

Proactive by Design

GEOTECHNICAL ENVIRONMENTAL ECOLOGICAL WATER CONSTRUCTION MANAGEMENT

249 Vanderbilt Avenue Norwood, MA 02062 T: 781.278.3700 F: 781.278.5701 F: 781.278.5702 www.gza.com November 2, 2020 File No. 01.0174440.01

King Devens LLC 800 Boylston Street, Suite 1570 Boston, MA 02199

Attention: Ms. Teri Ford, Associate

Re: Supplemental Geotechnical Evaluation Proposed Biotechnical Industrial/Manufacturing Development 45 Jackson Road Devens, Massachusetts

Dear Ms. Ford:

In accordance with our agreement executed on August 31, 2020 GZA GeoEnvironmental, Inc. (GZA) is pleased to submit this report that summarizes the results of additional subsurface explorations and geotechnical engineering evaluations made by GZA to supplement the due diligence phase geotechnical evaluation previously completed by GZA in December 2019 for the design and construction of a proposed industrial/manufacturing development located at 45 Jackson Road in Devens, Massachusetts (Site). This report supersedes our previous 2019 report.

This report is subject to the Limitations set forth in **Appendix A** and the Terms and Conditions of our agreement.

Elevations indicated in this report are in feet and are referenced to the National Geodetic Vertical Datum of 1929 (NGVD29).

BACKGROUND

PROJECT UNDERSTANDING

GZA's understanding of the project is based on our conversations with you, site visits by GZA, our previous work at the site (including exploration programs performed in 2008, 2012, and 2019) as summarized in our preliminary geotechnical due-diligence phase report dated December 11, 2010, and our review of the following documents:

- GZA's 2008 Geotechnical Engineering Study and Phase I Environmental Site Assessment (ESA) and limited environmental subsurface investigation at the project Site (the Geotechnical Study included 21 test borings and 37 test pits);
- GZA's 2012 Geotechnical Engineering Study at the project Site (the study included 14 test borings);
- GZA's 2019 Due-Diligence-Level Geotechnical Engineering Study at the project site (the study included 6 test borings and 10 test pits);





- A PDF file of GZA's proposed Supplemental Exploration Program Sketch from June 29, 2020 with mark-up edits by HEI, entitled "45 Jackson Prop_Exs_w_Prop_Bldgs_HEI edits," received by GZA on September 11, 2020;
- An AutoCAD drawing file of the currently proposed site development prepared by Highpoint Engineering, Inc. (HEI) entitled "Concept-(07-14-20).dwg," undated and received via email on September 22, 2020;
- An AutoCAD drawing file entitled "MasterPlan_Base.dwg," transmitted by HEI on September 22, 2020; and,
- Readily available online aerial photos and geologic maps.

EXISTING CONDITIONS

The proposed development is located at 45 Jackson Road (formerly known as Lot 16) and includes an area of approximately 24 acres along the west side of the former Fort Devens Military Reserve in Devens, Massachusetts. The property is currently owned by the Massachusetts Development and Finance Agency (MassDevelopment). A site locus plan is provided as **Figure 1**.

The Site is bounded to the east by Jackson Road, to the west by undeveloped land (beyond which is a retention pond), to the north and southeast by office/educational/commercial developments and to the south/southwest by an active electrical transmission line right-of-way (ROW) and undeveloped wooded land beyond. The central and eastern portions of the Site contain multiple abandoned and degraded asphalt paved roadway and parking areas, portions of buried foundations of a former bank and previous military barracks buildings that were razed during the early-to-mid 1990's, and areas of vegetation, including grass, trees, and shrubs. In addition, there was a motor pool facility that included a gas station in the central portion of the Site along the west side of former Lake George Street. The western third of the Site is undeveloped woodlands. The Site generally slopes down from east (at Jackson Road) to west. Site grades within the area of proposed development range from about elevation (El.) 348 at the southeast corner of the Site to approximately El. 280 at the northwestern extent of the Site. Available on-line FEMA mapping indicates the Site is not within flood hazard areas.

PROPOSED DEVELOPMENT

Based on the referenced July 2020 site development plan, we understand the development will include construction of three biotechnical industrial/manufacturing buildings, as well as a 2-level parking structure. Two of the buildings (Buildings 1 and 2) are proposed within the eastern portion of the site and the third building (Building 3) and parking deck structure are proposed within the western portion of the site. We understand that Building 1, associated paved access driveways and parking areas and utilities will be constructed before the other structures. The buildings and parking structure will not have a basement level. Approximate limits of the structures are shown on **Figure 2**. Additional information regarding the proposed structures is summarized in **Table A**.



Proposed Features	EASTERN POF	TION OF SITE	WESTERN PORTION OF SITE			
Proposed reatures	Building No. 1	Building No. 2	Building No. 3	Parking Structure		
No. Stories/Levels	1 to 2 ¹	1 to 2 ¹	1 to 2 ¹	2		
Approximate Footprint (square foot)	100,000	100,000	125,000	40,000		
Slab-on-grade FFE ² (ft)	339	339	316	Information not available ²		
Approx. Existing ground surface El. range (ft) near structure	328 to 343	336 to 343	307 to 326	297 to 304		

Table A – Summary of Proposed Development Areas and Structures

Notes: 1) We understand Building Nos. 1, 2, and 3 will include a full single-story level, and a potential second-floor mezzanine level over an undetermined portion (up to ½) of the first-floor footprint.

2) The ground level of parking structure is proposed to consist of asphalt pavement.

Based on the existing site topography and the proposed building FFEs, it appears the proposed structures will generally require cuts and fills of up to about 7 feet, with occasional areas requiring up to about 12-foot cuts/fills (not including the removal and replacement of unsuitable soils below the floor slabs or foundations). Earth retaining structures are not shown on the current conceptual plan however, based on existing grades and proposed building FFEs it is anticipated that either steepened slopes or retaining walls will be required. Column spacing and building load information was not available at this early stage of design, except for Building No. 1, where we understand the column spacing in the manufacturing area of the building will be 40 to 50 feet on-center.

In addition to the structures summarized above, we understand that relatively large stormwater drainage structures will be constructed below pavement areas. The locations of these structures were not shown on the above-referenced design plan.

PREVIOUS AND CURRENT SUBSURFACE EXPLORATIONS

Subsurface explorations considered during this geotechnical evaluation included select borings and/or test pits from our previous 2008 and 2012 geotechnical and environmental studies, our 2019 due diligence phase geotechnical explorations, as well as those performed during the recent 2020 exploration program. The 2008 and 2012 explorations were performed for two previously proposed manufacturing/industrial building developments located in the east and central portions of the Site. Neither of these previously proposed developments were constructed. The locations of previous and recent subsurface explorations are shown on **Figure 2**.

Table B provides an overview of the previous and recent exploration programs. Subsurface information from the relevant previous and recent borings and test pits are summarized more in more detail in **Tables 1 and 2**, the boring and test pit logs in **Appendices B and C**, and in the next section of this report.



Year Performed	Exploration Purpose	Exploration Type	No. of Explorations	No. of Refusals ²	Exploration Depth Range ¹ (ft)	Refusal Depth Range ² (ft)
2008	Geotechnical	Borings	21	14	3 to 21	6 to 16
2008	Geotechnical	Test Pits	37	21	5 to 16	7.5 to 16
2008	Environmental	Borings	4	2	16 to 20	12 to 12.5
2008	Environmental	Test Pits	16	0	5 to 8	-
2012	Geotechnical	Borings	14	14	8.8 to 16.8	8.8 to 16.8
2019	Geotechnical	Borings	6	2	7 to 14	7 and 14
2019	Geotechnical	Test Pits	10	5	5 to 12	5 to 10
2020	Geotechnical	Borings	7	7 (Note 3)	10.8 to 19	10.8 to 19 (Note 3)
2020	Geotechnical	Test Pits	9	6	8 to 11.5	8 to 11

Table B – Subsurface Explorations Overview

Notes:

1. Depths are referenced to existing ground surface at the time the exploration was performed.

2. Refusals are split spoon sampler and/or drilling refusals (roller bit or auger) for borings or excavator bucket refusal for test pits.

3. Number of refusals and refusal depth range includes boring GZ-304 (September 2020) where bedrock was cored from 10.8 to 16 feet below grade.

A description of the relevant previous and recent subsurface explorations is summarized in the following paragraphs.

2008 SUBSURFACE EXPLORATIONS

Geotechnical Borings and Test Pits

Twenty-one geotechnical test borings (GZ-100, GZ-101, GZ-103 through GZ-113, GZ-113A, GZ-114 through GZ-119 and GZ-119A) and 37 test pits (TP-101 through TP-137) were performed in January 2008 across the eastern and northwestern portions of the Site by New Hampshire Boring, Inc. of Brockton, Massachusetts and M.P. Crowley Company, Inc., respectively. The explorations were observed and logged by GZA personnel. The borings were performed using cased rotary wash and hollow stem auger (HSA) methods and the test pits were excavated using a steel-tracked excavator. Logs of the 2008 geotechnical borings and test pits are provided in **Appendix B**.

Environmental Borings and Test Pits

Four environmental borings (MW-1 through MW-4) with monitoring wells installed and 16 environmental test pits (TP-1 through TP-16) were performed by M.P. Crowley Company, Inc. within the eastern portion of the Site in January 2008. The borings and test pits were observed and logged by GZA personnel. These environmental explorations were performed in areas of former barracks buildings and underground storage tanks and in areas designated as an "area requiring environmental evaluation (AREE)". The borings were performed using hollow stem auger methods and the test pits were excavated using a steel-tracked excavator. The 2008 environmental explorations did not provide significant additional geotechnical information and were therefore excluded from **Tables 1 and 2** and the subsurface conditions discussion provided later in this report.



2012 SUBSURFACE EXPLORATIONS

Fourteen geotechnical borings (B-1 to B-14) were performed within the eastern portion of the Site in January 2012 by New Hampshire Boring of Derry, New Hampshire using HSA drilling methods. The borings were observed and logged by GZA personnel. Logs of the 2012 geotechnical borings are provided in **Appendix B**.

2019 DUE DILIGENCE PHASE GEOTECHNICAL SUBSURFACE EXPLORATIONS

Test Borings

Six geotechnical test borings (GZ-201 to GZ-206) were performed on November 5, 2019 by Drilex Environmental of Auburn, Massachusetts to evaluate subsurface conditions in and around the proposed building/structure areas. The borings were advanced with a drill rig mounted on a rubber-tracked all-terrain vehicle (ATV) using hollow stem auger drilling techniques. Split-spoon samples were obtained and Standard Penetration Tests (SPTs) were generally performed continuously to about 6 to 8 feet below existing ground surface (bgs) and at approximately 5-foot-intervals thereafter. A GZA representative observed the borings, obtained soil samples for laboratory testing, classified the soil samples using the Modified Burmister Soil Classification System and prepared boring logs, which are provided in **Appendix B**.

Test Pits

Ten test pits (TP-201, TP-201A and TP-202 to TP-209) were performed within and around the currently proposed building areas between November 14 and 15, 2019 by Anchor Excavating Corporation of Hanover, Massachusetts. The location and depth of the test pits were mutually agreed upon with the project civil engineer, HEI, to assess subsurface conditions and to perform in-situ permeability testing. The test pits were excavated with a Caterpillar 308E track-mounted excavator. A GZA representative observed the test pits, obtained soil samples for laboratory testing, classified the soil samples using the Modified Burmister Soil Classification System and prepared test pit logs, which are provided in **Appendix B**.

Field VOC Screening

GZA field screened soil samples collected from the borings and test pits for total volatile organic compounds (VOCs) using an Organic Vapor Meter equipped with a 10.6 eV photoionization detector (PID) lamp. Field screening results for most samples generally indicated levels below the detection limit (less than 0.1 parts per million [ppm]), with occasional isolated results up to about 5 ppm. Field PID screening results are included on the boring and test pit logs provided in **Appendix C**.

2020 GEOTECHNICAL SUBSURFACE EXPLORATIONS

Test Borings

Seven geotechnical test borings (GZ-301 to GZ-307) were performed from September 10 to 12, 2020 by Drilex Environmental of Auburn, Massachusetts to evaluate subsurface conditions in and around the currently proposed building/structure areas. The borings were advanced with a drill rig mounted on a rubber-tracked all-terrain vehicle (ATV) using hollow stem auger drilling techniques. Split-spoon samples were obtained and Standard Penetration Tests (SPTs) were generally performed continuously to about 6 to 8 feet below existing ground surface (bgs) and at approximately 5-foot-intervals thereafter. One 5-foot-long NX-sized rock core was performed in boring GZ-304 to confirm the presence, type, and quality of the bedrock. Groundwater observations wells were installed in borings GZ-301, GZ-303, GZ-304, and GZ-307, which were each finished with a 3-foot-high steel protective casing set in concrete. A GZA representative



observed the borings, obtained soil samples for laboratory testing, classified the soil samples using the Modified Burmister Soil Classification System and prepared boring logs, which are provided in **Appendix C**.

Test Pits

Nine test pits (TP-301 to TP-309) were performed within and around the currently proposed building areas between September 17 and 21, 2020 by Drilex Environmental of Auburn, Massachusetts. The location and depth of the test pits were mutually agreed upon with the project civil engineer, HEI, to assess subsurface conditions and to perform in-situ permeability testing. The test pits were excavated with a Takeuchi TB290 rubber track-mounted excavator. A GZA representative observed the test pits, obtained soil samples for laboratory testing, classified the soil samples using the Modified Burmister Soil Classification System and prepared test pit logs, which are provided in **Appendix C**.

Field VOC Screening

GZA field screened soil samples collected from the borings and test pits for total volatile organic compounds (VOCs) using an Organic Vapor Meter equipped with a 10.6 eV photoionization detector (PID) lamp. Field screening results for most samples generally indicated levels below the detection limit (less than 0.1 parts per million [ppm]), with occasional isolated results up to about 13 ppm (within an organic forest mat stratum). Field PID screening results are included on the boring and test pit logs provided in **Appendix C**.

FIELD PERMEABILITY TESTING

2008 PERMEABILITY TESTING

Falling head permeability tests were performed in 10 of the 2008 geotechnical borings: 4 within the east portion of the site (GZ-101, GZ-104, GZ-107, and GZ-110) and 6 within the west portion of the Site (GZ-113, GZ-113A, GZ-115, GZ-117, GZ-119, and GZ-119A). Test depths at the eastern and western portions of the Site ranged from 5 to 10 feet and 2.5 to 5 feet bgs, respectively. Permeability test data and results are provided in **Appendix D**.

2019 and 2020 PERMEABILITY TESTING

Falling head permeability testing in two of the 2019 test pits (TP-201A and TP-202) and two of the 2020 test pits (TP-306 and TP-307) within the natural glacial till and sand/gravel strata in the eastern and western portions of the Site. The permeability testing was performed to estimate the vertical hydraulic conductivity (i.e. permeability) of in-situ soils above the water table to provide preliminary data to HEI for design of stormwater infiltration system(s).

The testing apparatus consisted of an approximately 12-inch-diameter by 3.4-foot-long section of solid PVC pipe. The pipe was inserted into a hand-excavated hole (approximately 1.5 feet in diameter and 1.3- to 1.4-feet-deep). The annulus between the pipe and the hand-excavated hole was backfilled with excavated soil, manually tamped in place.

The inside of the pipe was filled with water for approximately 15 minutes to presoak the underlying soils prior to recording the water level drop in the pipe during the test. **Table C** provides an overview of the previous and recent permeability testing results. Permeability test data and results are provided in **Appendix D**.



Test Pit ID	Year Performed	Nearest Proposed Feature	Depth of Test (ft)	Stratum Test Performed in	Estimated Vertical Hydraulic Conductivity Result (cm/s)
TP-201A	2019	Pavement area east of Building No. 2	8.5	Glacial Till	5.8 x 10 ⁻³
TP-202	2019	Pavement area south of Building No. 2	6.5	Sand/Gravel	1.4 x 10 ⁻¹
TP-306	2020	Pavement area west of Building No. 3	7.3	Glacial Till	2.6 x 10 ⁻³
TP-307	2020	Pavement area west of Building No. 1	7.1	Glacial Till	3.5 x 10 ⁻³

Table C – Summary of 2019-2020 Single-Ring Infiltrometer Test Results

Based on our experience from other projects at the Devens base, the permeability of the natural glacial till with a similar percentage of silt as encountered is typically a few orders of magnitude lower than the permeability results estimated from this current study. It is possible that the higher permeability at this site could be due to sandy layer(s) within the glacial till stratum. A summary table of the results and calculation sheets for the field permeability tests are included in **Appendix D**.

LABORATORY ANALYSES

2008 GEOTECHNICAL LABORATORY TESTING

Eight soil samples from the geotechnical borings and test pits were submitted to GZA's geotechnical laboratory for gradation analysis to confirm field classifications and assess the potential for re-use of on-site soils as Structural Fill (i.e. Sand-Gravel Fill or Granular Fill). In addition, two of these samples were submitted to the laboratory for moisture-density relationship (Proctor) testing to obtain additional design/construction related information. Results of geotechnical laboratory testing are presented in **Appendix E**.

2012 GEOTECHNICAL LABORATORY TESTING

GZA performed four gradation analyses on samples recovered from the test borings. The purpose of the analyses was to confirm visual classifications made in the field and estimate the engineering properties of the soils. Laboratory results are included as **Appendix E**.

2019 GEOTECHNICAL LABORATORY TESTING

Laboratory grain size analyses were performed on two soil samples obtained from the 2019 borings to confirm visual field classifications and to help evaluate the potential for re-use as backfill on-site. Laboratory results are included in **Appendix E**.



2020 GEOTECHNICAL LABORATORY TESTING

Laboratory grain size analyses were performed on four soil samples obtained from the recent borings to confirm visual field classifications and to help evaluate the potential for re-use as backfill on-site. Laboratory results are included in **Appendix E**.

In addition, four composite topsoil samples were collected by GZA and submitted to the Soil Nutrient Analysis Laboratory at the University of Connecticut in Storrs, Connecticut for nutrient and textural analyses to evaluate the soils suitability as a growing medium (required for project unified permit application (UPA)). The "Standard Nutrient Analysis" provides pH, acidity, extractable nutrients, extractable heavy metals (e.g. lead and aluminum), cation exchange capacity, and percent base saturation. The "Organic Matter Content" analysis reports percent organic matter, and the "Soil Textural Analysis" provides a determination of the USDA Texture Classification by hydrometer analysis which indicates percentages of sand, silt and clay particles. Approximate topsoil sampling locations and laboratory test results are included in **Appendix F**.

SUBSURFACE CONDITIONS

Based on the relevant previous¹ and recent subsurface explorations, subsurface conditions across the currently proposed development areas generally consist of (in order of increasing depth): a thin layer of topsoil/forest mat or asphalt pavement, intermittent subsoil, granular fill, natural granular soils, glacial till, and bedrock. As noted above, a summary of subsurface conditions encountered in the explorations is presented on **Tables 1 and 2** for the proposed structures. A general description of the soil, bedrock and groundwater encountered in the proposed development areas is summarized below. Refer to the boring and test pit logs for more detailed information at each exploration location.

Note that the subsurface conditions presented below are separated into two main areas of the Site, as delineated on **Figure 2**:

- <u>Eastern Portion of Site</u> Mostly previously developed, contains portions of previous building foundations, abandoned and live underground utilities, and areas of asphalt pavement. Existing grades vary from about El. 348 to El. 335. Proposed Buildings 1 and 2 are located in the eastern portion of the Site. Fifty-nine subsurface explorations, including 28 borings and 31 test pits were considered for evaluating the eastern portion of the Site.
- <u>Western Portion of Site</u> Mostly undeveloped and wooded. Existing grades vary from about El. 335 to El. 280. Proposed Building 3 and the proposed parking structure are located in the western portion of the Site. Forty-five subsurface explorations, including 20 borings and 25 test pits, were considered for evaluating the western portion of the Site.

¹ Note that subsurface information from the relevant previous explorations (including ground surface elevations) included in the subsurface condition summaries assume changes to site grading from 2008 to the present are negligible.



EASTERN PORTION OF THE SITE (PROPOSED BUILDING NOS. 1 AND 2)

- Topsoil/Forest Mat and Pavement A surficial layer of topsoil/forest mat was noted in 48 of the 59 explorations with thicknesses ranging from 0.2 to 3 feet. 2008 test pit TP-118 and boring GZ-104 were located within an existing paved area and instead of topsoil encountered a 0.2-foot-thick surficial layer of bituminous asphalt pavement. Boring GZ-301 was located proximate to a former road and encountered a 0.2-foot-thick buried asphalt pavement layer below a 0.2-foot-thick surficial topsoil layer. The topsoil/forest mat layer generally consisted of dark brown to brown silty sand with varying amounts of gravel, trace to little organic matter (roots, leaves, grass), and occasionally trace amounts of asphalt. A buried topsoil layer of up to 0.7-feet-thick was noted at test pits TP-115, TP-116, TP-118, and TP-136.
- **Subsoil** A layer of subsoil was encountered directly below the topsoil in about 25 percent of the explorations. This layer was generally about 0.3- to 2.5-feet-thick and consisted of orange-brown silty sand with varying amounts of gravel and trace to little roots. Note that a buried subsoil layer up to about 1-foot-thick was encountered in five test pits (TP-115, TP-116, TP-117, TP-118, and TP-136) at a depth of up to about 2.5 feet bgs.
- *Fill* Fill encountered at the site was mainly granular and was observed in about 45 percent of the explorations from existing ground surface or below the surficial topsoil/subsoil or asphalt layers. The thickness of the fill ranged from about 1 to 10.5 feet. The fill varied from very loose to dense (typically medium dense to dense), brown or dark brown, sand with about 10 to 40 percent gravel and 10 to 35 percent silt. Trace amounts of asphalt, brick and/or wood were observed in the existing fill at some locations. Miscellaneous debris (i.e., concrete, metal, pipe fragments, cinder blocks and rebar) was also observed in the existing fill in test pit TP-103. Boulders were encountered in the fill in some of the explorations. Loose to very loose blow counts (SPT N-values) were encountered within the fill in boring B-4. Also, in a stratum which was called sand and gravel in borings B-3, B-9, and GZ-303 loose blow counts were encountered within about 4 feet of ground surface and, based on the location of these borings to existing and former structures at the site, the top approximately 4 feet of these borings may have instead been fill.

Old concrete foundations (i.e. walls, footings and/or piers) from former structures were encountered in the fill in nine of the test pits (TP-103 to TP-105, TP-108, TP-111, TP-114, TP-117, TP-136, and TP-201) at depths ranging from about 1 to 6 feet. In addition, abandoned pipes were encountered in the fill stratum in five of the test pits (TP-104, TP-105, TP-111, TP-116 and TP-201) at depths ranging from 3 to 8 feet.

It should be noted that in some of the explorations it was difficult to differentiate between fill and the natural granular soils. This was noted particularly at locations where it appeared that on-site granular soils may have been used to backfill around foundations of previous structures and in excavations following removal of underground fuel storage tanks that were used to heat the former barracks buildings.

• Natural Granular Soils – Natural sand and gravel/gravelly sand was encountered in most of the explorations at depths ranging from 0.2 to 8 feet bgs. This stratum was approximately 0.5 to 11 feet thick in the explorations and generally consisted of medium dense to dense sand with 10 to 50 percent gravel and 5 to 15 percent silt. At some locations (particularly the 2012 borings) this deposit contained up to about 30 percent silt. In a few of the test pits approximately 5 to 10 percent cobbles and occasional boulders were encountered in this layer. Loose blow counts were encountered in the 2- to 4-foot bgs samples within what was called sand and gravel at borings B-3, B-9, and GZ-303 only and it appears the top 4 feet of these two borings may have been fill of similar appearance to the natural granular soils.



- Glacial Till Glacial till was generally encountered below the natural granular soils layer and in about 3/4 of the explorations at depths ranging from about 3 to 14 feet bgs. The glacial till varied from medium dense to very dense (typically dense to very dense) and generally consisted of brown fine to medium sand with 30 to 40 percent silt and 10 to 35 percent gravel. The frequency of encountering boulders in the glacial till stratum varied from occasional to more frequent.
- Weathered Bedrock/Bedrock Bedrock was generally encountered below the glacial till layer. Bedrock coring was
 performed in borings GZ-110 (Building 2) beginning at a depth of about 14 feet. The bedrock generally consisted
 of moderately hard, slightly to severely weathered, moderately fractured blue, gray mica schist. Approximately
 0.1 to 7.5 feet of very severely to completely weathered bedrock was encountered immediately above more
 sound bedrock or apparent bedrock in 18 of the 59 explorations.

