	24/24	10.0-12.0	11 12 13 6	Compact, light brown to gray, silty SAND, some gravel, with trace brick. (Fill)
12	16									
13	15									
14	14									
15	13									
16	12				2	S6	24/18	15.0-17.0	1 1 1 1	Very soft, dark gray, sandy SILT and CLAY, trace gravel. (Fill)
17	11		17.0 / 10.6							
18	10			Bottom of borehole 17 feet below ground surface						
19	9									
20	8									
21	7									
22	6									
	5									

GRANULAR SOILS	
BLOWS/FT.	DENSITY
0-4	V.LOOSE
4-10	LOOSE
10-30	COMPACT
30-50	DENSE
>50	V.DENSE

COHESIVE SOILS	
BLOWS/FT.	CONSISTENCY
<2	V.SOFT
2-4	SOFT
4-8	FIRM
8-15	STIFF
15-30	V.STIFF
>30	HARD

SOIL COMPONENT

DESCRIPTIVE TERM	PROPORTION OF TOTAL
"TRACE"	0-10%
"SOME"	10-20%
"ADJECTIVE" (eg SANDY, SILTY)	20-35%
"AND"	35-50%

SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"

Notes:
15 foot well with 10 feet of screen installed

Weather: Clear

McPHAIL ASSOCIATES, LLC
2269 MASSACHUSETTS AVENUE
CAMBRIDGE, MA 02140
TEL: 617-868-1420
FAX: 617-868-1423

Project:	Walden Square 2nd Building	**Job #:**	7160.2.T4
Location:	Cambridge	**Date Started:**	3-15-22
City/State:	Cambridge, MA	**Date Finished:**	3-15-22

Boring No.

MA-105

Contractor: Seaboard
Driller/Helper: Dale/Mike
Logged By/Reviewed By: CAS
Surface Elevation (ft): 26.4

Casing Type: 4" Casing
Casing Hammer (lbs)/Drop (in): 140/30
Sampler Size/Type: 24" Split Spoon
Sampler Hammer (lbs)/Drop (in): 140/30

Groundwater Observations

Date	Depth	Elev.	Notes
3-15-22	10	16.4	

Depth (ft)	Elev. (ft)	Symbol	Depth/EL to Strata Change (ft)	Stratum	Sample N-Value / RQD	Sample No.	Sample Pen./Rec. (in)	Sample Depth (ft)	Sample Blows/6" / Min/ft	Sample Description and Boring Notes
0	26		1.0 / 25.4	TOPSOIL	10	S1	24/16	0.0-2.0	3 5 5 5	Loose to compact, light brown to dark brown, silty SAND, some gravel. (Fill)
1	25									
2	24				7	S2	24/5	2.0-4.0	3 4 3 7	Loose, yellow-brown, SAND, trace silt. (Fill)
3	23									
4	22				7	S3	24/10	4.0-6.0	5 4 3 3	Loose, light brown to dark brown, SAND and GRAVEL, trace silt, with trace brick. (Fill)
5	21									
6	20				7	S4	24/8	6.0-8.0	5 4 3 3	Loose, light brown to dark brown, sandy GRAVEL, some silt. (Fill)
7	19									
8	18									
9	17									
10	16				6	S5	24/8	10.0-12.0	4 2 4 4	Loose, brown, GRAVEL, some sand. (Fill)
11	15									
12	14			FILL						
13	13									
14	12									
15	11				15	S6	24/8	15.0-17.0	8 10 5 6	Compact, brown, GRAVEL, some sand. (Fill)
16	10									
17	9									
18	8									
19	7									
20	6				2	S7	24/6	20.0-22.0	2 1 1 1	Very soft to soft, gray, SAND and GRAVEL, some silt, some clay. (Fill)
21	5									
22	4									

GRANULAR SOILS	
BLOWS/FT.	DENSITY
0-4	V.LOOSE
4-10	LOOSE
10-30	COMPACT
30-50	DENSE
>50	V.DENSE

COHESIVE SOILS	
BLOWS/FT.	CONSISTENCY
<2	V.SOFT
2-4	SOFT
4-8	FIRM
8-15	STIFF
15-30	V.STIFF
>30	HARD

SOIL COMPONENT

DESCRIPTIVE TERM	PROPORTION OF TOTAL
"TRACE"	0-10%
"SOME"	10-20%
"ADJECTIVE" (eg SANDY, SILTY)	20-35%
"AND"	35-50%

SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"

Notes:

Weather: Clear

McPHAIL ASSOCIATES, LLC
2269 MASSACHUSETTS AVENUE
CAMBRIDGE, MA 02140
TEL: 617-868-1420
FAX: 617-868-1423

Project:	Walden Square 2nd Building	**Job #:**	7160.2.T4
Location:	Cambridge	**Date Started:**	3-15-22
City/State:	Cambridge, MA	**Date Finished:**	3-15-22

Boring No.