Auger, roller bit, and/or split-spoon refusals were encountered at 24 out of 28 boring locations at depths ranging from about 9 to 17.5 feet bgs. Excavator refusal was encountered at 13 of 21 test pit locations at depths ranging from 5 to 16 feet bgs. Apparent top of bedrock was encountered at elevations ranging from about 313.5 to 336. Although it appeared that the refusals were due to bedrock, it should be noted that the refusals may be on boulders, cobbles, or gravel and not necessarily bedrock. In addition, based on our experience on nearby sites, the top of bedrock elevation is erratic and may be encountered at higher elevations across the site.

WESTERN PORTION OF THE SITE (BUILDING NO. 3 AND PARKING STRUCTURE)

- Topsoil/Forest Mat A surficial layer of topsoil/forest mat was encountered in 41 of the 45 explorations. This layer
 was generally about 6- to 12-inches thick and consisted of dark brown silty sand with lesser amounts of gravel and
 trace to little roots and organic matter.
- **Subsoil** A layer of subsoil was encountered directly below the topsoil in about 80 percent of the explorations. This layer was generally about 0.5 to 2.5 feet thick and consisted of orange-brown silty sand with about 10 to 30 percent gravel and trace roots.
- *Fill* Existing fill was encountered in three of the explorations (borings GZ-114, GZ-304 and test pit TP-304). The fill was approximately 1- to 5.5-feet-thick and consisted of dark brown silty sand with various amounts of gravel. The fill at boring GZ-304 also contained asphalt and trace amounts of roots and metal in test pit TP-304.
- Natural Granular Soils Natural sand/gravel and gravelly sand was encountered in all but three of the explorations (GZ-113A, GZ-118 and GZ-206, all near the west end of the site) at depths ranging from 0 to 10 feet bgs. This stratum generally consisted of medium dense to dense sand with about 10 to 50 percent gravel and trace amounts of silt. At a few locations this deposit contained up to 20 to 35 percent silt. About 5 to 10 percent cobbles were encountered in this layer in a few of the test pits. Boulders were encountered in some of the test pits. This layer was observed to be approximately 1.5 to 9 feet thick in the explorations.
- **Glacial Till** Glacial till was encountered at depths ranging from 2 to 10 feet bgs. The glacial till was medium dense to very dense (typically dense to very dense) and generally consisted of brown fine to medium sand with 30 to 40 percent silt and 15 to 35 percent gravel. Cobbles and boulders were frequently encountered in the glacial till.
- **Bedrock** Bedrock coring was performed in borings GZ-117 and GZ-304 (both Building 3 area) beginning at depth of about 16 and 11 feet bgs, respectively. It was not possible to recover any rock core at GZ-117, possibly indicating the presence of weathered bedrock. However, at boring GZ-304 a 5-foot-rock core was advanced and collected and



indicated the presence of medium hard to hard, slightly weathered schist, which is consistent with the type of rock recovered from the core at boring GZ-110 (eastern portion of the site) and bedrock observed at other nearby GZA project sites on the Devens campus.

Auger, roller bit and split-spoon refusal was encountered at 15 of the 20 boring locations at depths ranging from about 7 to 19 feet bgs. Excavator refusal was encountered at 19 of the 25 test pit locations at depths ranging from about 5.5 to 14 feet bgs. Apparent top of bedrock was encountered at elevations ranging from about 286.5 to 313. Although it appeared that refusals were due to bedrock, it should be noted that the refusals may be on boulders, cobbles or gravel and not necessarily bedrock. Also, there is an apparent bedrock outcrop located within about 8 feet of the west-central edge of the proposed parking structure (approximate outcrop location shown on **Figure 2**). In addition, based on our experience on nearby sites, the top of bedrock elevation is erratic and may be encountered at higher elevations across on the site.

GROUNDWATER

Depths to groundwater were estimated based on observations made during drilling of the borings and excavation of the test pits, as well as measurements made over time within five monitoring wells installed in the recent (September 2020) borings. We note that the recent exploration program was performed during relatively dry late summer conditions, and that the levels observed in explorations without a monitoring well, particularly in the borings, may not represent stabilized groundwater levels. Also, based on available information at this site, it appears that the observed groundwater level often coincides with the top of the glacial till stratum, likely due to the relatively impervious nature of the glacial till. During wet periods, it is expected that groundwater level may be expected to drop below the top of glacial till. Groundwater flow is expected to generally follow the topography of the site and thus flow generally from east (at Jackson Road) to the west.

• **Eastern Portion of Site** – Groundwater was encountered in the borings and test pits at depths ranging from approximately 6 to 14 feet bgs, corresponding to approximate groundwater elevations ranging from El. 336 east of proposed Building No. 2 and sloping down to about El. 319 feet about to the west of proposed Building No. 1.

These approximate groundwater elevations in the Building 1 and 2 area were generally confirmed by the monitoring well readings summarized in Table D below. Table D – Summary of Recent and Previous Site Monitoring Well Readings (Eastern Portion of Site)

Exploration ID	Year Monitoring Well Installed	Date Monitoring Well Installed	Date of Monitoring Well Reading	Nearest Proposed Structure	Groundwater Depth Reading ¹ (ft)	Groundwater Elevation Reading (ft)
MW-2	2008	1/17/08	January 2008	Building 2	8.8	319.0
MW-4	2008	1/17/08	January 2008	Building 1	7.5	334.5
B-9	2012	1/12/12	1/16/12	Building 1	12.3	325.7
GZ-301	2020	9/10/20	10/23/20	Building 2	9.2	332.3
GZ-303	2020	9/10/20	10/23/20	Building 1	Dry (15)	< 323

Note: 1. Depths are referenced to existing ground surface at the time the exploration was performed.

• Western Portion of Site – Observations made in the borings and test pits indicated groundwater was encountered at depths ranging from approximately 3 to 11 feet bgs. Based on these depths, approximate



groundwater elevations range from about El. 300 to El. 309 in the vicinity of proposed Building No. 3, with the exception of Boring GZ-100 and TP-203 (located in proposed paved areas about 50 feet east and 100 feet south of proposed Building No. 3, respectively,) which indicate groundwater at approximately El. 315 to El. 319. Groundwater levels encountered in the explorations varied from El. 280 to El. 298 at the proposed parking structure.

Design groundwater elevations for the proposed structures at the site are provided below in the Design Recommendations section of this report. It should be noted that, in addition to precipitation, fluctuations in groundwater levels may occur due to variations in season, precipitation, site features and other factors different from those existing at the time of the explorations.

GEOTECHNICAL IMPLICATIONS OF SUBSURFACE CONDITIONS

The primary geotechnical issues for design and construction of the proposed development are:

- <u>Presence of unsuitable materials/debris and existing fill (Eastern Portion of Site)</u> The existing buried debris (including concrete foundations) from the demolished barracks buildings and potentially from demolished buildings at the former motor pool facility, as well as existing fill and buried topsoil and subsoil are considered unsuitable bearing material for support of slabs-on-grade and foundations due to variable density and potential compressibility. Also, some of the existing fill is difficult to distinguish from the natural granular soils at the site.
- <u>Relatively Shallow Bedrock (Western Portion of Site)</u> Subsurface explorations and observation of a bedrock outcrop indicate the depth to bedrock may be relatively shallow (within about 10 feet of ground surface) over much of the western portion of the site, particularly near the proposed Parking Structure and the southeast portion of Building No.
 3. Some foundation excavations and deeper utility excavations in these areas may require bedrock removal using methods such as blasting (if allowed) and hydraulic hammering.
- <u>Boulders and Cobbles (Eastern and Western Portions of Site)</u> The subsurface explorations across most of the Site
 indicate the presence of occasional and sometimes more frequent cobbles and boulders (particularly some greater
 than or equal to 3-feet thick) in the fill, natural granular soils, and glacial till strata. Boulders and cobbles should be
 accounted for during site cut/fill site balance considerations, as they will not be able to be reused as backfill within
 the building areas or utility trenches.
- <u>Reuse of On-Site Soils</u> Some of the proposed excavated soils, particularly those which penetrate the glacial till stratum will have a relatively high silt content and will likely be difficult to reuse as fill, especially in wet conditions.
- <u>Possible temporary high groundwater table</u> While recent stabilized groundwater levels (mostly obtained during a relatively dry season) indicate static groundwater level may be below proposed building and shallower utility excavation elevations, based on our experience in Devens during precipitation events, water tends to perch on top of the glacial till and bedrock strata (generally within about 5 to 15 feet of ground surface). Therefore, the presence of perched water will need to be considered in the overall site and building drainage design and during earthwork construction.
- <u>Unexploded Ordinance (UXO) Potential</u> While not encountered in the previous or current explorations, because of the past site usage as an Army base, unexploded ordinance (UXO) may be present in the soils across the site, although encountering UXO is considered unlikely due to past site cleanup operations.



GEOTECHNICAL RECOMMENDATIONS

The geotechnical design and construction recommendations presented below are based on GZA's understanding of the currently proposed development, evaluation of the available data from our previous and recent subsurface exploration programs, and the 2015 International Building Code (IBC) and the Massachusetts Amendments to the 2015 IBC, 9th Edition (MSBC). The recommendations presented herein are subject to the limitations in **Appendix A**.

<u>DESIGN</u>

1. Design Considerations

Table E provides GZA's recommended design groundwater elevation for each proposed structure, as well as other critical elevations of concern for the proposed structures.

Proposed Features	EASTERN POP	RTION OF SITE	WESTERN PORTION OF SITE			
Proposed reatures	Building No. 1	Building No. 2	Building No. 3	Parking Structure		
Slab-on-grade FFE	339	339	316	Information not available		
Range of Observed Groundwater Levels within Footprint of Structure	323 to 334	326 to 336	304 to 308	280.5 to 299		
Design Groundwater Elevation	336	338	312 ¹	301		
Range of Observed Top of Suitable Bearing Soils	328 to 343	328 to 341.5	306 to 325	297 to 304		
Range of Observed Top of Bedrock	322.5 to 331	327.5 to 334 ²	296 to 307 ³	288 to 298 ⁴		

Table E – Summary of Subsurface Conditions that Impact Building Design

Note: 1) Design Groundwater Elevation at Building No. 3 takes into account depth to glacial till stratum as an influence on perched water elevation. 2) Top of observed bedrock at Building No. 1 includes boring B-3, located approximately 40 feet east of proposed Building No. 1.

3) Top of possible bedrock observed just outside the Building 3 footprint includes El. 313 at boring GZ-304 immediately south of the building,

El. 316 at boring GZ-104 located about 45 feet east of the building, and El. 316 in boring GZ-104, located about 50 feet east of the building.

4) Apparent exposed bedrock outcrop observed about 10 feet east of boring GZ-206 (refer to Figure 2) at around El. 298 ft.

2. Foundations (Building Nos. 1, 2, 3 and Parking Structure)

The topsoil, subsoil, fill, buried topsoil/subsoil are unsuitable for support of the proposed structures because of their potential for compression due to organic content and variable density. Foundations, related demolition debris, and abandoned utilities from previous structures should also be removed prior to foundation or slab construction. It is anticipated that excavation to a depth of 4 to 6 feet below existing ground surface in the former barracks building areas will be required to remove remnants of foundations. Additional test pit excavations should be considered before or during the beginning of construction in the footprints of previously demolished buildings associated with the former motor pool to assess the presence and depths of potential foundation remnants.

The proposed structures may be supported on shallow foundations (e.g. spread footings) bearing on undisturbed natural granular soil, glacial till, bedrock, or on compacted Structural Fill (i.e., Sand-Gravel Fill, Granular Fill, or Crushed Stone) placed in controlled lifts over these natural materials after removing the fill, topsoil, subsoil, and buried topsoil/subsoil, foundations and debris. Removal below proposed buildings should include soils that have been



disturbed by excavations to remove existing footings from previously demolished buildings, and from test pit investigations performed for this project that extend below the bottom of proposed footings. Unsuitable soils should be removed within the zone of influence below the new foundations, defined by a 1 foot horizontal to 1-foot vertical line extending downward and outward starting at 1 foot horizontally outside the bottom edge of footing. Careful observation of footing subgrades by a qualified geotechnical engineer will be required to observe that subgrade soils are suitable for foundation support.

The gradation and compaction criteria for Structural Fill used to replace unsuitable soil are provided in **Tables 3 and 4**, respectively. Structural Fill must be placed in a controlled manner as further described in the Construction Recommendations section of this report.

Provided that foundation subgrades are prepared as described herein, recommended maximum net allowable bearing pressures in tons per square foot (tsf) for the shallow footings on the different strata are:

٠	Compacted Structural Fill	
	(placed over the Natural Undisturbed Soils):	3 tsf
•	Undisturbed Natural Gravelly Sand, Sand/Gravel Soils:	3 tsf
٠	Natural Undisturbed Glacial Till:	4 tsf
•	Weathered Bedrock ² :	4 tsf
•	Bedrock:	8 tsf

Since the actual bearing material may not be known until construction, it may be more practical to design all footings for a recommended bearing pressure of 3 tsf.

Assuming that the proposed shallow foundations are constructed no more than 4 feet below the slab-on-grade elevations, it is unlikely that substantial amounts of bedrock will be encountered during footing construction, especially in the eastern portion of the Site; however, some areas (such as the southeast corner of proposed Building No. 3 and possibly the parking structure) are more likely to encounter bedrock. If bedrock is encountered at or above the bottom of footing elevation, it should be overexcavated at least 6 inches below proposed footing grade and replaced with compacted Structural Fill. Alternatively, individual footings may bear entirely on bedrock. We recommend a transition zone be provided for continuous wall footings where the subgrade changes from natural soil or Structural Fill to bedrock. The transition zone should be constructed by excavating bedrock to 12 inches below the bottom of footing at the change in bearing material. Taper this bedrock excavation to 6 inches below the footing at 10 feet from the subgrade change and backfill with compacted Structural Fill. Alternatively provide a vertical construction joint in the foundation and building wall at the location of the subgrade change to mitigate cracking due to differential settlement, or provide additional reinforcement in the footing at the change in bearing material to accommodate potential bending stresses due to the differing subgrade material stiffness.

Footings should be designed in accordance with the Massachusetts State Building Code, 9th Edition (MSBC) Amendments to the 2015 International Building Code (IBC). Exterior footings and interior footings in unheated areas should bear at least 4 feet below the final exterior grades for frost protection. Interior footings in heated areas and footings bearing entirely on bedrock should bear at least 18 inches below top of slab. In accordance with MSBC Section

² "Weathered Bedrock" is defined as very severely to completely weathered bedrock that can be readily excavated with standard soil excavation equipment and techniques.



1806.2, for footings less than three feet in least lateral dimension (width), the recommended allowable bearing pressure shall be 1/3 of the value indicated above, times the footing width in feet.

3. Building Slabs

Slab-on-grade construction is recommended for the proposed buildings on a base course consisting of a minimum 8inch-thick layer of Sand-Gravel Fill in accordance with gradation and compaction criteria provided in **Tables 3** and **4**, respectively. Prior to the construction of the building slab and base course, existing unsuitable soils (e.g. topsoil, subsoil, fill, buried topsoil/subsoil) and debris should be removed in accordance with subgrade preparation/construction recommendations provided later in this report.

4. Foundation Settlement

Post-construction settlement for the proposed building and parking structure foundations is anticipated to be less than 1 inch and differential settlement (between columns) less than about ½ inch, provided that the foundations are designed and constructed as recommended herein.

5. <u>Geotechnical Seismic Design Parameters</u>

Based on the criteria of MSBC Section 1806.4 and Figures 1806.4b and 1806.4c, a qualitative liquefaction assessment was performed on the basis of SPT N-values, soil type and estimated fines content. The soils at the Site are not considered susceptible to liquefaction based on the criteria set forth in the MSBC.

The SPT N-values from the borings were used to evaluate seismic Site Class in accordance with Section 1613.5.5 of the MSBC, and the IBC. Based on this evaluation, we recommend <u>Site Class C</u> be used for seismic design. In accordance with Table 1604.11 of the MSBC, the mapped seismic design factors for the town of Shirley (nearest municipality to the 45 Jackson Road development area) are:

- S_s = 0.207, and
- S₁ = 0.071



Seismic loads on foundation walls should be calculated based on MSBC Section 1613.3.3(1) and (2), using the following parameters:

- Total Soil Unit Weight: 130 pcf
- Site Coefficient, F_a = 1.2
- Site Coefficient, F_v = 1.7

6. Permanent Groundwater Control

Based on groundwater levels measured in the borings, test pits, and a limited number of observation wells, observations of moisture in samples obtained from the borings, and our experience during design and construction for other structures within nearby sites in Devens, we recommend the design groundwater levels (same as those presented in **Table E**) and permanent groundwater control measures for the proposed structures as summarized in **Table F**:

Area	Proposed FFE	Design Groundwater El. (See Note 1) (ft)	Permanent Groundwater Control Measures
Building No. 1	339	336	Perimeter Foundation Drains
Building No. 2	339	338	Perimeter Foundation Drains
Building No. 3	316	312	Perimeter Foundation Drains
Parking Structure	Information not available	301	Perimeter Foundation Drains (Note 2)

Table F – Recommended Design Groundwater Levels and Permanent Groundwater Control Design Measures

Notes:

- The Design Groundwater Elevations correspond to maximum anticipated groundwater levels prior to construction
 of building perimeter drain system. Waterproofing up to the Design Groundwater Elevation is recommended for
 elevator and laboratory process/equipment pits. However, assuming the perimeter drains perform as intended, the
 static groundwater level around each structure will be maintained below its base slab elevation, and hydrostatic
 uplift is not anticipated.
- 2. Perimeter drains for the Parking Structure are not required if the design FFE is set at El. 303 or above, or if structure consists of asphalt pavement at ground surface and isolated column foundations (i.e. no continuous wall foundations and no concrete slab).

The perimeter foundation drainage system should be placed outside the foundation wall in accordance with Section 1805.4.2 of the MSBC to provide discharge of infiltrating rain and surface water. The drain should generally consist of 4-inch-diameter perforated PVC pipe surrounded by a minimum of 6 inches of Crushed Stone (required gradation described in **Table 3**) and wrapped in a non-woven geotextile (Mirafi 140N or equal). Above the Crushed Stone, Sand-Gravel fill, as detailed in the attached **Table 3**, should be placed to within 18 inches of ground surface to provide positive drainage into the foundation drain pipe. The perimeter drain should be installed outside the foundation wall a minimum of 4 feet below finish grade, to provide discharge of infiltrating rain and surface water.

Building perimeter drains should discharge via gravity from above the design groundwater levels into the on-site stormwater discharge lines/structures. Exterior grades should be sloped away from the building areas as much as



practical. Provisions should be made to incorporate clean-out risers into the perimeter drains to facilitate periodic clean-out of the drains.

Outside grades should be sloped away from the building areas as much as practical. It is recommended that the site storm drainage systems be designed such that that perimeter drain connections at the manholes are above the existing groundwater level.

We recommend that below-grade portions of foundation walls and lowest level slabs be damp-proofed in accordance with MSBC Section 1805.2. We understand the proposed buildings will not include a basement. Should elevator pits be proposed below observed groundwater levels or areas where perched groundwater is anticipated based on soil stratigraphy, waterproofing of the pit walls and slabs in accordance with IBC Section 1805.3 should be provided.

7. Lateral Earth Pressures

Retaining walls, buried foundation walls, and other permanent retaining structures subjected to unbalanced earthloading conditions should be designed to resist lateral earth pressures. We recommend the following design criteria:

- a) For the purpose of evaluating lateral earth pressures for retaining walls or other below-grade walls with unbalanced earth loading, we recommend the following equivalent weights:
 - flexible (cantilever) walls 45 pounds/cubic foot (pcf)
 - rigid walls
 65 pcf

These values are for horizontal backfill and assume that the walls are backfilled with free draining soils such as Granular Fill (provided it has less than 8 percent passing sieve No. 200) or Sand Gravel Fill within at least 3 feet of the walls and constructed with perimeter drains so that no water pressure develops behind the wall. Where the calculated earth pressure behind the wall is less than 250 pounds per square foot (psf), it should be increased to 250 psf to account for stresses created by compaction within 5 feet of the wall. This pressure does not account for surcharge loads from large equipment such as cranes and concrete trucks. Walls should also be designed for appropriate surcharge and seismic loads per Section 1807.2 of the MSBC.

- b) The recommended coefficient of friction to resist sliding between mass concrete/formed concrete and natural soils or compacted Structural Fill is 0.4.
- c) The minimum factors of safety for sliding and overturning under static loads should be 1.5. Passive pressure at the toe of the walls should not be included as a resisting force when analyzing for overturning and sliding.

On-site finished slopes should be no steeper than 2.5 horizontal to 1 vertical. If steeper slopes are required, GZA can provide recommended slope treatments and/or slope stabilizing measures upon request.



CONSTRUCTION

1. Foundation Subgrade Preparation

Remove all existing topsoil, subsoil, existing fill, and buried topsoil/subsoil within the proposed building areas and parking structure foundation areas down to undisturbed natural soils or bedrock. The limits of existing fill, topsoil, subsoil, and buried topsoil/subsoil to be removed below proposed footings is defined by a 1 horizontal to 1 vertical (1H:1V) line sloping downward and outward from 1 foot outside the bottom exterior edge of the footings and intersecting the undisturbed natural soil or bedrock subgrade.

Where practical, final excavation should be undertaken using a smooth-edged bucket to limit disturbance to the natural subgrades. Proof-roll final subgrade areas prior to placement of footings or Structural Fill with at least ten passes of a minimum 10,000 pound (minimum static weight) vibratory roller. In confined areas, proof-roll with a minimum of ten passes of a vibratory plate compactor or walk-behind vibratory drum roller. When near the water table or perched water, proof-rolling should be performed at the discretion of the Engineer and should be performed using static (non-vibratory) equipment.

Weak and unstable areas that are observed during proof-rolling should be overexcavated and replaced with compacted Structural Fill (Granular Fill, Sand-Gravel, or Crushed Stone wrapped in filter fabric).

Based on the borings and test pits, some of the soils at the bottom of the excavation, particularly those with higher silt content – such as glacial till soils, will be susceptible to disturbance during excavation in wet conditions. Excavations should be sequenced and conducted in such a way as to minimize disturbance of subgrades. Equipment (other than proof-rolling equipment) should not operate directly on the natural subgrade to limit disturbance. Where natural subgrades are silty and/or which easily disturbed when wet, they may require a mud mat or working mat of Crushed Stone. Crushed Stone placed in excess of 4-inches-thick should be wrapped in non-woven geotextile filter fabric.

Footing and slab subgrades should be protected from frost at all times during construction. We recommend that a qualified geotechnical engineer evaluate the subgrade for suitability for foundation support and to monitor proof-compaction and subsequent fill placement.

If bedrock excavation is required below footings, slabs or within utility trenches, bedrock should be overexcavated to at least 6 inches below bottom of the footing, slab or utility invert. Based on the explorations, it is anticipated that limited bedrock excavation (particularly noted in the southeast Building No. 3 and proposed parking structure areas) will be required for footing construction. Bedrock encountered in the explorations is indicated on **Tables 1 and 2**. Based on data from our exploration program, and the proposed finished floor elevations of the proposed structures, if bedrock excavation is required, we anticipate that some of the rock excavation can be accomplished with rippers or large excavation equipment. However, there may be areas where blasting is required to remove bedrock. If blasting is used, it should be performed in a controlled manner to avoid damage to existing utilities and nearby buildings.

2. Building Slab Subgrade Preparation

a. Below building slabs for proposed Building Nos. 1, 2, and 3, excavate and remove all existing topsoil, subsoil, organic fill, buried topsoil/subsoil. Also excavate inorganic fill, remnants of previous foundations, and demolition debris from previous structures to at least 3 feet below the bottom of proposed slabs. Slab excavation should extend at least 3 feet beyond the outside edge of the proposed slab. Where practical, final excavation should be undertaken using a smooth-edged bucket to limit disturbance to the soil subgrades.



- b. Proof-roll the existing subgrade with a minimum of six passes of a vibratory drum roller (with a minimum static drum weight of 10,000 pounds). This operation must be observed by a qualified geotechnical engineer.
- c. Place structural fill below slab base course as required. Backfill should be compacted to 95 percent of maximum dry density as determined by ASTM D-1557.

3. Pavement Subgrade Preparation

Remove topsoil, subsoil, organic fill and buried topsoil/subsoil to at least 2 ½ feet below proposed finished grades beneath paved areas (including the asphalt paved ground level of the parking structure) and remove existing inorganic fill to the minimum depth required to accommodate Finish, Binder and Sand-Gravel base course. Proof-roll the existing subgrade with a minimum of six passes of a vibratory drum roller (with a minimum static drum weight of 10,000 pounds). Any weak, unstable or soft spots identified during proof-rolling should be excavated and replaced with compacted Structural Fill.

4. <u>Reuse of On-Site Materials</u>

On-site materials anticipated to be excavated during construction include existing granular fill, and natural gravelly sand, sand/gravel and glacial till.

Based on visual and laboratory soil classifications, the existing on-site granular fill and the natural granular soils often contain less than approximately 15 percent fines (primarily silt) and in many cases meet the gradation requirements for Granular Fill. Some of the natural granular soils and fill contain up to 35 percent silt and generally do not meet the gradation requirements for Granular Fill. The on-site glacial till soils contain up to about 50 percent fines (primarily silt) and do not meet the gradation requirements for Granular Fill or Sand-Gravel Fill. Due to the high silt content, the on-site glacial till may be easily disturbed during wet/freezing conditions when subject to heavy earthwork equipment.

If weather conditions are favorable, the on-site natural granular soils and glacial till may be reused on site as a substitute for Granular Fill provided that the moisture content can be controlled and the material can be compacted to the required density. However, the on-site glacial till and any soil containing more than 20 percent fines should not be used as fill within 1 foot of bottom of footings or within 1 foot of the bottom of building slab base course, nor should it be used above perimeter foundation drain pipes. Where glacial till is used as fill below footings and slabs, a 12-inch-thick base course layer of Sand-Gravel Fill, Crushed Stone wrapped in non-woven filter fabric, or Granular Fill with no greater than 10 percent fines should be placed and compacted below the footings and slabs.

On-site granular fill from site excavations may be reused as a substitute for Granular Fill, provided it is free from deleterious or organic matter, topsoil/subsoil, roots, and particles greater than 6 inches in greatest dimension, its moisture content is controlled such that it can be placed in stable lifts and is placed and compacted as recommended herein.

The contract documents should include the requirement for the contractor to submit methods for acceptance by the engineer for on-site soil reuse during these difficult weather times (if proposed). Such measures could include: covering stockpiles to mitigate water intrusion, blending on-site soil with off-site gravel, using alternating layers of off-site Structural Fill and existing on-site granular fill, for example. The contractor's submittal should include demonstrated experience on other projects having similar soil conditions.



5. Fill Materials and Placement

Recommended gradations for off-site fill materials are provided in **Table 3**. Structural Fill should consist of off-site Granular Fill, Sand-Gravel, or Crushed Stone. Use of ¾-inch Crushed Stone, in lieu of soil fill, at the bottom of excavations will aid in dewatering operations. Crushed Stone greater than 4 inches in thickness should be wrapped in non-woven filter fabric (Mirafi 140N or equivalent).

Place Structural Fill in lifts and compact in accordance with the guidelines presented in **Table 4**, while meeting the recommended minimum degrees of compaction presented below. A qualified geotechnical engineer should be on site during fill placement and compaction, particularly where higher silt content on-site soils are encountered, such as glacial till, because of the sensitivity of these soils to moisture and disturbance due to construction and worker foot traffic.

The recommended minimum degree of compaction of soils, based on percentage of maximum dry density as defined by ASTM D-1557, is specified below for different areas.

	Percent of
	Maximum
Fill Area	Dry Density
Within Building Areas and Below Foundations and Slabs	95
Behind Retaining Walls	95
Pavement Base Course	95
Utility Trench Backfill	95
Below Pavement Base Course	92
Beneath Landscape Areas	90

Crushed Stone should be placed in lifts, with each lift compacted to an unyielding surface. Recommended maximum loose lift thickness and minimum number of passes of compaction equipment for structural fill materials are provided in **Table 3**.

Compaction within 5 feet of building walls and retaining walls should be performed using a hand-operated vibratory roller or plate compactor. Backfill and compact all fills at approximately similar elevations on each side of foundation walls to avoid unbalanced loading. Concrete footings and slabs, as well as footing and slab subgrades should be protected from frost at all times. Fill should not be placed over frozen soil.

6. <u>Construction Dewatering</u>

Groundwater measurements and observations in the previous and current explorations, generally indicated groundwater depths ranging from 6 to more than 15 feet bgs along the eastern portion of the site (Buildings 1 and 2) and 3 to 11 feet bgs along the western portion of the site (Building 3 and parking structure). Based on GZA's observations within excavations at the site and nearby sites within the former Devens Army base, groundwater tends to perch above the top of the glacial till stratum following rain events and could therefore be encountered within the top 4 feet of existing grade during construction.

Thus, construction dewatering will likely be required to conduct all below-grade construction work "in the dry". It is recommended that an interceptor trench (wrapped in filter fabric and filled with Crushed Stone) be excavated along the east side of the proposed buildings to the bottom of the deeper excavations prior to construction to help divert



groundwater away from the excavation. This is especially beneficial if excavations are performed in wet seasons. In addition, constructing small temporary earth berms and grading to allow drainage away from the excavation are recommended to control surface water runoff. We anticipate groundwater and storm water can be controlled by pumping from sump pumps. Sump pumps should be surrounded by ¾-inch Crushed Stone wrapped in filter fabric to limit migration of fines.

The site contractor should be responsible for designing and selecting construction dewatering methods based on his proposed methods and equipment used for excavation. Dewatering efforts must satisfy requirements of local, state and federal environmental and conservation authorities. Permits will be required if discharge is directed to public or site storm drains and utilities.

7. Excavation Slopes and Shoring

Where sufficient space is not available to safely lay back excavations in accordance with OSHA regulations, a temporary earth support system will be required to support the excavation and maintain existing structures and utilities that are adjacent to proposed excavations.

Temporary earth support systems, if required, should be selected by the site Contractor and designed by an experienced Professional Engineer registered in the Commonwealth of Massachusetts, and retained by the Contractor.

The Owner and the Contractor should make themselves aware of and become familiar with applicable local, state, and federal safety regulations, including the current Occupational Safety and Health Administration (OSHA) Excavation and Trench Safety Standards. Construction site safety generally is the sole responsibility of the Contractor, who shall also be solely responsible for the means, methods, and sequencing of construction operations. We are providing this information solely as a service to our client. Under no circumstances should the information provided below be interpreted to mean that GZA is assuming responsibility for construction site safety or the Contractor's activities; such responsibility is not being implied and should not be inferred.

The Contractor should be aware that slope height, slope inclination, or excavation depths (including utility trench excavations) should in no case exceed those specified in local, state, or federal safety regulations, e.g., OSHA Health and Safety Standards for Excavations, 29 CFR Part 1926, or successor regulations; such regulations are strictly enforced and, if they are not followed, the Owner, Contractor, and/or earthwork and utility subcontractors could be liable for substantial penalties.

If any excavation, including a utility trench, is extended to a depth of more than 20 feet, it will be necessary to have the side slopes designed and stamped by a professional engineer registered in the Commonwealth of Massachusetts, and retained by the Contractor.

As a safety measure, it is recommended that all vehicles and soil piles be kept a lateral distance away from the top edge of the excavation at least equal to the slope height. Also, the exposed slope face of open-cut excavations should be protected against the elements.

FINAL DESIGN AND CONSTRUCTION

We trust that the information presented herein addresses your current needs related to the geotechnical aspects of design and construction of the proposed biotechnical manufacturing/industrial development at this site.



Should the project advance and structure locations, finish floor elevations, and site grading become more defined or change (particularly of Building Nos. 2 and 3 and the Parking Structure), we recommend GZA be retained to update this supplemental geotechnical report as appropriate to reflect final structural and civil site design conditions, and to prepare technical specifications and review near-final plans as they relate to the geotechnical aspects of the project.

Due to the former structures on site, and given the amount of disturbance that the on-site soils may have been subjected to, we recommend that you retain GZA during foundation and site earthwork construction to observe subgrade conditions for consistency with our recommendations. It should also be noted that the Massachusetts <u>State Building Code</u> requires all foundation subgrades to be observed by a registered Professional Engineer or his/her representative. GZA's familiarity with the site and performing these services at nearby Devens sites will allow us to share lessons learned and help avoid unnecessary construction delays that may be related to earthwork and foundation construction.

We appreciate the opportunity to work with you on this design phase of the project. GZA looks forward to providing to our continued involvement. Please call Martin Rodick at 781-278-5790 or Michael Ostrowski at 781-278-5877 with any questions.

Very truly yours, GZA GEOENVIRONMENTAL, INC.

michael Orteour

Michael Ostrowski Assistant Project Manager

Martin Rodick, P.E. Associate Principal

Attachments: Tables

Terese Kwiatkowski, P.E.

Terese Kwiatkowski, P.E. Consultant Reviewer

Figures Appendix A – Limitations Appendix B – Relevant Previous Exploration Logs Appendix B.1 – 2008 Boring and Test Pit Logs Appendix B.2 – 2012 Boring Logs Appendix B.3 – 2019 Boring and Test Pit Logs Appendix C – 2020 Test Boring Logs Appendix D – Falling Head Borehole and Single-Ring Infiltrometer Permeability Test Results Appendix D.1 – 2008 Permeability Test Results Appendix D.2 – 2019 Permeability Test Results Appendix D.3 – 2020 Permeability Test Results Appendix E – Geotechnical Laboratory Test Results Appendix E.1 – 2008 Geotechnical Laboratory Results Appendix E.2 – 2012 Geotechnical Laboratory Results Appendix E.3 – 2019 Geotechnical Laboratory Results Appendix E.4 – 2020 Geotechnical Laboratory Results Appendix F – Topsoil Laboratory Test Results



Tables

TABLE 1 SUMMARY OF SUBSURFACE EXPLORATIONS EASTERN PORTION OF SITE

			[DEP	TH TO / ELEVA	TION OF FEAT	URE OR TOP O	F STRATUM (F	Г) ^{2,3}			
Nearest Proposed	Exploration	Exploration	Year	Ground	Bottom of	Refusal (Drilling,	Topsoil Forest	Fill ⁴	Natural Granular	Glacial Till	Weathered Bedrock	Bedrock	Ground- water	Notes
Structure ID	ID	Туре	Performed	Surface	Exploration	Sampler, or Excavation)	Mat/Subsoil		5 Deposits		Deurock		Reading ⁵	
	B-5	boring	2012	0/344	12.8/331.2	12.8 / 331.2	0/344	-/-	0.25 / 343.75		12.3 / 331.7	12.8 / 331.2	-/-	ss and auger refusal at bottom of boring
	B-9 B-10	boring boring	2012 2012	0/338	14 / 324 11.6 / 329.4	14 / 324 11.6 / 329.4	0/338 0/341	-/-	0.75 / 337.25	-/-	13 / 325 11 / 330	14 / 324 11.6 / 329.4		ss and auger refusal at bottom of boring, monitoring well installed ss and auger refusal at bottom of boring
	B-10 B-11	boring	2012	0/341	14.7 / 327.3	14.7 / 327.3	0/341	-/-	0.25 / 340.75	-/-	14/328	14.7 / 327.3	-/-	ss and auger refusal at bottom of boring
	B-12	boring	2012	0/342	13/329	13 / 329	0/342	-/-		8.25 / 333.75	12.5 / 329.5	13 / 329	-/-	ss and auger refusal at bottom of boring
	B-13	boring	2012	0/341	15.1/325.9	15.1 / 325.9	0/341	-/-	0.25 / 340.75	8 / 333	15 / 326	15.1 / 325.9		ss and auger refusal at bottom of boring
	B-14	boring	2012	0/337	10.5 / 326.5	10.5 / 326.5	0/337	-/-	0.25 / 336.75	8 / 329	9.75 / 327.25	10.5 / 326.5		ss and auger refusal at bottom of boring
	GZ-101 GZ-103	boring boring	2008 2008	0/335	13.8 / 321.2 14 / 327	13.8 / 321.2	0/335	-/-	3 / 332 0.5 / 340.5	7 / 328	-/- 13/328	-/- 14/327		ss and rollerbit refusal at bottom of boring ss refusal at 13.3 ft; auger refusal at 14 ft
1	GZ-106	boring	2008	0/342	15/327	15/327	0/342	-/-	0.4 / 341.6	7 / 335	13 / 329	15/327		ss refusal at 13.2 ft; auger refusal at 15 ft
Ċ	GZ-201	boring	2019	0/338.5	12 / 326.5	-/-	0/338.5	-/-	2.2 / 336.3	6.8 / 331.7	-/-	-/-	9 / 329.5	Gravel/Cobbles from 6.5 to 7.5 ft
N N	GZ-302	boring	2020	0/341	17.5 / 323.5	17.5 / 323.5	0/341	-/-	2.3 / 338.7	7.5 / 333.5	-/-	-/-		SS refusal at 15.1 ft, auger refusal at 17.5 ft
	GZ-303 TP-107	boring test pit	2020 2008	0 / 338 0 / 342	15 / 323 10.5 / 331.5	15 / 323 10.5 / 331.5	0 / 338 0 / 342	-/-	0.4 / 337.6	11.3 / 326.7 8.5 / 333.5	-/-	-/- 10.5/331.5	>15/<323	SS and auger refusal at 15 ft. See note #5. excavator refusal at bottom of test pit
Ľ,								,			,			
BUILDING	TP-108	test pit	2008	0/342	11/331	11/331	0 / 342	0.3 / 341.7	6 / 336	9 / 333	-/-	11/331	9 / 333	excavator refusal at bottom of test pit; encountered buried footing/pier from 3 to 6 ft
Ą	TP-109	test pit	2008	0/340	13.5 / 326.5	-/-	0/340	-/-	0.3 / 339.7	11.5 / 328.5	-/-	-/-	11.5 / 328.5	•
Ξ	TP-111	test pit	2008	0/342	9/333	-/-	0/342	1.5 / 340.5	5/337	-/-	-/-	-/-		encountered two buried footings from 3 to 5 ft
ີ	TP-112	test pit	2008	0/342	6 / 336	- / -	0/342	-/-	1.7 / 340.3	-/-	-/-	-/-	-/-	- fill thickness includes 0.5 ft topsoil, 0.7 ft buried topsoil & 1.3 ft buried subsoil; excavator
	TP-115	test pit	2008	0/334	11.5 / 322.5	11.5 / 322.5	-/-	0 / 334	4.5 / 329.5	11/323	-/-	11.5 / 322.5	11/323	refusal at bottom of test pit
	TP-116	test pit	2008	0/329	8.5 / 320.5	-/-	-/-	0 / 329	8/321	-/-	-/-	-/-	-/-	fill thickness includes 0.2 ft asphalt, 0.5 ft buried topsoil & 1 ft buried subsoil. C.I. pipe at
					-	-	-			-	-	-		8 ft
	TP-135	test pit	2008	0/341	16 / 325	16 / 325	0/341	-/-	2.5 / 338.5	9.5 / 331.5	-/-	16 / 325	9.5 / 331.5	excavator refusal at bottom of test pit excavator refusal; encountered buried concrete footing from 2 to 5 ft; Fill thickness
	TP-136	test pit	2008	0/326	7.5 / 318.5	7.5 / 318.5	0/326	0.5 / 325.5	3.5 / 322.5	6.5 / 319.5	-/-	7.5 / 318.5	6.5 / 319.5	includes 0.3 ft buried topsoil and 0.7 ft buried subsoil
	TP-209	test pit	2019	0/328	11/317	5 / 323	0/328	1/327	2/326	5 / 323	-/-	5 / 323	-/-	Buried fill layer from 1 to 2 ft depth. Excavator refusal on sloped bedrock
	TP-307	test pit	2020	0/324.5	11/313.5	11/313.5	0/324.5	-/-	2.3 / 322.2	4.2 / 320.3	-/-	11/313.5	-/-	Excavator refusal on apparent bedrock at bottom of test pit. K test at 7.1 ft
	TP-308	test pit	2020	0/330	10/320	-/-	0/330	-/-	2.2 / 327.8	5.7 / 324.3	-/-	- / -	-/-	-
	B-1 B-2	boring	2012 2012	0/343	16.75 / 326.25 14.5 / 328.5	16.75 / 326.25 14.5 / 328.5	0 / 343	-/-	0.25 / 342.75	8 / 335 6 / 337	-/- 13/330	- / - 14.5 / 328.5		ss and auger refusal at bottom of boring
	B-2 B-3	boring boring	2012	0/343	9.1/333.9	9.1/333.9	0/343	-/-	0.5 / 342.5	8/337	8.5 / 334.5	9.1/333.9		ss and auger refusal at bottom of boring ss and auger refusal at bottom of boring
	B-4	boring	2012	0/344	8.75 / 335.25	8.75 / 335.25	0/344	0.5 / 343.5	-/-	-/-	8.25 / 335.75	8.75 / 335.25	-/-	ss and auger refusal at bottom of boring, monitoring well installed
	B-6	boring	2012	0/343.5	10.5 / 333	10.5 / 333	0/343.5	-/-	0.25 / 343.25	-/-	9.5 / 334	10.5 / 333	-/-	ss and auger refusal at bottom of boring
	B-7	boring	2012	0/343	13.7 / 329.3	13.7 / 329.3	0/343	-/-	0.5 / 342.5	8 / 335	13 / 330	13.7 / 329.3		ss and auger refusal at bottom of boring
	B-8 GZ-104	boring boring	2012 2008	0/341.5 0/328	13 / 328.5 14 / 314	13 / 328.5 14 / 314	0/341.5 0/328	-/- 0.2/327.8	0.25 / 341.25 3 / 325	-/-	-/-	-/- 12/316		ss and auger refusal at bottom of boring Asphalt pavement at top 0.2 ft; casing ref. at 8 ft; roller bit ref. at 14 ft
	GZ-104 GZ-105	boring	2008	0/340	14.2 / 325.8	14.2 / 325.8	0/340	- / -	3/323	12/328	-/-	-/-		ss refusal at 14.2 ft at bottom of boring
	GZ-107	boring	2008	0/343	13/330	13 / 330	0/343	0.3 / 342.7	3 / 340	-/-	12.5 / 330.5	13 / 330	-/-	ss and rollerbit refusal at bottom of boring
	GZ-108	boring	2008	0/329	15 / 314	-/-	0/329	-/-	3 / 326	14 / 315	-/-	-/-	8/321	-
	GZ-109	boring	2008 2008	0/340	15 / 325 19 / 322	-/-	-/-	0/340	3/337	13.5 / 326.5 9 / 332	-/-	-/-	14 / 326	-
~	GZ-110 GZ-111	boring boring	2008	0/341	13.1/329.9	13 / 328 13.1 / 329.9	0/341	0.4 / 340.6	3 / 338 0.2 / 342.8	3/340	-/-	13/328	-/- 8/335	top of bedrock at 13 ft+/-; cored rock 14-19 ft; k test below gw level ss refusal at bottom of boring
2	GZ-301	boring	2000	0/341.5	15/326.5	15/326.5	-/-	0/341.5	4/337.5	-/-	7.5 / 334	-/-		Buried asphalt layer: 0.2 to 0.4 ft depth. SS refusal at 14.3 ft, auger refusal at 15 ft
Ó	TP-101	test pit	2008	0/343	8.5 / 334.5	8.5 / 334.5	0/343	0.5 / 342.5	2/341	7 / 336	-/-	8.5 / 334.5	7 / 336	excavator refusal at bottom of test pit
Ž	TP-102	test pit	2008	0/342	12/330	12/330	0/342	0.5 / 341.5	6/336	6.5 / 335.5	11.5 / 330.5	12/330	6.5 / 335.5	excavator refusal at bottom of test pit
U	TP-103 TP-104	test pit test pit	2008 2008	0 / 342 0 / 342	13 / 329 13.5 / 328.5	-/- -/-	0 / 342	0.5 / 341.5	-/-	5/337 11/331	-/-	-/-		observed concrete wall from 2.5 to 5.5 ft encountered buried footing/pier from 1 to 3 ft and C.I. pipe at 5.5 ft
7	TP-104 TP-105	test pit	2008	0/342	11.5 / 328.5	-/-	0/342	0.5 / 341.5	-/-	9/333	-/-	-/-	0 / 222	encountered ouried rooting/pier from 1 to 3 it and C.i. pipe at 5.5 it
Inlu	TP-106	test pit	2008	0/343	11.5 / 331.5	-/-	-/-	-/-	, 0.5 / 342.5	8 / 335	-/-	- / -	8 / 335	-
	TP-110	test pit	2008	0/342	5 / 337	-/-	0 / 342	-/-	2 / 340	-/-	-/-	- / -	-/-	-
5	TP-113	test pit	2008	0/342	6 / 336	-/-	0/342	-/-	0.3 / 341.7	-/-	-/-	- / -	-/-	-
B	TP-114	test pit	2008	0/342	5.5 / 336.5	-/-	0/342	0.5 / 341.5	5.5 / 336.5	-/-	-/-	-/-	-/-	encountered buried footing from 3 to 5.5 ft
	TP-114	test pit	2008	0/342	8/328	-/-	0/342	0.5 / 335.5	5.5 / 330.5	-/-	-/-	-/-		encountered buried concrete wall from 2.5 to 5.5 ft
	TP-118	test pit	2008	0/330	12.5 / 317.5	12.5 / 317.5	-/-	0 / 330	1.8 / 328.2	9.5 / 320.5	-/-	12.5 / 317.5		Fill thickness includes 2-inch asphalt pavement, 0.5 ft topsoil and 0.9 ft subsoil. Excavator
	TP-119	test pit	2008	0/340	12.5 / 327.5	12.5 / 327.5	-/-	0/340	2 / 338	10/330	-/-	12.5 / 327.5	-/-	excavator refusal at bottom of test pit
							•							
	TP-137	test pit	2008	0/336	15 / 321	15 / 321	0 / 336	-/-	2.5 / 333.5	12.5 / 323.5	-/-	15 / 321	12.5 / 323.5	excavator refusal at bottom of test pit
	TP-201	test pit	2019	0 / 343.5	5 / 338.5	-/-	-/-	0 / 343.5	-/-	-/-	-/-	-/-	-/-	D.I. pipe from 4 to 5 ft±
	TP-201A	test pit	2019	0/343.5	10/333.5	-/-	-/-	0/343.5	-/-	6.5 / 337	-/-	-/-	10/333.5	Large pieces of wood and a concrete structure from 1 to 2 ft, k test at 8.5 ft
		-								-				
	TP-202 TP-301	test pit	2019 2020	0/337.5	12 / 325.5 10 / 328	-/-	-/- 0/338	0/337.5	2.5 / 335 4.3 / 333.7	8.5 / 329	-/-	-/-	-/-	k test at 6.5 ft
	TP-301 TP-302	test pit test pit	2020	0/338	10/328	-/-	-/-	0/332	4.3/333./ 4/328	- / - 9.5 / 322.5	-/-	-/-	-/-	-
	TP-309	test pit	2020	0 / 340.5	11/329.5	11/329.5	0/340.5	-/-	1/339.5	9.6 / 330.9		11/329.5		Excavator refusal on apparent bedrock at bottom of test pit
											-			bility test performed within exploration, C.I. = cast iron, D.I. = ductile iron.