MA-105

Contractor: Seaboard
Driller/Helper: Dale/Mike
Logged By/Reviewed By: CAS
Surface Elevation (ft): 26.4

Casing Type: 4" Casing
Casing Hammer (lbs)/Drop (in): 140/30
Sampler Size/Type: 24" Split Spoon
Sampler Hammer (lbs)/Drop (in): 140/30

Groundwater Observations

Date	Depth	Elev.	Notes
3-15-22	10	16.4	

Depth (ft)	Elev. (ft)	Symbol	Depth/EL to Strata Change (ft)	Stratum	Sample N-Value / RQD	Sample No.	Sample Pen./Rec. (in)	Sample Depth (ft)	Sample Blows/6" / Min/ft	Sample Description and Boring Notes
24	3									
	2									
25	1				5	S8	24/0	25.0-27.0	2 3 2 1	Firm. (Fill) Weight of hammer for 6"
26	0			FILL						
27	-1									
28	-2									
29	-3									
30	-4		30.0 / -3.6		4	S9	24/16	30.0-32.0	3 2 2 3	Soft to firm, dark gray, silty CLAY, some sand, some gravel. (Marine Clay)
31	-5									
32	-6									
33	-7				3	S10	24/24	35.0-37.0	2 2 1 2	Soft, gray-brown, silty CLAY. (Marine Clay)
34	-8									
35	-9									
36	-10									
37	-11									
38	-12			MARINE CLAY						
39	-13									
40	-14				8	S11	24/24	40.0-42.0	3 2 6 5	Firm to stiff, gray-brown, silty CLAY. (Marine Clay)
41	-15									
42	-16									
43	-17									
44	-18									
45	-19									Firm, gray, silty CLAY, some sand. (Marine Clay)

GRANULAR SOILS	
BLOWS/FT.	DENSITY
0-4	V.LOOSE
4-10	LOOSE
10-30	COMPACT
30-50	DENSE
>50	V.DENSE

COHESIVE SOILS	
BLOWS/FT.	CONSISTENCY
<2	V.SOFT
2-4	SOFT
4-8	FIRM
8-15	STIFF
15-30	V.STIFF
>30	HARD

SOIL COMPONENT

DESCRIPTIVE TERM	PROPORTION OF TOTAL
"TRACE"	0-10%
"SOME"	10-20%
"ADJECTIVE" (eg SANDY, SILTY)	20-35%
"AND"	35-50%

SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"

Notes:

Weather: Clear

McPHAIL ASSOCIATES, LLC
2269 MASSACHUSETTS AVENUE
CAMBRIDGE, MA 02140
TEL: 617-868-1420
FAX: 617-868-1423

Project:	Walden Square 2nd Building	**Job #:**	7160.2.T4
Location:	Cambridge	**Date Started:**	3-15-22
City/State:	Cambridge, MA	**Date Finished:**	3-15-22

Boring No.

MA-105

Contractor: Seaboard
Driller/Helper: Dale/Mike
Logged By/Reviewed By: CAS
Surface Elevation (ft): 26.4

Casing Type: 4" Casing
Casing Hammer (lbs)/Drop (in): 140/30
Sampler Size/Type: 24" Split Spoon
Sampler Hammer (lbs)/Drop (in): 140/30

Groundwater Observations

Date	Depth	Elev.	Notes
3-15-22	10	16.4	

Depth (ft)	Elev. (ft)	Symbol	Depth/EL to Strata Change (ft)	Stratum	Sample N-Value / RQD	Sample No.	Sample Pen./Rec. (in)	Sample Depth (ft)	Sample Blows/6" / Min/ft	Sample Description and Boring Notes
47	-21				10	S12	24/24	45.0-47.0	4 3 7 6	
50	-24				4	S13	24/24	50.0-52.0	2 2 2 3	Soft, gray, silty CLAY, trace sand. (Marine Clay)
55	-29			MARINE CLAY	n/a	S14	24/24	55.0-57.0	WOR WOH 3 3	Soft, gray, silty CLAY, trace sand. (Marine Clay)
61	-35				2	S15	24/24	60.0-62.0	1 1 1 2	Very soft to soft, gray, silty CLAY, trace sand. (Marine Clay)
64	-38		64.0 / -37.6							
65	-39		65.0 / -38.6	BEDROCK						
				Bottom of borehole 65 feet below ground surface						

GRANULAR SOILS	
BLOWS/FT.	DENSITY
0-4	V.LOOSE
4-10	LOOSE
10-30	COMPACT
30-50	DENSE
>50	V.DENSE

COHESIVE SOILS	
BLOWS/FT.	CONSISTENCY
<2	V.SOFT
2-4	SOFT
4-8	FIRM
8-15	STIFF
15-30	V.STIFF
>30	HARD

SOIL COMPONENT

DESCRIPTIVE TERM	PROPORTION OF TOTAL
"TRACE"	0-10%
"SOME"	10-20%
"ADJECTIVE" (eg SANDY, SILTY)	20-35%
"AND"	35-50%

SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"