1) Definitions/Acronyms/shorthand: "-" = Not observed or noted, ft = depth measurement in feet, ref. = refusal, ss = splitspoon sampler, gw = groundwater, k test = in-situ hydraulic permeability test performed within exploration, C.I. = cast iron, D.I. = ductile iron. 2) Refer to the exploration logs and text of the report for more detail, including how the ground surface elevation of an exploration was estimated. Depths are relative to existing ground surface level at the time the exploration was performed. The ground surface elevation estimate should only be considered accurate to the degree implied by the method used. Elevations are in feet and are referenced to the National Geodetic Vertical Datum of 1929 (NGVD29). 3) The subsurface information from the relevant previous explorations from 2008, and 2012 (including ground surface elevation estimations) are included in the subsurface condition summaries below, are not altered from their original form, and information regarding

subsequent changes in site conditions/grading are not known and were generally not available for this study. 4) Included within the fill layer: a 2-inch-thick surficial layer of bituminous asphalt pavement in test pit TP-118, a 2-inch-thick surficial layer of bituminous asphalt pavement in boring GZ-104, a 0.2-foot-thick buried asphalt layer at GZ-301, and buried topsoil/subsoil layer(s)

observed at three test pits (TP-115, TP-116, and TP-136).

5) Groundwater observation wells were installed in 2020 borings GZ-301 and GZ-303. Groundwater level readings at the year 2020 observation wells were obtained over the course of an approximately 1.5-month-long stabilization period. The observation well at GZ-301 consistently indicated the presence of groundwater as indicated above. Observation well GZ-303 indicated water at 11.4 feet below existing ground surface after 1 day of stabilization but appeared dry for three consecutive readings thereafter and the initial water reading therefore does not appear to have been groundwater. It should be noted that fluctuations in groundwater levels may occur due to variations in season, rainfall, site features and other factors different from those existing at the time of the explorations and measurements. Also, we note that the rotary action of the drilling tools within the natural sand/silt and glacial till soils may have obscured observations of groundwater within some of the boreholes during drilling.

GZA File No. 01.0174440.01 Proposed Development - 45 Jackson Road October 2020

TABLE 2 SUMMARY OF SUBSURFACE EXPLORATIONS WESTERN PORTION OF SITE

Proposed structure ID	Exploration ID GZ-100 GZ-113	Exploration Type	Year Performed	Ground		Refusal			URE OR TOP O	· · ·	·			
	GZ-113		renomed	Surface	Bottom of Exploration	(Drilling, Sampler, or Excavation)	Topsoil /Subsoil	Fill⁴	Natural Granular Deposits	Glacial Till	Weathered Bedrock	Bedrock	Ground- water Reading ⁴	Notes
		boring	2008	0/324	14.8 / 309.2	14.8 / 309.2	0/324	-/-	0.5 / 323.5	9.5 / 314.5	14.5 / 309.5	14.8 / 309.2	5 / 319	ss and auger refusal at bottom of boring
	C7 112A	boring	2008	0 / 306	13.1 / 292.9	13.1 / 292.9	0 / 306	-/-	0.5 / 305.5	5.5 / 300.5	- / -	- / -	- / -	ss and roller bit refusal at bottom of boring
	GZ-113A	boring	2008	0 / 306	3 / 303	-/-	-/-	-/-	-/-	-/-	- / -	- / -	- / -	No soil samples obtained; k test from 2 to 3 ft
	GZ-114	boring	2008	0/310	11.5 / 298.5	11.5 / 298.5	-/-	0/310	1/309	3 / 307	9/301	11.5 / 298.5	4 / 306	auger refusal at bottom of boring
	GZ-116	boring	2008	0 / 307	11.5 / 295.5	11.5 / 295.5	0 / 307	-/-	0.5 / 306.5	3 / 304	9 / 298	11.5 / 295.5	3 / 304	ss refusal at 9.1 ft, auger refusal at 11.5 ft
	GZ-117	boring	2008	0/313	21/292	14.6 / 298.4	0/313	-/-	2/311	6 / 307	14.5 / 298.5	16 / 297	-/-	top of rock at 14.5 ft; cored rock 16 to 21 ft
	GZ-119	boring	2008	0 / 309	10.3 / 298.7	10.3 / 298.7	0 / 309	-/-	3 / 306	-/-	7.7 / 301.3	10.3 / 298.7	-/-	k test 6 to 8 ft; bit grinding from 7.7 ft; ss and rollerbit refusal at 10.3 ft
e e e e e e e e e e e e e e e e e e e	GZ-119A	boring	2008	0 / 309	3 / 306	-/-	- / -	-/-	0 / 309	-/-	-/-	- / -	- / -	boring moved 8 ft south; k test attempted at 2 to 3 ft
~ F	GZ-202	boring	2019	0/322	12 / 310	-/-	0/322	-/-	1/321	5/317	- / -	- / -	- / -	
m	GZ-203	boring	2019	0/317	12 / 305	-/-	0/317	-/-	2 / 315	6.5 / 310.5	-/-	- / -	-/-	-
m T	GZ-204	boring	2019	0/315	12 / 303	-/-	0/315	-/-	2/313	6 / 309	-/-	- / -	-/-	-
	GZ-205	boring	2019	0/313	14 / 299	14 / 299	0/313	-/-	2/311	9 / 304	11.2 / 301.8	14 / 299	- / -	ss refusal at 11.2 ft, auger refusal at bottom of boring
	GZ-304	boring	2020	0/324	16 / 308	10.8 / 313.2	0/324	0.5 / 323.5	2 / 322	8.5 / 315.5	- / -	10.8 / 313.2	- / -	Asphalt/fill from 0.5 to 2 ft. SS refusal at 10.8 ft, bedrock cored 11 to 16 ft
<u>o</u> [GZ-305	boring	2020	0/311	16.5 / 294.5	16.5 / 294.5	0/311	-/-	0.5 / 310.5	4.3 / 306.7	8 / 303	- / -	-/-	Auger refusal at 16.5 ft
Z	GZ-306	boring	2020	0/312.5	14.5 / 298	14.5 / 298	0/312.5	-/-	2 / 310.5	7.5 / 305	12.5 / 300	- / -	-/-	SS refusal at 14.3 ft, auger refusal at 14.5 ft at original and offset boring
ש	TP-120	test pit	2008	0/314	10/304	10/304	0/314	-/-	2.5 / 311.5	7 / 307	-/-	10 / 304	7 / 307	excavator refusal at bottom of test pit
ž	TP-121	test pit	2008	0/311	9 / 302	9 / 302	0/311	-/-	2 / 309	6 / 305	- / -	9 / 302	- / -	excavator refusal at bottom of test pit
Z	TP-122	test pit	2008	0 / 307	8 / 299	8 / 299	0 / 307	-/-	1.5 / 305.5	6.5 / 300.5	-/-	8 / 299	6.5 / 300.5	excavator refusal at bottom of test pit
	TP-125	test pit	2008	0/311	10/301	10/301	0/311	-/-	2.5 / 308.5	5.5 / 305.5	-/-	10/301	9 / 302	excavator refusal at bottom of test pit
	TP-128	test pit	2008	0 / 308	10 / 298	10/298	0 / 308	-/-	2.5 / 305.5	7/301	- / -	10 / 298	7/301	excavator refusal at bottom of test pit
	TP-129	test pit	2008	0/315	11/304	11/304	0/315	-/-	2/313	7.5 / 307.5	- / -	11/304	7.5 / 307.5	excavator refusal at bottom of test pit
Ξ	TP-130	test pit	2008	0/314	13.5 / 300.5	13.5 / 300.5	0/314	-/-	2.5 / 311.5	7 / 307	-/-	13.5 / 300.5	6 / 308	excavator refusal at bottom of test pit
1	TP-131	test pit	2008	0/310	8.5 / 301.5	-/-	0/310	-/-	2 / 308	4.5 / 305.5	-/-	- / -	4.5 / 305.5	-
	TP-132	test pit	2008	0/310	7 / 303	-/-	0/310	-/-	2.5 / 307.5	6 / 304	-/-	- / -	6 / 304	rapid inflow of groundwater at 6 ft
7	TP-133	test pit	2008	0 / 306	8.5 / 297.5	8.5 / 297.5	0 / 306	-/-	3 / 303	6 / 300	- / -	8.5 / 297.5	6 / 300	excavator refusal at bottom of test pit
	TP-134	test pit	2008	0 / 306	9 / 297	-/-	0 / 306	-/-	2.5 / 303.5	5.5 / 300.5	-/-	- / -	-/-	-
7	TP-203	test pit	2019	0/324	10/314	-/-	0/324	-/-	2 / 322	9.8 / 314.2	- / -	- / -	9/315	-
	TP-204	test pit	2019	0/317.5	10/307.5	-/-	0/317.5	-/-	2 / 315.5	9 / 308.5	-/-	- / -	8.7 / 308.8	-
	TP-205	test pit	2019	0/307	9 / 298	9 / 298	0/307	-/-	2 / 305	6.5 / 300.5	8.5 / 298.5	9 / 298	-/-	excavator refusal at bottom of test pit
	TP-208	test pit	2019	0/319	10/309	10/309	0/319	-/-	2/317	6/313	9.5 / 309.5	10 / 309	- / -	excavator refusal at bottom of test pit
7	TP-303	test pit	2020	0/315.5	8.8 / 306.7	8.8 / 306.7	0/315.5	-/-	1/314.5	5.8 / 309.7	- / -	8.8 / 306.7	-/-	Excavator refusal on apparent bedrock at bottom of test pit
														Fill includes Buried Topsoil from 5.5 to 6 ft depth. Excavator refusal on apparer
	TP-304	test pit	2020	0/322	11/311	11/311	- / -	0/322	6/316	9/313	10.5 / 311.5	11/311	- / -	bedrock at bottom of test pit
	GZ-112	boring	2008	0 / 306	7.5 / 298.5	7.5 / 298.5	0 / 306	-/-	3 / 303	4.5 / 301.5	- / -	- / -	4 / 302	ss and auger refusal at bottom of boring
	GZ-115	boring	2008	0 / 302	12 / 290	12 / 290	0 / 302	-/-	2 / 300	4.5 / 297.5	8 / 294	12 / 290	-/-	ss refusal at 8.2 ft; roller bit refusal at 12 ft
7	GZ-118	boring	2008	0 / 303	15 / 288	15 / 288	0 / 303	-/-	-/-	3 / 300	10 / 293	15 / 288	4 / 299	ss refusal at 13 ft; auger refusal at 15 ft
Ш														
שש	GZ-206	boring	2019	0 / 298	7 / 291	7 / 291	0 / 298	- / -	-/-	2 / 296	6.7 / 291.3	7 / 291	- / -	auger refusal at bottom of boring, bedrock outcrop observed ~10 ft to the eas
NG URE	GZ-307	boring	2020	0 / 299	19 / 280	19 / 280	0 / 299	-/-	0.5 / 298.5	4 / 295	-/-	-/-	18.7 / 280.3	SS refusal at 19 ft
ן קו	TP-123	test pit	2008	0 / 303	7.5 / 295.5	7.5 / 295.5	0 / 303	-/-	2/301	5 / 298	- / -	7.5 / 295.5	5 / 298	excavator refusal at bottom of test pit
$\mathbb{S} \times \mathbb{I}$	TP-124	test pit	2008	0 / 299	11.5 / 287.5	-/-	0 / 299	-/-	2 / 297	5.5 / 293.5	- / -	-/-	- / -	-
ARKING RUCTUR	TP-126	test pit	2008	0 / 300	8.5 / 291.5	8.5 / 291.5	0 / 300	-/-	1 / 299	5 / 295	- / -	8.5 / 291.5	- / -	excavator refusal at bottom of test pit
PA STR	TP-127	test pit	2008	0/301	10.5 / 290.5	10.5 / 290.5	0/301	-/-	2 / 299	5.5 / 295.5	- / -	10.5 / 290.5	- / -	excavator refusal at bottom of test pit
_ <u></u> [TP-206	test pit	2019	0 / 292	5.5 / 286.5	5.5 / 286.5	0 / 292	- / -	2 / 290	4 / 288	5 / 287	5.5 / 286.5	- / -	excavator refusal at bottom of test pit
	TP-207	test pit	2019	0 / 295	6 / 289	6 / 289	0 / 295	- / -	2 / 293	4 / 291	5.5 / 289.5	6 / 289	- / -	excavator refusal at bottom of test pit
	TP-305	test pit	2020	0 / 297.5	8.1 / 289.4	8.1/289.4	0/297.5	-/-	0.8 / 296.7	5.3 / 292.2	7.8 / 289.7	8.1 / 289.4	- / -	Excavator refusal on apparent bedrock at bottom of test pit
	TP-306	test pit	2020	0/305.5	8 / 297.5	8 / 297.5	0 / 305.5	-/-	2 / 303.5	6.5 / 299	7.7 / 297.8	8/297.5	- / -	Excavator refusal on apparent bedrock at bottom of test pit. K test at 7.3 ft

1) Definitions/Acronyms/shorthand: "-" = Not observed or noted, ft = depth measurement in feet, ref. = refusal, ss = splitspoon sampler, k test = in-situ hydraulic permeability test performed within exploration. 2) Refer to the exploration logs and text of the report for more detail, including how the ground surface elevation of an exploration was estimated. Depths are relative to existing ground surface level at the time the exploration was performed. The ground surface elevation estimate should only be considered accurate to the degree implied by the method used. Elevations are in feet and are referenced to the National Geodetic Vertical Datum of 1929 (NGVD29).

3) The subsurface information from the relevant previous explorations from 2008, and 2012 (including ground surface elevation estimations) are included in the subsurface condition summaries below, are not altered from their original form, and information regarding subsequent changes in site conditions/grading are not known and were generally not available for this study.

4) Included within the fill layer: a 6-inch-thick buried topsoil layer observed at test pit TP-304.

5) It should be noted that fluctuations in groundwater levels may occur due to variations in season, rainfall, site features and other factors different from those existing at the time of the explorations and measurements. Also, we note that the rotary action of the drilling tools within the natural silty granular and glacial till soils may have obscured observations of groundwater within some of the boreholes during drilling.



TABLE 3

RECOMMENDED USE AND GRADATION CRITERIA FOR FILL MATERIALS

Geotechnical Evaluation Proposed Development 45 Jackson Road Devens, Massachusetts

USE OF STRUCTURAL FILL MATERIAL

- <u>Granular Fill:</u> Below building slab and pavement base course.
- <u>Sand-Gravel:</u> Building slab and pavement base course and as backfill within three feet laterally of retaining walls.
- <u>Crushed Stone:</u> For use in bottom of excavations to aid in construction dewatering, maintaining subgrade stability, and backfill behind walls in confined areas Crushed Stone shall be wrapped in non-woven geotextile fabric when placed in thicknesses greater than 4 inches.

GRADATION REQUIREMENTS

Sieve Size	Percent Finer by Weight				
	s, sod, rubbish and other deleterious or organic to the following gradation requirements:				
2/3 of the loose lift thickness	100				
No. 10	30 - 95				
No. 40	10 - 70				
No. 200	0 - 15				
	rel and shall be free from ice and snow, roots, organic matter. Sand-Gravel shall conform to ::				
3 inch	100				
1/2 inch	50 - 85				
No. 4	40 - 75				
No. 40	10 - 35				
No. 200	0 - 8				
	or durable crushed gravel stone and shall be d other deleterious material. Crushed Stone ion requirements:				
1 inch	100				
3/4 inch	90 - 100				
1/2 inch	10 - 50				
3/8 inch	0 - 20				
No. 4	0 - 5				

J:\170,000-179,999\174440\174440-01.MJO\WORK\REPORT\[TABLE 3 - 174440-01_Gradation Requirements.xlsx]TABLE 3



TABLE 4

RECOMMENDED COMPACTION METHODS

Geotechnical Evaluation Proposed Development 45 Jackson Road Devens, Massachusetts

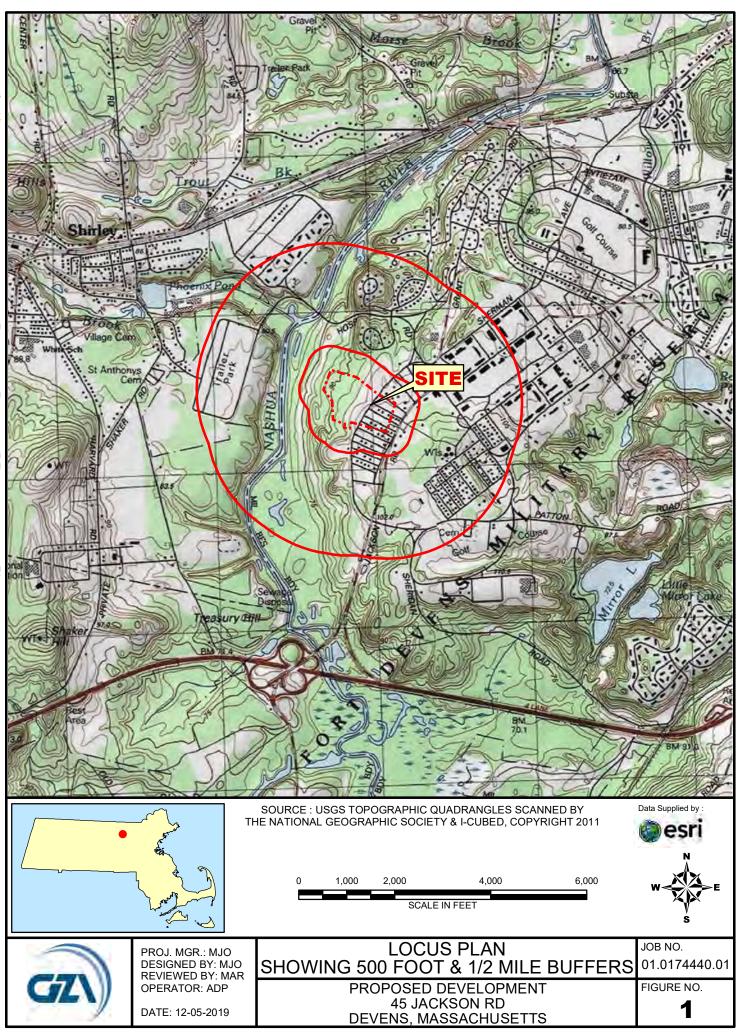
		Maximum I Thickr		Minimum N Pass	
Compaction Method	Maximum Stone Size*	Below Structures and Pavement	Less Critical Area	Below Structures and Pavement	Less Critical Area
GRANULAR F	ILL, SAND-GRA	VEL, CRUSHED S	STONE**		
Hand-operated vibratory plate or light roller in confined areas	4"	6"	8"	4	4
Hand-operated vibratory drum rollers weighing at least 1,000# in confined areas	6"	10"	12"	4	4
Light vibratory drum roller					
minimum weight minimum dynamic at drum: 3,000# force: 10,000#	8"	12"	18"	4	4
Medium vibratory drum roller					
minimum weight minimum dynamic at drum: 10,000# force: 20,000#	8"	18"	24"	6	6

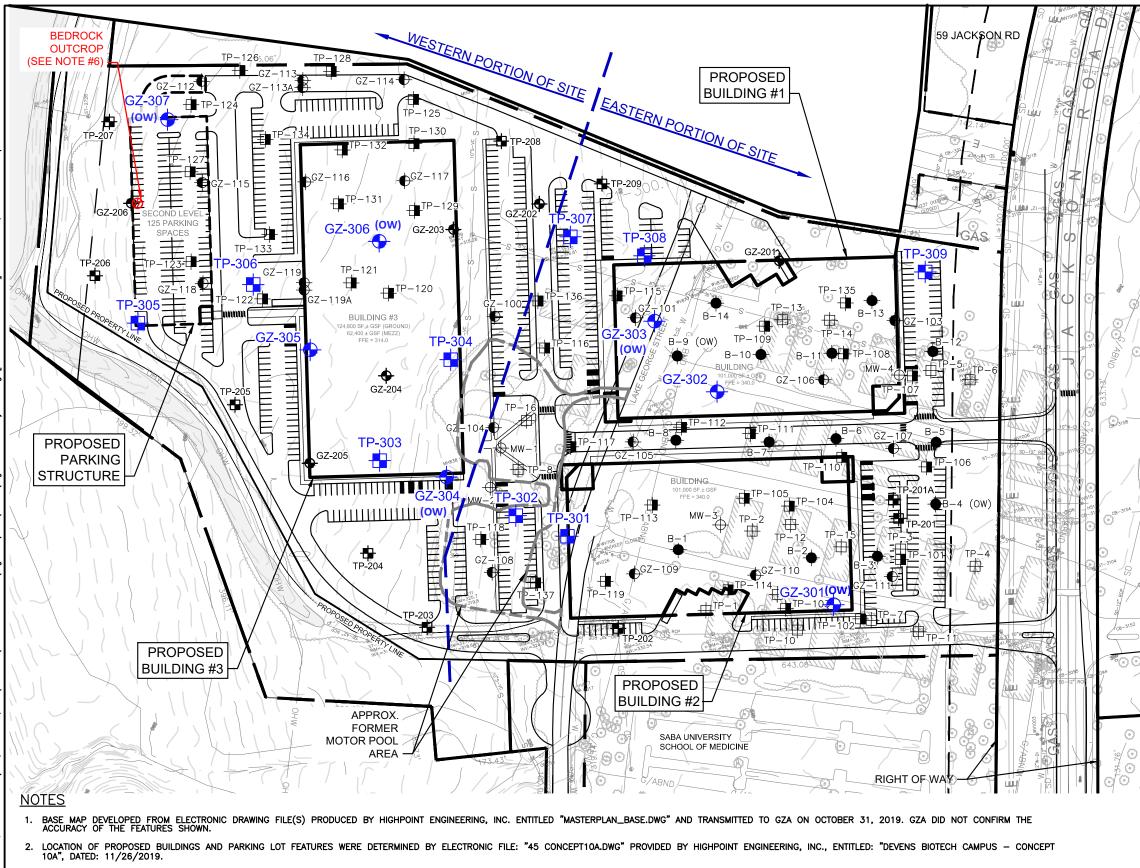
* And no more than two-thirds (2/3) loose lift thickness.

** Crushed Stone greater than 4 inches in thickness should be enveloped on all sides with non-woven filter fabric (Mirafi 140N or equivalent).



Figures





- 3. LOCATION OF FORMER BARRACKS BUILDINGS WERE DETERMINED BY ELECTRONIC FILES PROVIDED BY S.J. MULLANEY ENGINEERING, INC. OF LEOMINSTER, MA, ENTITLED "CONCEPTUAL SITE PLAN OF LAND IN DEVENS, MASSACHUSETTS LOCATED AT LOT 16 – JACKSON ROAD, WITH A REVISION DATE OF JANUARY 8, 2008, AND A PLAN ENTITLED "SITE PLAN OF LAND IN DEVENS, MASSACHUSETTS LOCATED AT LOT 16A – JACKSON ROAD, WITH A REVISION DATE OF JANUARY 8, 2008, AND A PLAN ENTITLED "SITE PLAN OF LAND IN DEVENS, MASSACHUSETTS LOCATED AT LOT 16A – JACKSON ROAD, WITH A REVISION DATE OF JANUARY 8, 2008, AND A PLAN ENTITLED "SITE PLAN OF LAND IN DEVENS, MASSACHUSETTS LOCATED AT LOT 16A – JACKSON ROAD", PLAN NO. 80–D–5, DATED MARCH 6, 2008.
- 4. LOCATIONS OF THE 2020 EXPLORATIONS WERE APPROXIMATELY DETERMINED USING A TRIMBLE GEO7X GPS/GNSS DEVICE, HOWEVER TEST BORINGS GZ-302, GZ-305, AND GZ-306 WERE LOCATED USING TAPED MEASUREMENTS THE GPS-LOCATED STAKES. LOCATIONS OF THE 2019 EXPLORATIONS WERE APPROXIMATELY DETERMINED USING A TRIMBLE R1 HANDHELD WITH IPAD GPS/GNSS DEVICE. PREVIOUS EXPLORATIONS WERE LOCATED BASED ON LINE OF SIGHT AND FROM EXISTING TOPOGRAPHIC SITE FEATURES. THE EXPLORATION LOCATIONS SHOWN SHOULD BE CONSIDERED ACCURATE ONLY TO THE DEGREE IMPLIED BY THE METHOD USED.
- 5. PER MASSDEVELOPMENT THE ELEVATION DATUM IS REFERENCED TO NATIONAL GEODETIC VERTICAL DATUM OF 1929 (NGVD29).
- 6. BEDROCK OUTCROP LOCATION APPROXIMATED BASED ON TAPED MEASUREMENT FROM BORING GZ-206 AND IS NOT DEPICTED TO SCALE.

LEGEND

TP-301

0

GZ-201

TP-201

TP - 101

⊕

TP -

 \oplus

MW-1

GZ-10

P

B

INDICATES BORINGS PERFORMED BY DRILEX ENVIRONMENTAL OF AUBURN, MASSACHUSETTS FROM SEPTEMBER 10 TO 12, GZ-301 (OW)

"(OW)" INDICATES MONITORING WELL INSTALLED IN BOREHOLE

INDICATES TEST PITS PERFORMED BY DRILEX ENVIRONMENTAL OF AUBURN, MASSACHUSETTS ON SEPTEMBER 17, 18, AND 21, 2020 AND OBSERVED AND LOGGED BY GZA PERSONNEL.

INDICATES BORINGS PERFORMED BY DRILEX ENVIRONMENTAL OF AUBURN, MASSACHUSETTS ON NOVEMBER 5, 2019 AND OBSERVED AND LOGGED BY GZA PERSONNEL.

INDICATES TEST PITS PERFORMED BY ANCHOR EXCAVATING CORPORATION OF HANOVER, MASSACHUSETTS ON NOVEMBER 14 AND 15, 2019 AND OBSERVED AND LOGGED BY GZA PERSONNEL.

- INDICATES BORINGS PERFORMED BY NEW HAMPSHIRE BORING, 10. OF DERRY, NEW HAMPSHIRE FROM JANUARY 12 -4(OW) THROUGH 16, 2012 AND OBSERVED AND LOGGED BY GZA PERSONNEL.

"(OW)" INDICATES MONITORING WELL INSTALLED IN BOREHOLE.

INDICATES TEST PITS PERFORMED BY CROWLEY COMPANY FROM JANUARY 7 THROUGH 10, 2008 AND OBSERVED AND LOGGED BY GZA PERSONNEL.

INDICATES BORINGS PERFORMED BY NEW HAMPSHIRE BORING OF BROCKTON, MASSACHUSETTS FROM JANUARY 15 THROUGH 23, 2008 AND OBSERVED AND LOGGED BY GZA PERSONNEL.

INDICATES TEST PITS PERFORMED BY CROWLEY COMPANY ON JANUARY 15, 2008 AND OBSERVED AND LOGGED BY GZA PERSONNEL.

INDICATES BORING/MONITORING WELL INSTALLED BY GEOSEARCH, INC, OF FITCHBURG, MASSACHUSETTS ON JANUARY 16 AND 17, 2008 AND OBSERVED AND LOGGED BY GZA PERSONNEL.

INDICATES APPROXIMATE FORMER BARRACKS BUILDING LOCATION

SCALE IN FEET

150

75

INLESS SPECIFICALLY STATED BY WRITTEN AGREEMENT, THIS DRAWING IS THE SOLE PROPERTY OF GZ EOENVIRONMENTAL, INC. (GZA). THE INFORMATION SHOWN ON THE DRAWING IS SOLELY FOR USE BY GZA' LIDITI OR THE CLIENT'S DESIGNATED REPRESENTATIVE FOR THE SPECIFIC PROJECT LOCATION IDENTIFIED O HE DRAWING. THE DRAWING SHALL NOT BE TRANSFERRED, REUSED, COPIED, OR ALTERED IN ANY MANNER FO SE AT ANY OTHER LOCATION OR FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITEN CONSENT OF GZA. AN RANSFER, REUSE, OR MODIFICATION TO THE DRAWING BY THE CLIENT OR OTHERS, WITHOUT THE PRIOR WRITE XPRESS CONSENT OF GZA, WILL BE AT THE USER'S SOLE RISK AND WITHOUT ANY RISK OR LIABILITY TO GZ/ SUPPLEMENTAL GEOTECHNICAL EVALUATION

300

PROPOSED DEVELOPMENT 45 JACKSON ROAD DEVENS, MASSACHUSETTS

EXPLORATION LOCATION PLAN

PREPARED BY:		PREPARED FOR:	
GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com		KING DEVENS LLC	
PROJ MGR: MJO	REVIEWED BY: MAR	CHECKED BY: TMK	FIGURE NO.
DESIGNED BY: MJO	DRAWN BY: MJO / AJP	SCALE: AS SHOWN	0
DATE:	PROJECT NO.	REVISION NO.	
OCTOBER 2020	01.0174440.01		



Appendix A – Limitations



GEOTECHNICAL LIMITATIONS 01.0174440.01 Page | 1 October 2020

USE OF REPORT

1. GZA GeoEnvironmental, Inc. (GZA) prepared this report on behalf of, and for the exclusive use of our Client for the stated purpose(s) and location(s) identified in the Proposal for Services and/or Report. Use of this report, in whole or in part, at other locations, or for other purposes, may lead to inappropriate conclusions; and we do not accept any responsibility for the consequences of such use(s). Further, reliance by any party not expressly identified in the contract documents, for any use, without our prior written permission, shall be at that party's sole risk, and without any liability to GZA.

STANDARD OF CARE

- 2. GZA's findings and conclusions are based on the work conducted as part of the Scope of Services set forth in Proposal for Services and/or Report, and reflect our professional judgment. These findings and conclusions must be considered not as scientific or engineering certainties, but rather as our professional opinions concerning the limited data gathered during the course of our work. If conditions other than those described in this report are found at the subject location(s), or the design has been altered in any way, GZA shall be so notified and afforded the opportunity to revise the report, as appropriate, to reflect the unanticipated changed conditions.
- 3. GZA's services were performed using the degree of skill and care ordinarily exercised by qualified professionals performing the same type of services, at the same time, under similar conditions, at the same or a similar property. No warranty, expressed or implied, is made.
- 4. In conducting our work, GZA relied upon certain information made available by public agencies, Client and/or others. GZA did not attempt to independently verify the accuracy or completeness of that information. Inconsistencies in this information which we have noted, if any, are discussed in the Report.

SUBSURFACE CONDITIONS

- 5. The generalized soil profile(s) provided in our Report are based on widely-spaced subsurface explorations and are intended only to convey trends in subsurface conditions. The boundaries between strata are approximate and idealized, and were based on our assessment of subsurface conditions. The composition of strata, and the transitions between strata, may be more variable and more complex than indicated. For more specific information on soil conditions at a specific location refer to the exploration logs. The nature and extent of variations between these explorations may not become evident until further exploration or construction. If variations or other latent conditions then become evident, it will be necessary to reevaluate the conclusions and recommendations of this report.
- 6. In preparing this report, GZA relied on certain information provided by the Client, state and local officials, and other parties referenced therein which were made available to GZA at the time of our evaluation. GZA did not attempt to independently verify the accuracy or completeness of all information reviewed or received during the course of this evaluation.
- 7. Water level readings have been made in test holes (as described in this Report) and monitoring wells at the specified times and under the stated conditions. These data have been reviewed and interpretations have been made in this Report. Fluctuations in the level of the groundwater however occur due to temporal or spatial variations in areal recharge rates, soil heterogeneities, the presence of subsurface utilities, and/or natural or artificially induced perturbations. The water table encountered in the course of the work may differ from that indicated in the Report.
- 8. GZA's services did not include an assessment of the presence of oil or hazardous materials at the property. Consequently, we did not consider the potential impacts (if any) that contaminants in soil or groundwater may have on construction activities, or the use of structures on the property.



 Recommendations for foundation drainage, waterproofing, and moisture control address the conventional geotechnical engineering aspects of seepage control. These recommendations may not preclude an environment that allows the infestation of mold or other biological pollutants.

COMPLIANCE WITH CODES AND REGULATIONS

10. We used reasonable care in identifying and interpreting applicable codes and regulations. These codes and regulations are subject to various, and possibly contradictory, interpretations. Compliance with codes and regulations by other parties is beyond our control.

COST ESTIMATES

11. Unless otherwise stated, our cost estimates are only for comparative and general planning purposes. These estimates may involve approximate quantity evaluations. Note that these quantity estimates are not intended to be sufficiently accurate to develop construction bids, or to predict the actual cost of work addressed in this Report. Further, since we have no control over either when the work will take place or the labor and material costs required to plan and execute the anticipated work, our cost estimates were made by relying on our experience, the experience of others, and other sources of readily available information. Actual costs may vary over time and could be significantly more, or less, than stated in the Report.

SCREENING AND ANALYTICAL TESTING

12. Our interpretation of field screening and laboratory data is presented in the Report. Unless otherwise noted, we relied upon the laboratory's QA/QC program to validate these data.

ADDITIONAL SERVICES

13. GZA recommends that we be retained to provide services during any future: site observations, design, implementation activities, construction and/or property development/redevelopment. This will allow us the opportunity to: i) observe conditions and compliance with our design concepts and opinions; ii) allow for changes in the event that conditions are other than anticipated; iii) provide modifications to our design; and iv) assess the consequences of changes in technologies and/or regulations.



Appendix B – Relevant Previous Exploration Logs

BORING LOG LEGEND

GS Elev. = Ground Surface Elevation NAVD = North American Vertical Datum NR = No Recovery S.S. = Split Spoon Stab. = Stabilization Time for groundwater reading WOH = Weight of Hammer WOR = Weight of Rods

SOIL DESCRIPTIONS

Soil samples are described on the exploration logs by the "Modified Burmister Soil Identification System". The following provides a brief description of the Modified Burmister System.

1. Major and minor components of the soil matrix are identified as gravel, sand or fines. The relative amounts of these constituents are proportioned as:

Component	Proportional Term	Percent by Weight of Total
Major		Greater than percentage of other components
Minor	And	35-50
	Some	20-35
	Little	10-20
	Trace	1-10

2. The nature of "fines" is defined by using the following guidelines:

Degree of Plasticity	Identity	Plasticity Index
Non-plastic	SILT	0
Slight	Clayey SILT	1-5
Low	SILT & CLAY	5-10
Medium	CLAY & SILT	10-20
High	Silty CLAY	20-40
Very High	CLAY	40 and Greater

3. For boring logs, relative density or consistency is identified based on standard penetration resistance, using the following table.

Non-Plastic Soils		Plastic Soils	
Blows/ft "N"	Relative Density	Blows/ft "N"	Consistency
0-4	Very Loose	<2	Very Soft
4-10	Loose	2-4	Soft
10-30	Medium Dense	4-8	Medium Stiff
30-50	Dense	8-15	Stiff
>50	Very Dense	15-30	Very Stiff
		>30	Hard

BEDROCK DESCRIPTIONS

Rock samples described on the exploration logs are generally based on the International Society of Rock Mechanics (ISRM) System, as generally described on the following page. Each rock sample was generally described using the following guideline, in the order presented:

- 1. Field hardness: very hard, hard, moderately hard, medium, soft, very soft
- 2. Weathering: fresh, very slight, slight, moderate, moderately severe, severe, very severe, complete
- 3. Rock continuity (fracturing): extremely, moderately, slightly, sound
- 4. Texture: amorphous, fine, medium, coarse, very coarse
- 5. Color
- 6. Rock type
- 7. Fractures, Bedding, and Foliation, Spacing and Attitude
- 8. Rock Quality Designation (RQD)



Appendix B.1 – 2008 Boring and Test Pit Logs

	\blacksquare Eng	gineers and	mental, Inc d Scientists		DEV	ENS, M	ASSACHUSE	:115		Page: _ File No.		<u>1</u> 07
tractor			NHB			uger/				Check:		
							Sampler		GROU			
ged bv:		A. M	ichonski		Type:		Split Spoon	Date				Sta
e Start/F	inish:	1-16	6-08 / 1-16	-08	O.D. / I.D.:		1-3/8"/2"	1/16/08	1050		Out	15 r
ing Loca	ation: _S	See Exploi	ation Loca	tion Plar	Hammer Wt.:		140 lb.	1/21/08	080) 5'	Out	5 d
Elev.: _	324'	Dat	um: <u>NA</u>	D 1983	_ Hammer Fall:		30"					
	Sam	nple Inform	nation		Other:	5" HSA						
<u> </u>				Field					, vi		inment last	
No.	Pen./ Rec. (ft.)	Depth (Ft.)	Blows (/6")	Test Data (ppm)	Description	& Ċlassific		Desc.	Remark	Equ	<u>.</u>	
S-1	24/8	0-2		ND			rse SAND,		1		None	
]			20-21					GRAVELLY	,			
1								C, IND				
-												
5.2	24/10	4-6	3_8	ND	Medium dense, brow	n fine to a	coarse		[,]			
0-2	2-1/10	-+-0	8-6	שא					2			
1												
S-3	24/20	8-10	12-17	ND		o medium	SAND, some					
1			11-17			e to coare		9.5'				
-					some Gravel, trace S	Silt		GLACIAL				
-							um SAND					
					and SILT, little Grave	÷1						
]												
S-4	8/8	14-14.8	51-100/2"	ND		n, fine to c	oarse SAND,					
					trace Silt			BEDROCK	<u>ا_</u> 3			
-					ROCK FRAGMENTS	and SILT	, some fine					
-						44.0]					
-					End or Exploration at	. 14.8						
]												
1												
1												
1												
-												
-												
1												
1												
	eman: ged by: start/F ing Loca Elev.: No. S-1 S-2 S-3	eman: ged by: e Start/Finish: ing Location: _S Elev.:324' No. Pen./ Rec. (ft.) S-1 24/8 S-2 24/10 S-3 24/20	Todd F ged by: A. M e Start/Finish: 1-16 ing Location: See Explor Elev.: 324' Dat Sample Inform No. Pen./ Rec. (ft.) Depth (Ft.) S-1 24/8 0-2 S-2 24/10 4-6 S-3 24/20 8-10	Todd Penticost ged by: A. Michonski e Start/Finish: 1-16-08 / 1-16- ing Location: See Exploration Loca Elev.: 324' Datum: NA Sample Information Rec. (ft.) Depth (Ft.) Blows (/6") S-1 24/8 0-2 5-19 20-21 S-2 24/10 4-6 3-8 8-6 S-3 24/20 8-10 12-17 11-17	Todd Penticost ged by: A. Michonski e Start/Finish: 1-16-08 / 1-16-08 ing Location: See Exploration Location Plar Elev.: 324' Datum: NAD 1983 Sample Information No. Pen./ (ft.) Depth (Ft.) Blows (/6") Field Test Data (ppm) S-1 24/8 0-2 5-19 20-21 ND S-2 24/10 4-6 3-8 8-6 ND S-3 24/20 8-10 12-17 11-17 ND	Todd Penticost Start/Finish: 1-16-08 O.D. / I.D.: Hammer Wt:: Bet start/Finish:	Todd Penticost Casing ged by: A. Michonski Casing a Start/Finish: 1-16-08 / 1-16-08 0.D. / I.D.:	Todd Penticost Sampler ged by: A. Michonski Casing Sampler ged by: A. Michonski Type: Split Spoon e Start/Finish: 1-16-08 / 1-16-08 O.D. / I.D.: 1-3/8"/2" ing Location: See Exploration Location Plan Hammer Wt: 140 lb. Elev: 324' Datum: NAD 1983 Hammer Wt: 30" Sample Information Sample Information Sample Information Sample Depth (ft.) Biows (fe") [(ft.)] 0-2 5-19 ND Dense, dark brown, fine to coarse SAND, some Silt, little Gravel S-1 24/8 0-2 5-19 ND Dense, dark brown, fine to coarse SAND, some Gravel, little Silt S-2 24/10 4-6 3-8 ND Medium dense, brown, fine to coarse SAND, some Gravel, little Silt S-3 24/20 8-10 12-17 ND Top 8": Brown, fine to medium SAND, some Silt, some Gravel S-3 24/20 8-10 12-17 ND Top 8": Brown, fine to coarse SAND, some Gravel, trace Silt Bottom 6": Brown, fine to coarse SAND, and SILT, little Gravel S-4 8/8 14-14.8 51-100/2" ND Top 6": Dense, pray WEATHERED ROCK FRAGMENTS an	Seman: Todd Penticost Sampler ged by: A. Michonski Casing Sampler ged by: A. Michonski Type: Split Spoon Date a Start/Finish: 1-16-08 (1-16-08 O.D. / I.D.: 1-3/8'/2" 1/16/08 ing Location: See Exploration Location Plan Hammer Wt: 140 lb. 1/21/08 Elev.: 324' Datum: NAD 1983 Hammer Fall: 30" 1/16/08 No. Pen/ (ft.) Depth (ft.) Blows (ft.) Field (ppm) Sample Sample Stratum Description & Classification Stratum Desc. Stratum Desc. Stratum S-1 24/8 0-2 5-19 ND Dense, dark brown, fine to coarse SAND, some Silt, little Gravel Stratum S-2 24/10 4-6 3-8 ND Medium dense, brown, fine to coarse SAND, some Gravel, little Silt Stratum S-3 24/20 8-10 12-17 ND Top 8": Brown, fine to medium SAND, some some Gravel, trace Silt 9.5' S-4 8/8 14-14.8 51-100/2" ND Top 6": Dense, brown, fine to coarse SAND, and SILT, little Gravel 14.5' S-4 8/8 14-14.8 51-100/2" ND Top 6": De	Todd Penticost Togan Sampler GROU ged by: A. Michonski Type: Split Spoon Date Tim 9 Start/Finish: 1-16-08 / 1-16-08 1-16-08 1-16-08 1-16-08 100 100 Date Tim 19 Start/Finish: 1-16-08 / 1-16-08 1-16-08 1-16-08 100 100 116/08 1050 ing Location: See Exploration Location Plan Hammer Yall 140 100 1/16/08 1050 Elev: 324 Datum: NAD 1983 Hammer Yall 30" 1/16/08 1050 Sample Information Field Togst Sample 0.5 5.7 24/8 0-2 5-19 ND Dense, dark brown, fine to coarse SAND, some Silt, little Gravel 0.5 TOPSOIL 1 S-2 24/10 4-6 3-8 ND Medium dense, brown, fine to coarse SAND, some Silt, some Gravel 0.5 TOPSOIL 1 S-3 24/20 8-10 12-17 ND Top 8": Brown, fine to medium SAND, some Silt, some Gravel 9.5	Nature Tod Penicost Auger/ Casing Sampler ged by: A. Michonski Type: Split Spoon Date Time Deptt ing Location: See Exploration Location Plan Hammer Yalt: 140 lb. 1/16/08 1050 5 ing Location: See Exploration Location Plan Hammer Yalt: 140 lb. 1/16/08 0800 5 ing Location: See Exploration Location Plan Hammer Yalt: 30" 1/21/08 0800 5 istartion Sample Information Other: 2.5" HSA 30" 1/21/08 0800 5 S-1 24/8 0-2 5-19 Do Dense, dark brown, fine to coarse SAND, some Silt, little Gravel Stratum get	Auger/ man: solution Auger/ Todd Penticost Auger/ Solution Sampler GROUNDWATER READINGS ged by: A. Michonski 1-16-08 / 1-16-08 1 Solution Split Spoon Date Time Depth Casing start/Finish: 1-16-08 / 1-16-08 10-16-08 1 Time Depth Casing Split Spoon Date Time Depth Casing 1/16/08 1050 5' Out start/Finish: 1-16-08 / 1-16-08 The-08 Time Depth Casing 1/16/08 1050 5' Out Blows See Exploration Location ND Hammer Vit: 140 lb. 1/21/08 0800 5' Out Solution Test Sample Sample Stratum Sitty Immer Vit: 1/21/08 0800 5' Out Solution Test Sample Sample Stratum Sitty: Sitty: Sitty: Sitty: Sitty: Sitty: Sitty: Sitty: Sitty: Sitry: <t< td=""></t<>

GZA

LOT 16 DEVELOPMENT

GZ-100 Boring No.: ___

		GZ	7 A				LOT 16 DI	EVELOPME	NT		Boring No	GZ	-101
	74	Ge	oEnviron	mental, Inc d Scientists	2.	D	EVENS, M	ASSACHUS	ETTS		Page:	of _	
		$\blacksquare + En_{\tilde{c}}$									File No.:		
				<u>NHB</u>			Auger/	Sampler			Check: _		<u> </u>
Fore	eman: _		Todd F A. M	renticost ichonski			Casing HW	Split Spoon	Date	GROUN	DWATER R Depth	EADINGS Casing	Stab
Date	ged by: Start/F	inish [.]	1-18	3-08 / 1-21	-08	_ Type: _ _ O.D. / I.D.: _		1-3/8"/2"	See Note 2			Casing	Olab
				ration Loca				140 lb.					
GS	Elev.: _	335'	Dat	um: <u>NA</u>	D 1983	_ Hammer Fall: _	18"	30"					
		Sam	ple Inforr	nation		Other:							
Ę					Field					<u> </u>	Equip	ment Insta	
Depth	No.	Pen./ Rec. (ft.)	Depth (Ft.)	Blows (/6")	Test Data (ppm)	Descript	Sample ion & Classific	cation	Stratum Desc.	Remarks	Equip		
	S-1	24/3	0-2	4-16	ND	Medium dense, o	dark brown, fin	e to medium	TOPSOIL	1		None	
1-				14-12		SAND, some Silt (Topsoil)	t, trace Gravel,	trace Roots		2			
2-						(-1)							
3-									3'SAND				
4-	S-2	15/10	4-5.3	16-27	ND	Very dense, brov	wn fine to coar		AND GRAVEL	3			
5-	0-2	15/10	4-0.0	100/3"		and GRAVEL, so		Se SAND		4			
6-													
7-									7'				
8-	S-3	1/0	8-8.1	100/1"		No Recovery				5			
9-	S-4	24/12	9-11	8-10	ND	Dense, orange/b							
10-				20-15		SAND, some Silt	t, some Gravel						
11-													
12-													
13-	S-5	10/6	12 12 1	36-100/4"	ND	Very dense, gray	, fina ta anara			6			
14-	3-5	10/0	13-13.1	30-100/4	IND	√little fine to coars			13.8'	7			
15-						End of Exploration	on at 13.8'						
16-													
17-													
18-													
19-													
20-													
21 —													
22-													
23-													
24-													
25-													
25 26-													
27-													
28-													
29-													
R E M A R K S	sam millic 2. Wate 3. Drille 4. Perfo 5. Rolle 6. Rolle 7. Bore	ble jars u on by vol er added er roller b brmed ac er bit thru er bit refu hole bac	using a Mii ume (ppm to boreho bit to 7 fee dditional fa boulder f usal at 13. kfilled with	ni Rae orga nv). ND inco ole. Could t to get pase alling head rom 8 to 9 8'. h soil cuttir	anic vap dicates n not obta st dense test from feet. ngs upon	c vapor levels, refe or meter equipped othing detected (< in accurate ground gravel. Advanced n 5 to 7 feet on 1/2 completion.	with a photoio 0.1 ppmv). Iwater reading. I casing to 7 fe 1/08.	nization detecto	r (PID) and	10.6 eV la	rom 5 to 7 f	lts in parts eet.	s per
and ur	cation line ider condi	tions state	d. Fluctuatio	ate boundary ons of ground	between s lwater may	oil types, transitions may occur due to other fact	ay be gradual. Wa tors than those pre	ater level readings esent at the time me	easurements we	e at times ere made.	Boring N	lo.: GZ-10)1

	GZ	ZA				<u>LOT 1</u> 6 DE	EVELOPMEN	NT		Boring No	o.: GZ	-103
ZN	Ge	oEnvironr	nental, In	с.	D		ASSACHUSE			Page:	1 of _	1
	$\blacksquare + En_{3}$	gineers and	<i>t Scientists</i>	5						File No.:		
			NHB		_	Auger/	Sampler			Check: _		
an:		Todd P	enticost			Casing	-			IDWATER F		
d by: _	alah.	<u>A. Mi</u> 1-16	CNONSKI	-08				Date See Note 2	Time	Depth	Casing	Stab
		See Explor			O.D. / I.D.: .			Dee Note 2	-			
		Dati			Hammer Fall:		30"					
					Other:	2.5" HSA						
	San	nple Inform	nation	Field					s			
No.	Pen./ Rec. (ft.)	Depth (Ft.)	Blows (/6")	Test Data (ppm)	Descript	Sample tion & Classific	ation	Stratum Desc.	Remarks	Equip	oment Insta	alled
S-1	24/16	0-2	3-14	ND	Top 6": TOPSOI			0.5' TOPSOIL GRAVELLY	_ 1		None	
			12-8		medium SAND, s Bottom 10": Brow little Gravel, little	wn, fine to coar		SAND				
S-2	24/18	4-6	21-20 29-23	ND	Dense, brown, fi Gravel, trace Silt		AND, some					
							-	_7'				
S-3	24/14	8-10	12-19 13-16	ND	Dense, brown/ta and SILT, some		um SAND	IILL	2			
S-4	3/2	13-13.3	100/3"	ND	Very dense, gray	y WEATHERED	D ROCK	13' WEATHERE 14' BEDROCK				
					FRAGMENTS End of Exploration	on at 14'			3			
sampl millior Samp Driller Boreh	le jars u by vol le S-3 d augere ole bac	using a Mir ume (ppm observed t ed to 14 fe ckfilled with nt approxima	ni Rae org v). ND in o be wet. et after sp n soil cutti	anic vapo dicates n Groundy boon refus ngs upon	sal at 13'3". Auger completion.	with a photoior (0.1 ppmv). mately 8 feet. r refusal at 14 f	rization detector	r (PID) and ²	10.6 eV	lamp. Resu	ults in parts	s per
Dril Bor	nes	ler augere ehole bac	ler augered to 14 fe ehole backfilled with	ler augered to 14 feet after sp ehole backfilled with soil cutti nes represent approximate boundary	ler augered to 14 feet after spoon refus ehole backfilled with soil cuttings upon	ler augered to 14 feet after spoon refusal at 13'3". Auge ehole backfilled with soil cuttings upon completion.	ehole backfilled with soil cuttings upon completion.	ler augered to 14 feet after spoon refusal at 13'3". Auger refusal at 14 feet. ehole backfilled with soil cuttings upon completion.	ler augered to 14 feet after spoon refusal at 13'3". Auger refusal at 14 feet. ehole backfilled with soil cuttings upon completion.	ler augered to 14 feet after spoon refusal at 13'3". Auger refusal at 14 feet. ehole backfilled with soil cuttings upon completion.	ler augered to 14 feet after spoon refusal at 13'3". Auger refusal at 14 feet. ehole backfilled with soil cuttings upon completion.	ler augered to 14 feet after spoon refusal at 13'3". Auger refusal at 14 feet. ehole backfilled with soil cuttings upon completion.