Notes:

Weather: Clear

McPHAIL ASSOCIATES, LLC
2269 MASSACHUSETTS AVENUE
CAMBRIDGE, MA 02140
TEL: 617-868-1420
FAX: 617-868-1423

APPENDIX C:

GROUNDWATER MONITORING REPORTS

Groundwater Monitoring Report

Well I.D.: MW-2
Project: Walden Square Apartments
Location: Cambridge, MA
Project No.: 7160
Elev. Datum: Cambridge City Base

Road Box Elev.: +23.0
Top of PVC Elev.:
Top of Well Screen Elev.:
Bot. of Well Screen Elev.:
Well Diameter:

Date	Time	Elapsed Time	Depth from Road Box (feet)	Groundwater Elev. (feet)	McPhail Representative	Comments
05/24/21	12:20 PM	Initial	7.5	+15.5	LE	Initial Reading
03/14/22	10:00 AM	294 Day(s)	7.2	+15.8	CAS	
03/15/22	10:30 AM	295 Day(s)	7.1	+15.9	CAS	
03/16/22	3:00 PM	296 Day(s)	7.1	+15.9	CAS	
03/17/22	1:00 PM	297 Day(s)	7.1	+15.9	CAS	
04/19/22		330 Day(s)	7.1	+15.9	CAS	

Groundwater Monitoring Report

Well I.D.: MA-3
Project: Walden Square Apartments
Location: Cambridge, MA
Project No.: 7160
Elev. Datum: Cambridge City Base

Road Box Elev.: +25.2
Top of PVC Elev.:
Top of Well Screen Elev.:
Bot. of Well Screen Elev.:
Well Diameter:

Date	Time	Elapsed Time	Depth from Road Box (feet)	Groundwater Elev. (feet)	McPhail Representative	Comments
03/24/21		Initial	8.5	+16.7	JDM	Initial Reading
03/25/21		1 Day(s)	8.5	+16.7	JDM	
03/26/21		2 Day(s)	8.4	+16.8	JDM	
03/30/21		6 Day(s)	8.7	+16.5	JDM	
05/24/21	12:15 PM	61 Day(s)	8.5	+16.7	LE	
03/14/22	10:00 AM	355 Day(s)	8.2	+17.0	CAS	
03/24/21		0 Day(s)	8.5	+16.7	JDM	Initial Reading
03/25/21		1 Day(s)	8.5	+16.7	JDM	
03/26/21		2 Day(s)	8.4	+16.8	JDM	
03/30/21		6 Day(s)	8.7	+16.5	JDM	
05/24/21	12:15 PM	61 Day(s)	8.5	+16.7	LE	
03/14/22	10:00 AM	355 Day(s)	8.2	+17.0	CAS	
03/15/22	10:30 AM	356 Day(s)	8.1	+17.1	CAS	
03/16/22	3:00 PM	357 Day(s)	8.1	+17.1	CAS	
03/17/22	1:00 PM	358 Day(s)	8.1	+17.1	CAS	
04/19/22		391 Day(s)	8.1	+17.1	CAS	

Groundwater Monitoring Report

Well I.D.: MA-101
Project: Walden Square Apartments
Location: Cambridge, MA
Project No.: 7160
Elev. Datum: Cambridge City Base

Road Box Elev.: +24.6
Top of PVC Elev.: +24.4
Top of Well Screen Elev.: +19.4
Bot. of Well Screen Elev.: +9.4
Well Diameter: 2"

Date	Time	Elapsed Time	Depth from Road Box (feet)	Groundwater Elev. (feet)	McPhail Representative	Comments
03/16/22	3:30 PM	Initial	6.6	+18.0	CAS	Initial Reading
03/17/22	1:00 PM	1 Day(s)	7.0	+17.6	CAS	
04/19/22		34 Day(s)	7.0	+17.7	CAS	

Groundwater Monitoring Report

Well I.D.: MA-104
Project: Walden Square Apartments
Location: Cambridge, MA
Project No.: 7160
Elev. Datum: Cambridge City Base

Road Box Elev.: +27.6
Top of PVC Elev.: +27.4
Top of Well Screen Elev.: +22.4
Bot. of Well Screen Elev.: +12.4
Well Diameter: 2"

Date	Time	Elapsed Time	Depth from Road Box (feet)	Groundwater Elev. (feet)	McPhail Representative	Comments
03/14/22	10:00 AM	Initial	9.7	+17.9	CAS	Initial Reading
03/15/22	10:30 AM	1 Day(s)	9.6	+18.0	CAS	
03/16/22	3:00 PM	2 Day(s)	8.6	+19.0	CAS	
03/17/22	1:00 PM	3 Day(s)	9.7	+17.9	CAS	
04/19/22		36 Day(s)	10.9	+16.7	CAS	