W_B_SAMP-DEPTH 19707.GPJ GZADEPTH.GDT 3/6/08

of1 19707 PJM ADINGS Casing S
PJM ADINGS Casing S
ADINGS Casing S
Casing S
ent Installed
ant Installed
ent Installed
ent Installed
ent Installed
None

	<u> </u>	GZ	ZA		_			EVELOPME			Boring No		
	7	Ge En	oEnvironr gineers and	l Scientists	c.	D	EVENS, M	ASSACHUSI	ETTS		Page: File No.: _	1970	
Fore	eman: _		Todd P	IHB enticost		-	Auger/ Casing	Sampler			Check: DWATER R		
Log Date	ged by: e Start/F	inish: _	<u>A. Mi</u> 1-17	<u>chonski</u> '-08 / 1-17	-08	_ Type: _ _ O.D. / I.D.: _		Split Spoon 1-3/8"/2"	Date See Note 2		Depth	Casing	Sta
			See Explor			_ Hammer Wt.: _ _ Hammer Fall: _		140 lb.	_				
			nple Inform			Other:	2.5" HSA						
Depth	No.	Pen./ Rec. (ft.)	Depth (Ft.)	Blows (/6")	Field Test Data (ppm)	Descript	Sample ion & Classific	cation	Stratum Desc.	Remarks	Equip	ment Insta	lled
1- 2- 3-	S-1	24/12	0-2	7-7 7-7	ND	Top 6": Dark brov some Silt, trace (Bottom 6": Orang SAND, some Silt	Gravel, trace F ge/brown, fine	Roots	0.5' TOPSOIL SUBSOIL	1 1		None	
4— 5— 6— 7—	S-2	24/20	4-6	9-20 23-35	ND	Dense, brown, fir GRAVEL, trace S		AND and	AND GRAVEL				
8- 9- 10- 11-	S-3	24/4	8-10	25-34 32-30	ND	Very dense, brow and GRAVEL, litt		rse SAND		2			
12— 13— 14— 15—	S-4	14/14	13-14.2	11-16 100/2"	ND	Very dense, brov and SILT, some End of Exploratic	Gravel	lium SAND	12'	3			
16— 17— 18—													
19— 20— 21—													
22— 23— 24— 25—													
23 26— 27— 28—													
29-													
R E M	sam millio 2. Sam	ple jars u on by vol iple S-3 (using a Mir ume (ppm observed t	ni Rae org v). ND ind o be wet.	anic vapo dicates no Groundwa	vapor levels, refe r meter equipped thing detected (< ater level approxir completion.	with a photoio 0.1 ppmv).						
	ication lin		nt approxima	te boundary	between so	il types, transitions ma	who gradual W						

ſ	77	GZ Ge	Z A oEnvironr gineers and	nental, In	с.	Г		<u>EVELOPMEI</u> ASSACHUSI			Boring No Page:		
		Ĕn	gineers and	l Scientists	7	L					File No.: _		
For	reman: _	·	Todd P	NHB enticost			Auger/ Casing	Sampler			Check: IDWATER RI		
Log	gged by:		A. Mi		00	_ Туре:		Split Spoon	Date See Note 2	Time	Depth	Casing	St
			1-17 See Explor			_ O.D. / I.D.: . _ Hammer Wt.: .			See Note 2				
						_ Hammer Fall:							
00							2.5" HSA						
_		San	ple Inforn	nation									
Depth	No.	Pen./ Rec. (ft.)	Depth (Ft.)	Blows (/6")	Field Test Data (ppm)	Descript	Sample ion & Classific	cation	Stratum Desc.	Remarks	Equip	ment Insta	lled
	S-1	24/10	0-2	25-16	ND	Top 4": TOPSOI	L, dark brown,	fine to	0.4' TOPSOIL	<u> </u>		None	
1-	-			5-7		medium SAND, Gravel	some Silt, little	e Roots, trace	GRAVELLY SAND				
2-	-					Bottom 6": Brow		e SAND,					
3-	_					some Gravel, tra	ace Silt						
4-													
	S-2	24/16	4-6	7-7	ND	Medium dense,							
5-	1			9-5		SAND, some Gr	avei, trace Silt						
6-	-												
7-	-								_7'				
8-		04/40	0.40	04.00		Von dense b	un finnte		TILL				
9-	S-3	24/12	8-10	21-36 58-68	ND	Very dense, brow and SILT, some		ium SAND		2			
-							Clavel						
10-	1												
11-	-												
12-	-												
13-		0/0	10.10 -	400/0"		Mame dana d	un für - ti						
14-	S-4	2/2	13-13.5	100/2"	ND	Very dense, brow and SILT, some			WEATHEREI BEDROCK				
						rock at tip of spo	on)		15'				
15-						End of Exploration	on at 15'		.0	4			
16-	1												
17-	-												
18-	4												
19-	4												
20-													
21-	1												
22-	-												
23-	-												
24-	4												
25-													
-													
26-	7												
27-	1												
28-	-												
29-	-												
R E M A R K S	sam millio 2. Sam 3. Augo	ple jars u on by vol ople S-3 o er grindir	using a Mir ume (ppm observed t ng from 13	ni Rae org v). ND in o be wet. to 15 feet	anic vapo dicates no Groundwa . Auger re	vapor levels, refe r meter equipped thing detected (< ater level approxi efusal at 15 feet. completion.	with a photoio 0.1 ppmv).						
Strati	ification lin	es represe	nt approxima	ite boundary	between so	il types, transitions m	ay be gradual. Wa	ater level readings l	nave been made	e at times	Boring N	o. : GZ-10	6

		GZ	7 A				LOT 16 D	EVELOPME	NT		_	Boring No.	GZ-	107
C	7▲	Ge	oEnvironr gineers and	nental, In	c.	D	EVENS, M	ASSACHUS	ETTS		_	Page:	1 of	
		\blacksquare + En_{2}									_	File No.: _ Check:	<u>1970</u> PJM	
Fore	eman: _		Todd P	NHB enticost		_	Auger/ Casing		Data			OWATER RE	ADINGS	
Log	ged by:		<u>A. Mi</u> 1-18	CNONSKI 2-08 / 1-18	-08	_ Type: _ _ O.D. / I.D.: _		Split Spoon 1-3/8"/2"	_ Date See Note 2	 	ne	Depth	Casing	Stab
			See Explor					140 lb.		-				
			Date		D 1983	Hammer Fall: _	18"	30"	_					
		San	ple Inform	nation		Other: _			-					
Ę					Field					<u>г</u>	ŝ	Fauipr	nent Insta	lled
Depth	No.	Pen./ Rec. (ft.)	Depth (Ft.)	Blows (/6")	Test Data (ppm)	Descript	Sample ion & Classifi	cation	Stratum Desc.	י ו	Remarks	-46-		
	S-1	24/20	0-2	5-15 17-21	ND	Top 3" TOPSOIL medium SAND, s	, Dark brown,	fine to	0.3' TOPSOIL FILL		1		None	
1-				17-21		little Roots					2			
2-						Bottom 17" Medi to coarse SAND,								
3-						to coarse SAND,	, some Glaver,		GRAVELLY	~ -				
4-	S-2	24/3	4-6	8-8	ND	Medium dense, t	an/brown. fine	to medium	SAND		3			
5-				13-25		SAND, some Gra								
6-														
7-									_7'					
8-									SAND					
9-	S-3	24/18	8-10	25-31 32-18	ND	Very dense, dark coarse SAND an			GRAVEL					
				02 10		Coarse OAND an								
10-														
11-														
12-														
13-	S-4	1/0	13-13.1	100/1"	ND	No Recovery End of Exploration	n of 12!		13'		4 5			
14-						End of Exploratio	JII AL 13				5			
15-														
16-														
17-														
18-														
19-														
20-														
21-														
22-														
23-														
24 –														
25-														
26-														
27 -														
28-														
20														
29														
R E M A R	sam millio 2. Wato 3. Fallio 4. Rollo	ple jars u on by vol er added ng head er bit grir	using a Mir ume (ppm to boreho permeabil nding from	ni Rae org v). ND ind le. Could ity test per 12.5 to 13	anic vapo dicates n not obta formed f 3 feet. Ro	c vapor levels, refe or meter equipped othing detected (<br in accurate ground rom 4 to 6 feet. oller bit refusal at 1 completion.	with a photoio 0.1 ppmv). Iwater reading.	nization detecto	or (PID) and	10.6 e	eV la			
Stratifi and un	cation lin der cond	es represe itions state	nt approxima d. Fluctuatio	te boundary	between s dwater may	oil types, transitions ma	ay be gradual. W tors than those pr	ater level readings esent at the time m	have been mad easurements w	le at tim ere ma	nes de.	Boring No	o.: GZ-10	7

		GZ	ζ.Δ			LOT 16 D	EVELOPMEN	NT		_	Boring No	.:GZ	108
	7	Ge	oEnviron	nental, In	с.	DEVENS, M	IASSACHUSE	ETTS		_	Page:	1 of _	
		\blacksquare En_{2}	gineers and	d Scientists	i						File No.:		
Cor	ntractor:			NHB		Auger/	Sampler			-	Check:		<u> </u>
For	eman: _		Todd P	Penticost		Casing	-	Data			DWATER R		01-1
Log	ged by:		A. Mi 1-16		00	Type:	<u>Split Spoon</u>	Date See Note 2	Tin	ne	Depth	Casing	Stab
						O.D. / I.D.:	<u>1-3/6 /2</u> 140 lb	Dee Note 2	f				
GS	Flev ·	329'		um NA	D 1983	Hammer Fall:							
						Other: 2.5" HSA							
		San	ple Inforr	nation									
Depth		Pen./	Depth	Blows	Field Test	Sample		Stratum		ž	Equip	ment Insta	alled
ď	No.	Rec. (ft.)	(Ft.)	(/6")	Data	Description & Classifi	ication	Desc.		Remarks			
	S-1	24/20	0.2	16.0	(ppm) ND	Top 6", TOPCOIL dark brown	fine to	0.5' TOPSOIL		_		None	
1 1-	-	24/20	0-2	16-9 8-10	ND	Top 6": TOPSOIL, dark brown medium SAND, some Silt, trad		SUBSOIL	-1	1		None	
						little Roots							
2-	1					Bottom 14": Brown, fine to coa some Gravel, some Silt (Subs		3'					
3-	1							GRAVELLY	7				
4-	S-2	24/15	4-6	6-17	ND	Dense, brown, fine to coarse S	SAND, little	SAND					
5-				18-16		Gravel, little Silt							
6-	_												
7-													
	1												
8-	S-3	24/20	8-10	15-21	ND	Dense, brown, fine to coarse \$	SAND, little			2			
9-	-			28-29		Gravel, trace Silt							
10-	-												-
11-	_												
12-													
13-	S-4	24/10	13-15	11-15	ND	Top 4": Dense, brown, fine to	coarse SAND,	4.41					
14-	-			21-17		little Gravel, little Silt Bottom 6": Dense, brown/tan,	fine to	GLACIAL	_				
15-						medium SAND and SILT, little	Gravel	15' TILL	_	3			-
16-	-					End of Exploration at 15'							
17-	-												
18-													
19-													
20-	1												-
21-	-												
22-	-												
23-	4												
24-	1												
25-]												-
26-	1												
27-	1												
28-	-												
29-	4												
29- 29- R E M A R K S	sam millio 2. Sam	ple jars u on by vol ple S-3 (using a Mi ume (ppm observed t	ni Rae org iv). ND in to be mois	anic vap dicates n t. Groun	c vapor levels, referenced to a b or meter equipped with a photoid othing detected (<0.1 ppmv). dwater level approximately 8 fee completion.	onization detecto						
Strati	ication lin nder cond	es represe tions state	nt approxima d. Fluctuatio	ate boundary	between s dwater may	oil types, transitions may be gradual. W	Vater level readings h resent at the time me	nave been mad easurements we	le at tin ere ma	nes de.	Boring N	o.: GZ-10	8
-													

W_B_SAMP-DEPTH 19707.GPJ GZADEPTH.GDT 3/6/08

GZA GeoEnvironmental, Inc. Engineers and Scientists					LOT 16 DEVELOPN				oring No		109	
7 L `	Geo Eng	o Environ pineers an	nental, In d Scientists	c.	DEVENS, MASSACHU	JSETTS			ige:		1	
									e No.:			
tractor:					- Sambio	r						
eman: _			ichonski		_ Casing '						Stab	
ged by: Start/F	inish.	1-17	7-08 / 1-17	-08		" 1/17/08			14'		None	
					Hammer Wt.: 140 lb.			<u> </u>				
Elev.:	340'	Dat	um:NA	AD 1983	_ Hammer Fall: 30"							
	Sam	nlo Inform	notion]	Other:2.5" HSA							
	Sam	iple inform	nation	Field			<i>u</i>					
No.	Pen./ Rec. (ft.)	Depth (Ft.)	Blows (/6")	Test Data	Sample Description & Classification	Stratum Desc.	Remark		Equip	oment Insta	alled	
S-1	24/6	0-2	11-21	ND	Dense, brown, fine to coarse SAND and	FILL		_		None		
			12-16		GRAVEL, little Silt							
						_3'						
						AND						
S-2	24/16	4-6		ND		GRAVEL						
			20-23									
5.3	24/14	8-10	20-22		Dense brown fine to coarse SAND and							
0-0	24/14	0-10	18-13		GRAVEL, trace Silt							
S-4	24/20	13-15	21-19	ND	Top 6": Dense brown fine to coarse SANC	13.5'						
04	24/20	10 10	16-18		and GRAVEL, trace Silt	GLACIAL						
					Bottom 14": Dense, tan/brown, fine to	15'						
					End of Exploration at 15'	_/	2					
	eman: _ ged by: e Start/F ing Loca Elev.: _ No.	ged by:	Todd F ged by: A. M a Start/Finish: 1-17 ing Location: See Explor Elev.: 340' Date Sample Inform Sample Inform No. Pen./ (ft.) Depth (Ft.) S-1 24/6 0-2 S-2 24/16 4-6 S-3 24/14 8-10	Bernan: Todd Penticost ged by: A. Michonski a Start/Finish: 1-17-08 / 1-17 ing Location: See Exploration Loca Elev.: 340' Datum: N/ Sample Information See Exploration Loca N/ No. Pen/ (ft.) Depth (Ft.) Blows (/6") S-1 24/6 0-2 11-21 12-16 S-2 24/16 4-6 20-24 23-29 S-3 24/14 8-10 20-22 18-13 S-4 24/20 13-15 21-19	Todd Penticost ged by: A. Michonski 2 Start/Finish: 1-17-08 / 1-17-08 ing Location: See Exploration Location Plan Elev.: 340' Datum: NAD 1983 Sample Information Sample Information Sample Information Field Test S-1 24/6 0-2 11-21 ND S-2 24/16 4-6 20-24 ND S-3 24/14 8-10 20-22 ND S-3 24/14 8-10 20-22 ND S-4 24/20 13-15 21-19 ND	Todd Penticost Casing Sample ged by: A. Michonski Split Spot 2 Start/Finish: 1-17-08 / 1-17-08 Type: Split Spot ing Location: See Exploration Location Plan Hammer Wt.: 140 lb. Elev.: 340' Datum: NAD 1983 Hammer Wt.: 140 lb. Sample Information Sample Information Other: 2.5" HSA 30" S-1 24/6 0-2 11-21 ND Dense, brown, fine to coarse SAND and GRAVEL, little Silt S-2 24/16 4-6 20-24 ND Dense, brown, fine to coarse SAND and GRAVEL, trace Silt S-3 24/14 8-10 20-22 ND Dense, brown, fine to coarse SAND and GRAVEL, trace Silt S-4 24/20 13-15 21-19 ND Dense, brown, fine to coarse SAND and GRAVEL, trace Silt	Todd Penticost Casing Sampler ged by: A. Michonski Date Sampler 2 Start/Finish: 1-17-08 / 1-17-08 O.D. / I.D.: 1-3/8"/2" 1/17/08 ing Location: See Exploration Location Plan Hammer Wt.: 140 lb. 1/17/08 Elev.: 340' Datum: NAD 1983 Hammer Fall: 30" Sample Information Grave Other: 2.5" HSA	Todd Penticost Casing Sampler GROL ged by: A. Michonski Type: Split Spoon Date Tim ing Location: See Exploration Location Plan Hammer WI: 1-3/8"/2" 1/17/08 111 ing Location: See Exploration Location Plan Hammer Fall: 30" 1/17/08 111 Elev.: 340" Datum: NAD 1983 Hammer Fall: 30" 1/17/08 111 No. Pen/ (ft.) Depth Blows Field Sample Stratum Desc. S-1 24/6 0-2 11-21 ND Dense, brown, fine to coarse SAND and FiLL 1 S-2 24/16 4-6 20-24 ND Dense, brown, fine to coarse SAND and 3" SAND GRAVEL, irace Silt S-3 24/14 8-10 20-22 ND Dense, brown, fine to coarse SAND and 13.5" S-4 24/20 13-15 21-19 ND Top 6": Dense, brown, fine to coarse SAND and GLACIAL TILL 15" M	NHB Ch Auger/ Casing Sampler Ch Sample Point Spon Date Time GROUNDW/ GROUNDW/ ged by: A. Michonski SpittSpon Date Time GROUNDW/ SpittSpon Date Time GROUNDW/ SpittSpon Date Time Date Time Date Time Date Time Date Sample Information Stratum Depth (ft,) Blows Field Sample Information Stratum Depth (ft,) Blows Field Sample Depth (ft,) Blows Field GRAVEL, ital Bala Sample Colspan= Colspan= Sample Stratum Depth (ft,) Depth (ft,) Depth (ft,) Dept	NHB Check:	NHB Auger/ Casing Sampler Check: PJM Auger/ Casing Split Spoon Check: PJM Auger/ Casing Split Spoon Check: PJM Auger/ Casing Split Spoon Check: PJM Sample Information Information Sample Information Sample Information Set: Sploration Location Plan Hammer Vk:: 140 lb. 140 lb. Hammer Vk:: Date 140 lb. Hammer Vk:: 140 lb. 117/08 141/17/08 Check: PJM No. Ref. / Pent/ (Ft.) Depth Blows (F*) Field Test Data (Ft.) Stratum Desc, brown, fine to coarse SAND and GRAVEL, trace Silt S-2 24/16 4-6 20-24 ND Dense, brown, fine to coarse SAND and GRAVEL, trace Silt 35AND - AND GRAVEL AND GRAVEL, trace Silt S-2 24/14 8-10 Coarse SAND and GRAVEL, trace Silt S-2 24/14 8- 30* <th c<="" td=""></th>	

Finish: ation: _S 341'	Todd P A. Mi 1-17 See Explor	2-08 / 1-17 ation Loca um: <u>NA</u>	ation Pla	Hammer Fall:	4.5"/4" 300 lb.	Sampler Split Spoon 1-3/8"/2" 140 lb. 30"		GROUNE Time 1250 1310	DWATER R Depth 3.2' 3.4'	EADINGS Casing 8' 8'	Sta 15 n 45 n
inish: ation: _S 341' Sam Pen./ Rec.	1-17 See Explor Datu Depth	<u>ation Loca</u> um: <u>NA</u> nation	ation Plai	O.D. / I.D.: 1 Hammer Wt.: Hammer Fall: _	HW 4.5"/4" 300 lb. 18"	1-3/8"/2" 140 lb. 30"	1/17/08 1/17/08	1250	3.2'	8'	15 n
inish: ation: _S 341' Sam Pen./ Rec.	1-17 See Explor Datu Depth	<u>ation Loca</u> um: <u>NA</u> nation	ation Plai	O.D. / I.D.: 1 Hammer Wt.: Hammer Fall: _	4.5"/4" 300 lb. 18"	140 lb. 30"	1/17/08				
341' Sam Pen./ Rec.	Datu ple Inform Depth	um: <u>NA</u> nation	ND 1983	Hammer Fall:	18"	30"	-	1310	3.4'	8'	45 n
Sam Pen./ Rec.	ple Inform Depth	nation					See Note 5				
Pen./ Rec.	Depth		Field	Other: _							
Pen./ Rec.	Depth		Field								
(,	(1.1.)	(/6")	Test Data	Descripti	Sample on & Classifi	cation	Stratum Desc.	Remarks	Equip	ment Insta	alled
24/10	0-2	2-8	(ppm) ND	Top 4": Dark brov	n fine to me	dium SAND	0.4' TOPSOIL	1		None	
24/10	0-2	16-11		some Silt, trace G			FILL			None	
				(Topsoil)	rown to bla-	k fina ta					
				coarse SAND, so	me Silt, little	Gravel, trace	3'				
						,	SAND				
24/14	4-6	15-16	ND	Dense, brown/da	k brown, fine	to coarse	GRAVEL				
		18-16									
24/16	8-10	23-18	ND			ium SAND	Q'				
		∠1-18		and SILT, little Gr	avei		GLACIAL	2			
							13'				
1/0	13-13.1	100/1" min/ft		No Recovery			BEDROCK	3			
60/49	14-19	2.5		Top 45": Moderat	ely to modera	ately hard,		4			
		3		slightly to severel	y weathered,	moderately					
		4		SCHIST, very clo	se to close, s						
						ovoroly					
		9.5		coarse grained, w	/hite/gray QU		19'	5			
				End of Exploration	n at 19'			6			
	24/16	24/16 8-10 1/0 13-13.1	24/16 8-10 23-18 21-18 1/0 13-13.1 100/1" min/ft 2.5 3	24/16 8-10 23-18 21-18 ND 1/0 13-13.1 100/1" min/ft 2.5 3 100/1" 4 60/49 14-19 2.5 3 4 8 8	24/144-615-16 18-16NDCoarse SAND, so Roots, trace Brick SAND and GRAV24/168-1023-18 21-18NDDense, brown/dar SAND and GRAV1/013-13.1100/1" 2.5 3 4 4 8 9.5No Recovery Top 45": Moderat slightly to severel fractured, fine gra Bottom 4": Moder weathered, mode coarse grained, weathered, mode coarse grained, weathered, mode coarse grained, weathered, mode	24/14 4-6 15-16 18-16 ND Dense, brown/dark brown, fine SAND and GRAVEL, trace Site SAND and SILT, little Gravel 1/0 13-13.1 100/1" min/ft 2.5 3 4 ND Dense, tan/brown, fine to med and SILT, little Gravel 1/0 13-13.1 100/1" 2.5 3 ND Dense, tan/brown, fine to med and SILT, little Gravel 1/0 14-19 2.5 3 SCHIST, very close to close, s moderately dipping joints Bottom 4": Moderately hard, so weathered, moderately fractured	24/144-615-16 18-16NDDense, brown/dark brown, fine to coarse SAND and GRAVEL, trace Silt24/168-1023-18 21-18NDDense, tan/brown, fine to medium SAND and SILT, little Gravel1/013-13.1 14-19100/1" min/ft 2.5 3 4 4 8 9.5ND Recovery Top 45": Moderately to moderately hard, slightly to severely weathered, moderately fractured, fine grained, blue, gray MICA SCHIST, very close to close, shallow to moderately hard, severely weathered, moderately hard, severely	24/14 4-6 15-16 18-16 ND Dense, brown/dark brown, fine to coarse SAND and GRAVEL, trace Silt 3 SAND GRAVEL 24/16 8-10 23-18 21-18 ND Dense, tan/brown, fine to medium SAND and SILT, little Gravel 9 GLACIAL TILL 1/0 13-13.1 100/1" min/ft 2.5 No Recovery Top 45": Moderately to moderately hard, slightly to severely weathered, moderately hard, severely weathered, moderately fractured, fine to coarse grained, white/gray QUARTZ 19'	24/14 4-6 15-16 18-16 ND Dense, brown/dark brown, fine to coarse SAND and GRAVEL, trace Silt 3 	24/14 4-6 15-16 18-16 ND Dense, brown/dark brown, fine to coarse SAND and GRAVEL, trace Silt 3' SAND AND GRAVEL 24/16 8-10 23-18 21-18 ND Dense, tan/brown, fine to medium SAND and SILT, little Gravel 9' 9' 1/0 13-13.1 100/1" No Recovery 13' 13' 2 1/0 13-13.1 100/1" No Recovery 13' 3 4 60/49 14-19 2.5 3 3 No Recovery 13' 3 4 8 9.5 SCHIST, very close to close, shallow to moderately dipping joints Severely weathered, fine to coarse grained, white/gray QUARTZ 19' 5	24/14 4-6 15-16 18-16 ND coarse SAND, some Silt, little Gravel, trace Roots, trace Brick (Fill) 3- AND SAND 3- AND GRAVEL 24/14 4-6 15-16 18-16 ND Dense, brown/dark brown, fine to coarse SAND and GRAVEL, trace Silt 3- AND GRAVEL 3- AND GRAVEL 24/16 8-10 23-18 21-18 ND Dense, tan/brown, fine to medium SAND and SILT, little Gravel 9' GLACIAL TILL 2 1/0 13-13.1 100/1" No Recovery 13' Top 45": Moderately to moderately hard, slightly to severely weathered, moderately fractured, fine grained, blue, gray MICA SCHIST, very close to close, shallow to moderately dipping joints Bottom 4": Moderately hard, severely weathered, moderately hard, severely tractured, fine to coarse grained, white/gray QUARTZ 5

DEVENS, MASSACHUSETTS

GZA GeoEnvironmental, Inc. *Engineers and Scientists*

G

GZ-110

19707

Boring No.: ____

File No.:

Page: _____ of ____

		GZ	ΖA			Boring No		-111				
G	72	Ge	oEnvironi	mental, Inc d Scientists		DEVENS, M	ASSACHUSE	TTS		Page:		1
		\blacksquare $En_{\tilde{z}}$	-							File No.:		
				NHB		Auger/	Sampler			Check:		
Fore	man: _		Todd F	Penticost		Casing	-			DWATER R		
Logo	ged by:		A. M		00	Туре:	Split Spoon	Date	Time	Depth	Casing	Stab
				<u>8-08 / 1-16-</u> ration Loca		O.D. / I.D.:	140 lb.	1/16/08	1330	8'	Out	20 min.
				um:NA		<u> Hammer Wt.:</u> Hammer Fall:						
031	_iev				2 1000	Other:						
		Sam	nple Inform	nation								
Depth	No.	Pen./ Rec. (ft.)	Depth (Ft.)	Blows (/6")	Field Test Data (ppm)	Sample Description & Classifie	cation	Stratum Desc.	Remarks	Equip	ment Insta	alled
	S-1	24/18	0-2	3-9	ND	Top 2": TOPSOIL, dark brown,		0.2' TOPSOIL	/ 1		None	
1- 2-				11-14		medium SAND, some Silt, trac Bottom 16": Brown, fine to coa some Gravel, little Silt		GRAVELLY SAND				
3-							-	_3'				
4-	S-2	24/12	4-6	10-8	ND	Medium dense, brown, fine to	nedium	TILL				
5-	-		-	9-25		SAND, some Silt, little Gravel						
6-												
7-												
8-	S-3	22/20	8-9.10	24-27	ND	Dense, brown, fine to medium	SAND and					
9-				25-100/4"		SILT, some Gravel (wet)						
10-												
11 –												
12-												
13-	S-4	1/1	13-13.1	100/1"	ND	_ Very dense, large piece of Gra	vel (possible	13.1'				
						bedrock at tip of spoon)	/		2			
14-						End of Exploration at 13.1						
15-												
16-												
17-												
18-												
19-												
20-												
21 –												
22-												
23-												
24 –												
25 -												
26-												
27												
28-												
29-												
-												
R E	sam millio	ple jars u on by vol	using a Mi ume (ppm	ni Rae orga v). ND inc	anic vap licates n	c vapor levels, referenced to a be or meter equipped with a photoio othing detected (<0.1 ppmv). ould be measured after stabilizat	nization detector					
) Strotific	cation line	es renrese	nt approxima	ate boundary	between	oil types, transitions may be gradual. W	ater level readings h	ave been made	e at times	_	0	
						occur due to other factors than those pr				Boring N		

		GZ	7.Δ				LOT 16 D	EVELOPME	NT		Boring No	.: GZ-	-112
	7 \	Ge	oEnviron	mental, In	с.			ASSACHUS			Page:	1 of	1
		\blacksquare En	gineers and	d Scientists							File No.:		
Contra	ctor.		١	NHB			Auger/				Check:	PJM	
Forem	an		Todd F			_	Casing	Sampler		GROUN	DWATER R		
00000	d hv		A. Mi	ichonski			Casing	Split Spoon		Time	Depth	Casing	Sta
oyyet ata Si	tort/Ei	nieh	1-15	5-08 / 1-15	-08			1-3/8"/2"	See Note 2				
						<u>Hammer Wt.:</u>							
-	V.:				D 1983	Hammer Fall:							
55 Ele	v	200		um. <u> </u>	(B 1000		2.5" HSA						
		San	nple Inforr	nation		Other.	2.0 110/(
£ 🗖			-		Field					S	Equip	ment Insta	
	No.	Pen./ Rec. (ft.)	Depth (Ft.)	Blows (/6")	Test Data (ppm)	Descript	Sample tion & Classific	cation	Stratum Desc.	Remarks	Equip		aneu
1	S-1	24/16	0-2	1-3	ND	Top 6": TOPSO	L, dark brown,	fine to	0.5' TOPSOIL	1		None	
_				4-8		medium SAND,	some Silt		SUBSOIL	_ .			
						Bottom 10": SUI							
-						to medium SAN	D, some Silt, lif	tle Gravel					
-									_3' GRAVELLY				
									SAND				
1 5	S-2	24/18	4-6	8-17	ND	Top 6": Brown, f		AND, some	4.5'	2			
_				18-17		Gravel, trace Sil	t (wet)		GLACIAL				
						Bottom 10": Bro		lium SAND	TILL				
						and SILT, little G	Bravel						
-									7.5'	3			
						End of Exploration	on at 7.5'		1.5	4			
										5			
-													
4													
1													
1													
-													
_													
-													
_													
-													
_													
-													
_													
-													
_													
-													
ı													
5-													
5-													
'-													
-													
2. 3. 4.	samp million Samp Auger Auger	le jars u n by vol ole S-2 o r refusa r refusa	using a Mii lume (ppm observed t Il at 7 feet. Il encounte	ni Rae org iv). ND in to be wet. Moved 4 ered at 7.5	anic vap dicates r Ground feet nor feet at r	c vapor levels, refe or meter equipped oothing detected (< water level at appro th of stake. new location. n completion.	with a photoio 0.1 ppmv).	nization detecto					
						oil types, transitions m occur due to other fac					Boring N	lo.: GZ-11	2

		GZ	7.4				LOT 16 D	EVELOPME	NT		Boring No	o.:GZ-	113
C	74	Ge	oEnviron	mental, In d Scientists	2.	D	EVENS, M	ASSACHUS	ETTS		Page:	1 of	1
											File No.: . Check:		
Fore	man: _		Todd F	NHB Penticost		_	Auger/ Casing	Sampler			IDWATER R	EADINGS	
Loge	ged by:		A. M		00	Type: _		Split Spoon 1-3/8"/2"	_ Date See Note 2	Time	Depth	Casing	Stab
				2-08 / 1-22		O.D. / I.D.: _ <u>n</u> Hammer Wt.: _		140 lb.		<u> </u>			
				um: <u>NA</u>			18"		-				
				um					-				
_		San	nple Inforr	nation									
Depth	No.	Pen./ Rec. (ft.)	Depth (Ft.)	Blows (/6")	Field Test Data (ppm)	Descripti	Sample ion & Classifie	cation	Stratum Desc.	Remarks	Equip	ment Insta	lled
	S-1	24/12	0-2	1-1	ND	Loose, brown, fin			0.5' TOPSOIL	_ 1		None	
1-				2-8		Silt, trace Gravel	, trace Roots ((Topsoil)	GRAVELLY SAND	2			
2-	S-2	24/12	2-4	7-10	ND	Medium dense, c	rango/brown	fino to		3			
3-	3-2	24/12	2-4	12-19	ND	coarse SAND, so				3			
-						,							
4-	S-3	24/18	4-6	28-27	ND	Top 12": Brown,		SAND and					
5-				22-16		GRAVEL, little Si	ilt		5.5'				
6-						Bottom 6": Tan/b SAND and SILT,		nedium	GLACIAL				
-						SAND and SILT,			TILL				
7-													
8-	S-4	21/16	8-9.9	20-19	ND	Dense, tan/browr	n. fine to medi	um SAND					
9-				28-100/3"		and SILT, little G							
10-													
11-													
12-													
13	S-5	1/0	13-13.1	100/1"		No Recovery		_	13.1'	4			
						End of Exploration	on at 13.1'			5			
14-													
15-													
16-													
17-													
18-													
19-													
20-													
21 –													
22-													
23-													
24													
25-													
26-													
27 -													
28-													
29-													
R E M A R	sam millio 2. Wate 3. Fallio 4. Rolle	ple jars u on by vol er added ng head er bit and	using a Mi lume (ppm l to boreho permeabil d split spoo	ni Rae organy). ND indole. Could ity test per on refusal a could ity test per on refusal a	anic vap dicates r not obta formed t at 13.1 f	ic vapor levels, refe or meter equipped nothing detected (<(nin accurate ground from 2 to 4 feet. eet. n completion.	with a photoio 0.1 ppmv).	nization detecto					
Stratific and un	cation lin der cond	es represe	nt approxima d. Fluctuatio	ate boundary ons of ground	between s lwater may	soil types, transitions ma y occur due to other fact	ay be gradual. W	ater level readings esent at the time m	have been mad easurements we	e at times ere made.	Boring N	lo.: GZ-11	3

		L G7	.A				LOT 16 DE	EVELOPMEN	T		Boring No	o.: GZ-1	113A		
	7	Ge	ZA oEnvironr gineers and	nental, In	c.	DE	EVENS. MA	ASSACHUSE	TTS		Page:	1 of _			
		\blacksquare Eng	gineers and	d Scientists			- 1				File No.:				
Co	ntractor:			NHB		_	Auger/				Check: _	PJM			
For	eman: _		Todd P	Penticost		_	Casing	Sampler		GROUN	DWATER R	EADINGS			
Log	gged by:		A. Mi	chonski		Туре:		Split Spoon	Date	Time	Depth	Casing	Stab		
Dat	te Start/F	inish: _	1-23	8-08 / 1-23		O.D. / I.D.:		1-3/8"/2"		ncounte	ed				
	-		See Explor						See Note 2	2					
GS	Elev.: _	306'	Dati	um: <u>N</u> A	D 1983	_ Hammer Fall: _		30"							
		San	ple Inforn	nation		Other:									
÷					Field					S	Equip	ment Insta	llod		
Depth	No.	Pen./ Rec.	Depth	Blows	Test		Sample		Stratum	lar	Equip		lineu		
		(ft.)	(Ft.)	(/6")	Data (ppm)	Descriptio	on & Classific	ation	Desc.	Remarks					
						No samples taken	1			1		None			
1-	-									2					
2-	_														
_						End of Exploration	n at 3'								
4-	1														
5-	-												-		
6-	-														
7-	4														
8-															
-															
10-	-												-		
11-	-														
12-	11- 12- 13- 14-														
13-	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$														
15-	7-														
16-	-														
17-	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$														
18-															
19-	1														
20-	-												-		
21-	-														
22-	-														
23-	4														
24-															
25-	1												-		
26-	1														
27-	-														
28-	4														
29-	4														
Ľ															
R E M A R K S	2 to 3	3 feet. E	Borehole w	as backfil	led upon o	Driller advanced ca completion. n accurate groundw	-	and cleaned out	borehole.	Falling h	head test wa	is performe	ed from		
Strati and u	fication line Inder condi	es represe tions state	nt approxima d. Fluctuatio	ate boundary	between so dwater may	occur due to other facto	y be gradual. Wa ors than those pre	ater level readings hat esent at the time mea	ave been mad asurements we	e at times ere made.	Boring N	lo.: GZ-11	3A		

		GZ	ZA				LOT 16 DI	EVELOPME	NT		Boring No	.: GZ	-114
C	7	Ge Eng	oEnviron gineers an	mental, Inc d Scientists		C	DEVENS, MA	ASSACHUSE	ETTS		Page: File No.:		<u>1</u>)7
Со	ntractor:			NHB			Auger/				Check:		
For	reman: _		Todd F	Penticost		_	Casing	Sampler	_		DWATER R		
Log	gged by:		A. M	lichonski	00	_ Type:		Split Spoon	Date	Time	Depth	Casing	Sta
				<u>5-08 / 1-15-</u> ration Loca		O.D. / I.D.:		1-3/8 /2 140 lb.	See Note 2	<u> </u>			
	Elev.: _			tum: <u>NA</u>	D 1983	Hammer Wt.: Hammer Fall:							
63		010		um. <u>- 10 (</u>		_ nammer Fail. Other:	2.5" HSA						
_		San	ple Infor	mation		e allori				_			
Depth	No.	Pen./ Rec. (ft.)	Depth (Ft.)	Blows (/6")	Field Test Data (ppm)	Descript	Sample tion & Classific	cation	Stratum Desc.	Remarks	Equip	ment Insta	alled
	S-1	24/12	0-2	3-10	ND	Top 6": Dark bro		dium SAND,	FILL 1'	1		None	
1-	-			14-17		some Silt, trace Bottom 6": Brow	Gravel (Fill)		GRAVELLY	(
2-	-					some Gravel, litt		Se SAND,	SAND				
3-									_3'				
									GLACIAL TILL				
4-	S-2	21/21	4-5.9	7-14	ND	Dense, brown, fi	ne coarse SAN	ND, some Silt,		2			
5-	1			29-100/3"		some Gravel							
6-	-												
7-	4												
8-													
	S-3	10/8	8-8.10	32-100/4"	ND	Very dense, tan/ SAND and SILT			9'				
9-						weathered rock			WEATHERE	D 3			
10-	-						5	,	ROCK				
11-	-								11.5'				
12-						End of Exploration	on at 11.5'		11.0	4			
· <u>-</u> 13-													
14-													
15-	1												
16-	-												
17-	4												
18-	1												
19-	1												
20-	1												
21-	+												
22-	-												
23-	4												
 24-													
25-	1												
26-	1												
27-	+												
28-	-												
29-	-												
R E M A R K S	sam millio 2. Sam 3. Auge	ple jars u on by vol ple S-2 o er grindir	using a Mi ume (ppn observed ng from 9	ini Rae orga nv). ND inc to be wet. to 11.5 feet	anic vap licates n Groundv t. Refus	c vapor levels, refo or meter equipped othing detected (< vater level at appro al at 11.5 feet. o completion.	with a photoio 0.1 ppmv).	nization detecto					
						ater level readings h esent at the time me			Boring N	lo.: GZ-11	4		

		GZ	A				LOT 16 D	EVELOPMEI	NT		Boring No		115
C	7L)	Ge End	oEnviron	mental, In d Scientists	c.	D	EVENS, M	ASSACHUSI	ETTS			<u>1</u> of	
											File No.:		
						_	Auger/	Sampler			Check: _		
							Casing HW	Split Spoon	Date	GROUN Time	IDWATER R Depth		Sta
LOC	ged by: start/F	inish	1-20)-08 / 1-20	-08	_ Type: _ _ O.D. / I.D.: _		1-3/8"/2"	See Note 2		Deptil		51
Bor	ing Loc	ation: _S	See Explo	ration Loca	ation Plar	Hammer Wt.: _							
GS	Elev.: _	302'	Dat	um: <u>N</u> A	D 1983	_ Hammer Fall: _	18"	30"					
		Sam	nle Infor	mation		Other: _							
÷		tart/Finish: $1-20-08 / 1-20-0$ Location: See Exploration Location v.: $302'$ Datum: NAD Sample Information No. Pen./ Rec. (ft.) Depth (Ft.) Blows (/6'') (/6'') S-1 24/8 0-2 1-2 3-6 3-6 S-2 24/16 2-4 15-22 21-26 21-26 S-3 24/20 4-6 20-25 30-65 30-65								S	Equin	oment Insta	llod
Depth	No.	Rec.			Test Data (ppm)	Descripti	Sample on & Classific	cation	Stratum Desc.	Remarks	Equip		lieu
	S-1	24/8	0-2		ND	Top 4": Dark brow	wn, fine to me	dium SAND,	TOPSOIL 1'	1		None	
1-	-			3-6		some Silt, some (Topsoil)	Roots, trace G	Jravel	SUBSOIL	2			
2-	S-2	24/16	2-4	15-22	ND	Bottom 4": Orang	e/brown, fine	to medium	2' SAND	3			
3-	-					SAND, some Silt Dense, orange/bi	, trace Gravel rown, fine to c	(Subsoil) oarse SAND	AND GRAVEL				
4-	- c	21/20	16	20.25	ND	∖ and GRAVEL, tra	ace Silt		4.5'				
5-		24/20	4-0		עא	Top 4": Very den coarse SAND an	se, orange/bro d GRA\/FI tr	own, fine to ace Silt	GLACIAL TILL				
6-						Bottom 16": Very	dense, tan/br	rown, fine to	IILL				
7-						medium SAND a	nd SILT, some	e Gravel					
									8'				
8-	S-4	2/2	8-8.2	100/2"	ND	Very dense, gray	WEATHERE	D ROCK	WEATHERE				
9-	1					FRÄGMENTS			DEDITOOIT				
10-	1												
11-	-	S-4 2/2 8-8.2 100/2"											
12-		S-4 2/2 8-8.2 100/2"				End of Exploratio	n at 12'		12'	5			
13-	-	No.Pen./ Rec. (ft.)Depth (Ft.)Blows (/6")FT D (pS-124/80-21-2 3-61S-224/162-415-22 21-261S-324/204-620-25 30-651S-42/28-8.2100/2"1S-42/28-8.2100/2"1Field testing results represent total o sample jars using a Mini Rae organic million by volume (ppmv). ND indica Water added to borehole. Could not Performed falling head permeability					n al 12			5			
14-		-4 2/2 8-8.2 100/2" I											
15-			24/20 4-6 20-25 NI 30-65 NI										
-													
16-]												
17-	1												
18-	1												
19-	1												
20-	-												
21-	-												
22-	-												
23-	1												
20 24-													
25-]												
26-	1												
27 -	1												
28-	1												
29-	-												
R E M A R K S	sam millio 2. Wat 3. Perf 4. Rollo	ple jars u on by volu er added ormed fa er bit grin	ising a Mi ume (ppm to boreho lling head ding from	ni Rae org nv). ND in ble. Could permeabi 8 to 12 fe	anic vapo dicates n not obta lity test fr et. Rolle	or meter equipped othing detected (<0 in accurate ground	with a photoio 0.1 ppmv). water reading.	nization detecto	I, measured r (PID) and 1	in the he	eadspace of lamp. Resu	f sealed soi ults in parts	l per
Stratiti and u	fication lin nder cond	es represer itions state	nt approxima d. Fluctuation	ate boundary ons of ground	between s dwater may	oil types, transitions ma	ay be gradual. W	ater level readings here a the time me	nave been made easurements we	e at times ere made.	Boring N	lo.: GZ-11	5

		GZ	ZA			LOT 16 DE	EVELOPME	NT		Boring No	.:GZ	-116
	7L	Ge	oEnviron	nental, Inc		DEVENS, MA	ASSACHUS	ETTS		Page:	1 of	1
	_/	\blacksquare En	gineers an	d Scientists						File No.: _		
Con	tracto	r:		NHB		Auger/	Sampler			Check:	PJN	1
Fore	eman:		Todd F	Penticost		Casing				DWATER R		
Log	ged by	:	<u>A. M</u>	ichonski	00	Туре:	Split Spoon		Time	Depth	Casing	Stab
				<u>6-08 / 1-16</u>		O.D. / I.D.:	<u>1-3/8"/2"</u>	1/16/08	0930	3'	Out	15 min.
				ration Loca um: <u>NA</u>				-				
GSI	=iev.:	307	Dat	um:	D 1903	Hammer Fall: Other:2.5" HSA		-				
		San	nple Inforr	nation				-				
Depth		Pen./	_		Field				ks	Equip	ment Insta	alled
De	No.	Rec. (ft.)	Depth (Ft.)	Blows (/6")	Test Data (ppm)	Sample Description & Classific	ation	Stratum Desc.	Remarks			
	S-1	24/12	0-2	7-4	ND	Top 6": TOPSOIL		0.5' TOPSOIL SAND	1		None	
1-				9-11		Bottom 6": Brown, fine to coars GRAVEL, little Silt	e SAND and	AND				
2-						0 <u>-</u> , 0		GRAVEL				
3-								_3'				
4-						_		TILL				
	S-2	21/21	4-6	8-18 25-100/3"	ND	Dense, orange/brown, fine to m SAND and SILT, some Gravel	iedium					
5-				20-100/3		SAND and SILT, SOME GIAVE						-
6-									2			
7-												
8-	0.0	10/10	0.0.1				to an eller					
9-	S-3	13/13	8-9.1	5-55 100/1"	ND	Very dense, orange/brown, fine SAND and SILT, some Gravel		9'				
-						fractured rock at tip of spoon)	(,	WEATHERE				
10-												-
11-								11.5'				
12-						End of Exploration at 11.5'			3			
13-									1			
14-												
15-												_
-												
16-												
17-												
18-												
19-												
20-												-
21 –												
22-												
23-												
24 –												
25 –												-
26-												
27-												
28-												
29-												
								 			م م م اد دا د	
R						c vapor levels, referenced to a be or meter equipped with a photoio						
Е	mill	ion by vol	ume (ppm	v). ND inc	licates n	othing detected (<0.1 ppmv).		()		1	P 10	
			l at 6 feet. I at 11.5 fe		ble 6 fee	t to east. Augered to 8 feet and s	sampled.					
R					ngs upor	completion.						
K S					-							
~												
Stratifi	cation li	nes represe	nt approxima	ate boundary	between s	oil types, transitions may be gradual. Wa	ater level readings	have been made	e at times	Boring	a . 07 44	6
and un	der con	ditions state	d. Fluctuatio	ons of ground	water may	occur due to other factors than those pre	esent at the time m	easurements we	re made.	Boring N	o.: GZ-11	0

W_B_SAMP-DEPTH 19707.GPJ GZADEPTH.GDT 3/6/08

							LOT 16 D	EVELOPME	NT		_	Boring No	.:GZ-	117
C	7L	Ge	oEnviron	mental, In d Scientists	c.	D	EVENS, M	ASSACHUSI	ETTS		_	Page:	1 of	
		\blacksquare + En_{2}	gineers and	a Scientists								File No.:		
For	eman: _		۱ Todd F	NHB Penticost			Auger/ Casing HW	Sampler				Check: DWATER R	EADINGS	
Log	ged by:	inich	<u>A. IVI</u> 1-23	ichonski 3-08 / 1-23	-08	_ Type: _ _ 0.D. / I.D.: _	4.5"/4"	Split Spoon 1-3/8"/2"	Date 1/23/08	Tin 130		Depth 2.2'	Casing Out	Stab None
									See Note 6		00	2.2	Out	None
GS	Elev.: _	313'	Dat	um: <u>N</u> A	D 1983	_ Hammer Fall: _	18"	30"						
		tart/Finish: 1-23-08 / 1-23-0 Location: See Exploration Location v.: 313' Datum: NAE Sample Information No. Pen./ Rec. (ft.) Depth (Ft.) Blows (/6") S-1 24/8 0-2 1-1 2-4 S-2 24/14 2-4 10-15 16-17				Other: _								
ţ					Field						ŝ	Equip	ment Insta	llod
Depth	No.	Rec.			Test Data (ppm)	Descripti	Sample on & Classific	cation	Stratum Desc.		Remarks	Equip		liou
	S-1	24/8	0-2		ND	Top 4": TOPSOII		te mendiume	0.5' TOPSOIL SUBSOIL		1		None	
1-	1			2-4		Bottom 4": Orang SAND, some Silt			2'					
2-	S-2	24/14	2-4		ND	Dense, brown, fir	ne to coarse S	· ,	GRAVELLY SAND	(
3-	-			16-17		Gravel, trace Silt			SAND					
4-	S-3	24/16	4-6	13-14	ND	Top 14": Medium	dense, browr	n, fine to						
5-		2 // 10	10	13-14		coarse SAND, so	me Gravel, tra	ace Silt						
6-	-					Bottom 2": Brown and SILT, little G		nedium SAND	6' GLACIAL	_				
7-									TILL					
8-														
9-	S-4	24/8	8-10		ND	Dense, brown/tar and SILT, little G		um SAND						
-														
10-	1													
11-														
12-	-													
13-	S-5	S-3 24/16 4-6 13-14 S-4 24/8 8-10 4-11 S-5 19/16 13-14.7 16-23 S-5 19/16 13-14.7 16-23 S-5 19/16 13-14.7 16-123 S-100/1* 100/1* 100/1*			ND	Very dense, brow								
14-	-	23-21 23-21				SAND and SILT, weathered rock a	some Gravel,	(1-2" of	14.5'					
15-	-	S-4 24/8 8-10 4-11 S-5 19/16 13-14.7 16-23 S-5 19/16 13-14.7 16-23 S-100/1" 16-21 3 S-10 16-21 3 S-10 3 3 S-10 3 3				weathered fock a)	WEATHERE BEDROCK		2			
16-	C-1	S-5 19/16 13-14.7 16-23 55-100/1" C-1 60/0 16-21 3 3 3 3 3				No Recovery					3			
17-	- 0-1	C-1 60/0 16-21 3 3				No Recovery					3			
18-	_			-										
19-														
20-				-										
-				3					21'		4			
21-						End of Exploratio	n at 21'				5			
22-	1										۰			
23-	1													
24-	1													
25-	1													
26-	1													
27 -	1													
28-	1													
29-														
R E M A R K S	sam millio 2. Rolle 16 fe 3. For 4. Core 5. Bore	ple jars u on by vol er bit grin eet. core sam ed bedroo ehole bac	using a Min ume (ppm iding from upling, nun ck from 16 ckfilled with	ni Rae org Iv). ND ind 14.5 to 16 nbers indic to 21 feet h soil cutti	anic vapo dicates no feet on p cated in th t ngs upon	e vapor levels, refe or meter equipped othing detected (<(oossible weathered ne Blows/6" column completion. tive of actual grou	with a photoio 0.1 ppmv). d bedrock. Dri n are rate of c	nization detecto iller indicated th oring in min/ft.	or (PID) and a	10.6 e er wa	eV la	amp. Resu	lts in parts	per
Strati				•				•			nes	Dente 1		7
and u	nder cond	itions state	d. Fluctuatio	ons of ground	dwater may	il types, transitions ma occur due to other fact	ors than those pre-	esent at the time me	easurements we	ere ma	de.	Boring N	o.: GZ-11	(

Fore Logg Date Bori	eman: _ ged by: e Start/F	inish: _	Todd P A. Mi 1-15	chonski		_ Auger/ _ Casing _ Type:	Sampler Split Spoon		GROUND Time		EADINGS	
Logo Date Bori GS E	ged by: Start/F ng Loca	inish: _	<u>A. Mi</u> 1-15	chonski		-	Split Spoop					Ct-l
Date Bori GS E	Start/F	Finish: ation:	1-15							Depth	Casing	Stab
Bori GS E	ng Loc	ation: _S			-08	O.D. / I.D.:		See Note 2				
	Elev.: _	303'		ation Loca	ation Plar	Hammer Wt.:	140 lb.					
Depth			Datu	um: <u>N</u> A	D 1983	_ Hammer Fall:						
Depth		San	ple Inforn	nation		Other:						
Deg		Pen./			Field				ks	Equip	ment Insta	lled
	No.	Rec. (ft.)	Depth (Ft.)	Blows (/6")	Test Data (ppm)	Sample Description & Classifi	cation	Stratum Desc.	Remarks			
	S-1	24/14	0-2	1-2 1-4	ND	Top 8": Dark brown, fine SANI (Topsoil)	D, some Silt	TOPSOIL 0.8'	1		None	
1- 2-				1-4		Bottom 6": Orange/brown, fine SAND, little Silt, trace Gravel (to medium Subsoil)	SUBSOIL				
3-												
4-	S-2	24/20	4-6	8-25	ND	Dense, brown/orange, fine to r	nedium	TILL	2			
5-	02	24/20	- 0	23-30		SAND and SILT, little Gravel	liculum					
6-												
7-												
8-												
	S-3	24/24	8-10	22-35 45-58	ND	Very dense, orange/brown, fin SAND and SILT, some Gravel						
9-				40-00		fractured rock at tip of spoon)	(gray,	10'				
10-								WEATHERE				
11-								DEDITOON				
12-												
13-	S-4	4/4	13-13.4	100/4"	ND	Very dense, orange/brown, fin	e to medium					
14-						SAND and SILT, some Gravel weathered rock fragments at t	(brown/gray					
15						End of Exploration at 15'		15'	3			
16-									4			
17-												
18-												
19-												
20-												
21-												
22-												
23-												
24-												
25 –												
26-												
27 –												
28-												
29-												
R E M A	sam millio 2. Sam 3. Auge	ple jars u on by vol ple S-2 d er refusa	using a Mir ume (ppm observed to I at 15 feet	hi Rae org v). ND ind o be mois t.	anic vapo dicates n t. Groun	c vapor levels, referenced to a b or meter equipped with a photoic othing detected (<0.1 ppmv). dwater level may be at approxim completion.	onization detecto					
Stratific and un	cation lind	es represe	nt approxima d. Fluctuatio	te boundary	between s dwater may	bil types, transitions may be gradual. W occur due to other factors than those p	ater level readings	have been made easurements we	e at times ere made.	Boring N	lo.: GZ-11	8

DEVENS, MASSACHUSETTS

GZA GeoEnvironmental, Inc. Engineers and Scientists

G

GZ-118

19707

Boring No.: ____

File No.: ____

Page: _____ of ____

	4		A En-i-	non4-1 T				EVELOPME			Boring No		-119
Ľ		Ge Eng	oEnvironn gineers and	nental, In l Scientists	c. 7	D	<u>EVENS, M</u>	ASSACHUSI	LTTS		Page: File No.:		
Con	tractor			IHB			Auger/				Check:		
				enticost			Casing	Sampler		GROUN	DWATER R		
				chonski		Туре: _	HW	Split Spoon	Date	Time	Depth	Casing	Sta
			1-21			O.D. / I.D.: _	4.5"/4"	1-3/8"/2"	1/22/08	0730	3.4'	4'	15 hc
		ation: <u>3</u> 09'		um: <u>N</u> A	AD 1983	 Hammer Wt.: _ Hammer Fall: _ 		<u>140 lb.</u> 30"	1/22/08 \$ee Note 5	0900	3.5'	Out	Nor
001													
ا ء		Sam	ple Inforn	nation									
Depth	No.	Pen./ Rec. (ft.)	Depth (Ft.)	Blows (/6")	Field Test Data (ppm)	Descripti	Sample on & Classifi	cation	Stratum Desc.	Remarks	Equip	ment Inst	alled
1- 2-	S-1	24/14	0-2	3-7 13-9	ND	Top 8": Dark brow some Silt, little Re Bottom 6": Brown little Silt, little Gra	oots, trace Gi , fine to medi	ravel (Topsoil) ium SAND,	TOPSOIL 0.8' SUBSOIL	1		None	
3- 4-	S-2	24/18	4-6	21-34 31-28	ND	Very dense, brow and GRAVEL, tra	n, fine to coa		_3'SAND AND GRAVEL	2			
5— 6— 7—				51-20		and GRAVEL, IIa				3			
8- 9-	S-3	3/2	10-10.3	100/3"	ND	Rock Cuttings			7.7' WEATHEREI ROCK				
0-	00	0/2	10 10.0	100/0		End of Exploratio	n at 10.3'		10.3'	4			
11-						·				5			
12-													
13-													
14-													
15-													
16-													
17-													
18-													
19-													
20-													
21 –													
22-													
23-													
24 –													
25 -													
26-													
27 -													
28-													
29-													
R E M A R	sam millio 2. Fallii 3. Rolle 4. Bore	ple jars u on by vol ng head er bit grin hole bac	ising a Mir ume (ppm permeabili ding from kfilled with	ni Rae org v). ND in ity test pe 7.75 feet n soil cutti	anic vapo dicates no rformed fi to 10 feei ngs upon	c vapor levels, refe or meter equipped o othing detected (<c rom 4 to 6 feet. t. Roller bit refusal completion. tive of actual groun</c 	with a photoic).1 ppmv). at 10.3'.	nization detecto	r (PID) and 1	0.6 eV li			
Stratifi	cation line	es represei	nt approxima	te boundary	between s	oil types, transitions ma	y be gradual. W	ater level readings l	have been made	e at times	Boring N	lo.: GZ-11	9

| GZA

LOT 16 DEVELOPMENT

GZ-119 Boring No.:

		GZ	ZA				LOT 16 D	EVELOPMEN	١T		Boring No	.: GZ-^	119A		
	7	Ge	oEnvironr	nental, In	с.	DE	EVENS, M	ASSACHUSE	TTS		Page:	1 of _	1		
	Engineers and Scientists File No.: 19707 Contractor: NHB Auger/ Check: PJM Foreman: Todd Penticost Casing Sampler GROUNDWATER READINGS														
							Auger/	<u> </u>			Check: _	PJN			
						_	Casing	-		GROUND	WATER R	EADINGS			
Log	ged by:		A. Mi	chonski		Туре:	HW	Split Spoon	Date	Time	Depth	Casing	Stab		
Date	e Start/F	inish: _	1-22	-08 / 1-22	-08	O.D. / I.D.:		1-3/8"/2"		ncountere	d				
	-		See Explor					<u>140 lb.</u>	See Note 4	ŀ					
GS	Elev.: _	309'	Datu	um: <u>N</u> A	D 1983	_ Hammer Fall: _		30"							
		San	nple Inform	nation		Other: _									
Ę		Dam (-		Field					ks	Fauin	ment Insta	lled		
Dep	No.	Pen./ Rec. (ft.)	Depth (Ft.)	Blows (/6")	Test Data (ppm)	Descriptio	Sample on & Classifie	cation	Stratum Desc.	Remar	Equip				
	Description Pen./ Depth Blows Test Sample No. Rec. (/5t) (/6t) Data Description & Classification Desc														
	S-1	24/16	1-3		ND			se SAND,	SAND						
3 3' 3' 4- 5- 6- 7- 7- 1															
4-	2- 19-12 some Gravel, trace Silt 3 3 4- 5- 6- 7- 8- 9-														
5-	3 4 4- 5- 6- 7- 8- 9-														
	3 4 4- 5- 6- 7- 8- 9-														
6-	3 3' 4- 5- 5- 6 7- 6 9- 6 10- 11- 12-														
7-	3 3 3 4- 5- 3 6- 7- 8- 9- 10- 11- 11- 12- 13- 1														
8-	1 - S-1 24/16 1-3 14-16 ND Dense, tan/brown, fine to coarse SAND, some Gravel, trace Silt 2 3 3 3 3 3 3 3 4 3 3 4 3 3 4 3 3 4 5 - 6 - 7 8 - - 6 - 6 - 6 - 6 - 6 - 6 - 6 - 6 - 6 - 6 - 6 - 6 - 6 - 6 - 6 - 6 - - 6 - - 6 - - 6 - <td< td=""></td<>														
9-	1 - S-1 24/16 1-3 14-16 ND Dense, tan/brown, fine to coarse SAND, some Gravel, trace Silt 2 3														
10-	3 3' 3' 3 4- 5 5 5 4 6- 6 6 6 6 7- 6 6 6 9- 6 6 6 10- 6 6 6 11- 6 6 6 10- 6 6 6 10- 6 6 6 11- 6 6 6 11- 6 6 6 11- 6 6 6 11- 6 6 6 11- 6 6 6 11- 6 6 6 11- 6 6 6 11- 6 6 6 11- 6 6 6 11- 6 6 6 11- 6 6 6 11- 6 6 6 11- 6 6 6 11- 6 6 6 11- 6 6 6 11- 6 6 6 11- 6 6 6 1														
	1- S-1 24/16 1-3 14-16 ND Dense, tan/brown, fine to coarse SAND, some Gravel, trace Silt 3' 2 3- - - - - - 3' 3 4 5- - - - - - 4 - - 3' 3 4 5- - - - - - - 4 -														
	(ft.) (ft.) <th< td=""></th<>														
12-	(t,) (r,) (r,) <th< td=""></th<>														
13-	1 - S-1 24/16 1-3 14-16 ND Dense, tan/brown, fine to coarse SAND, some Gravel, trace Silt 3 3 3 3 3 3 3 3 3 3 4 3 3 4 3 4 3 4 5 6 7 8 9 0 1 <td< td=""></td<>														
14-	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$														
15-	S-1 24/16 1-3 14-16 ND Derise, tanbrown, inter to coarse SAND, some Gravel, trace Silt 3 3 - - 19-12 Some Gravel, trace Silt 3 4 5- - - - - 3 4 - - 3 4 5- - - - - - - 3 4 - - - - - - 4 -<														
	3 5 6 3 4 5- 6 7 8 6 9- 9 9 9 10- 10 10 10 11- 12 13 14 15- 16 16 16														
	3														
	1														
18-	-														
19-	-														
20-	-														
21-	-														
22-	4														
23-]														
24-	1														
25 –	1														
26-	-														
27 –	-														
28-	-														
29-															
23															
Α	sam millio 2. Relo 3. Bore	ble jars u on by vol cated bo hole bac	using a Mir lume (ppm pring 8 feet ckfilled with	ni Rae org v). ND in south of soil cutti	anic vapo dicates no GZ-119. ngs upon	c vapor levels, refer or meter equipped v othing detected (<0 Advanced casing a completion. n accurate groundv	vith a photoio .1 ppmv). Ind cleaned b	nization detector	(PID) and <i>'</i>	10.6 eV la	mp. Resu	Its in parts	per		
						bil types, transitions may occur due to other facto					Boring N	l o.: GZ-11	9A		

Г

C	74	GGE	ZA eoEnviro ngineers o	onmental, 1 and Scienti	nc. sts	-	Lot 16, Jackso Devens, I	Massachuse			Page: File No.: _	19691	1 .00
For	amanı			eoSearch,		_	Auger/ Casing Type: <u>HSA</u>	Sampler S.S.	Date	GROUN Time	Check: IDWATER R Depth		
Log	ged by:		S	cott Marci	nkus	_ 0	.D. / I.D.:	2" O.D.					
Date	e Start/Fi	nisn: _	-	10-007 1-	7-06	Ham	imer Wt.:	140 lb.	-	_	-		_
	-			atum:			mer Fall: Other:		-				
ŧ	Casing		-	nple Inform	nation	Field	Sample		Stratum	rks	Equip	ment Insta	lled
Depth	Blows	No.	Pen./ Rec. (in.)	Depth (Ft.)	Blows (/6")	Field Test Data	Description & Clas	sification	Desc.	Remarks		FLUSH	1
1 1 1 1		S-1	24/16	0-2	10-17 23-22	ND	4" ASPHALT. Top 4": Brown, fine to r SAND, little Gravel, trac Middle 2": Concrete pie Bottom 6": Brown, fine SAND, little Gravel, trac	ce Silt. eces/dust. to medium	10.3 ASPHALT	1	ACCERT OF CONTRACT OF CONTRACT.	— Backfil	1 0-5'
5-		S-2	24/20	5-7	12-12 13-13	ND	Brown, fine to medium Gravel.	SAND, trace	SAND with GRAVEL			Bentor Filter S 6-17'	
		S-3	21/18	10-11.7	9-15 14-60	ND	Top 4": Saturated, brow medium SAND, trace S Gravel. Bottom 14": Saturated, to medium SAND, little -some Gravel. Refusal at 11.75 feet.	ilt, llttle brown, fine	10.5' SILTY 12' SAND with GRAVEL BEDROCK			Wellsc 7-17'	reen
20							Bottom of Boring at 17	feet.	177				
	sampl	e jars ι	using an	apresent to organic va ndicates no	por meter	equippe	evels, referenced to a be d with a photoionization c 0.1ppmv).	nzene standard detector (PID) a	, measured i nd 10.6 eV la	n the he imp. Re	adspace of s esults in part	sealed soll s per millic	on by

6		G Er	eoEnviro igineers a	nmental, 1 nd Scienti	Inc. sts	-	*	Massachuse	tts		File No.:	<u>1</u> of 19691.	.00
				eoSearch	, Inc.	_	Auger/ Casing	Sampler				EADINGS	
Loa	eman: ged by:		S	cott Marci	nkus	_ 0	Type: <u>HSA</u> D.D. / I.D.; <u>4-1/4"</u>	<u>S.S.</u> 2" O.D.	Date	Time	Depth	Casing	Sta
Date	e Start/F	inish: .	1-1	16-08 / 1-	17-08	Ham	mer Wt.:	140 lb.					
	-				ocation Pla		mer Fall: Other:		-				
			- 1										
Depth	Casing		Pen./	ple Inform	Blows	Field	Sample		Stratum	Remarks	Equip	FLUSH	
Ď	Blows	No.	Rec. (in.)	(Ft.)	(/6")	Test Data	Description & Clas		Desc.	Rem		FLUSF	1
		S-1	24/15	0-2	8-7 12-9	ND	Brown, fine to medium trace-little Silt, trace (+)		3	1		Backfill	iite
5-		S-2	24/16	5-7	9-13 14-17	ND	Brown, fine to coarse S (-) Silt, trace (+) Gravel		SAND with GRAVEL			7.5-3.5 Filter S 3.5-14.	and
- - 10 - - 15 -		S-3	24/16	10-12	13-45 43-40	ND	Top 4": Brown SAND, li trace Gravel. 4-5": Gray SAND. 5-8": Brown SAND, trac (+) Gravel. Bottom 8": Brown, fine	ce Silt, trace to medium	_10'			— Wellsci 4.5-14.	
- 15- -		S-4	24/20	15-17	11-35 19-41	ND	SAND, little Silt, little (+ Brown SAND, little-som little-some Gravel.	ie Silt,	SAND and GRAVEL				
20- 25-							Bottom of Boring at 17	reet.					
REVIARKS	samp	le jars ı	using an i	organic va	otal organi apor meter nothing def	· equippe	evels, referenced to a be d with a photoionization o 0.1ppmv).	nzene standard detector (PID) a	, measured in nd 10.6 eV lan	the head	Ispace of sults in part	sealed soil s per millio	on by

.

GZA GeoEnvi								Test Pit No.	1	TP-10	
Engineers/Scie	ntists			Lot 16 Develop Devens, Massac				Page No. File No.	1	of 19707.	1
One Edgewate	Drive		1	Devens, Massac	nuseus			Checked By:		PJM	
-	sachusetts 02062										
GZA Rep.	Adam Michonski	С	ontractor	Excavatio M.P. Crowley	n Equipmer Corp	nt		Date		1/7	/2008
			perator	Chris Crowley	1			Ground Elev			13'±
Weather	Cool, cloudy, 50's		Iake	CAT	Model	315CL		Time Started		9	:00
		C	apacity	3 cu.yd	Reach	14	ft.	Time Comple	eted	10):00
Depth		Soil D	escription				Sample	PID	F	Boulders:	N7 .
							No.	Reading (ppm)	Excav. Effort	Count/ Class	Note No.
0 0.5	± Dark brown, fine to me	edium SAND some Si	lt_little Gr	avel (TOPSOI)			(ppiii)	LIIOIT	Class	110.
1.2					-)				Е	0	
1'					1 (1997-14)						
2'±	Light brown, fine to me	edium SAND, some G	ravel, som	e Siit, trace Brid	K. (FILL)				Е	1A,1C	
2'											
3'							S-1		E	0	
5							(3')				
4'	Light brown-orange, fin	ne to coarse SAND an	d GRAVE	L, little Silt.					Е	0	
									Е	0	
5'									Б	0	
6'±									Е	0	
- 6'	December		0.1								
7'7'±	Brown, fine to coarse	SAND, little Gravel, ti	race Slit.						Е	0	
,	Tan, fine to coarse SA	ND and SILT, some G	ravel. (GL	ACIAL TILL)					D	0	1
- 8'-											
Q'		Refusal at 8.5	feet.						D	0	2,3
,											
10'											
11'											
11											
12'											
13'									_		
14											
- 15'-											
16'											
Notes:											
1. Slight water	seepage at approximately 7 feet.										
	cket refusal at approximately 8.5 feet										
Test pit back	filled in 2 to 3 foot lifts and tamped w	with excavator bucket upor	n completior	1.							
Te	st Pit Plan	Paulda Cl		p	ortions				GI	ROUNDWATE	R
		Boulder Class etter Size Range			Jsed		F = Fine	previations	(x)	Encountered	
4'	Des	A Classification Classification Classification		TRACE (TR.)	0 -	- 10%	M = Media C = Coarse		()	Not Encounter	ed
		B 18" - 36" C 36" and Larg		LITTLE (LI.)	10	- 20%	V = Very	e to medium	Elapse Time 1		Depth to
•		-					F/C = Fine	to coarse	Readin	ng	Ground-
	IORTH	Excavation Effort EEasy		SOME (SO.)	20	- 35%	GR = Gray BN = Broy	vn	(Hour	s)	water
Volume =	cu. yd.	MModerate DDifficult		AND	35	- 50%	YEL = Ye	llow	L		7'
		D Dimour									
G7	GZA GeoEnvironmental, Inc.										

GZA GeoEnv Engineers/Sc	vironmental, Inc.			Lot 16 Develo	oment			Test Pit No. Page No.	1	TP-10 of	1
0				Devens, Massac				File No.		19707	.00
One Edgewat	ter Drive			· · ·				Checked By:		PJM	[
Norwood, Ma	assachusetts 02062										
			~		n Equipmer	nt		-			
GZA Rep.	Adam Miche	onski	Contractor	M.P. Crowley	*			Date			/2008
Weather	Cool, cloudy	7. 50's	Operator Make	Chris Crowley CAT	Model	315CL		Ground Elev Time Started			42'± 0:15
weather	Cool, cloudy	y, 308	Capacity	3 cu.yd	Reach	<u>313CL</u> 14	ft.	Time Started			0:15
			Capacity	5 cu.yu	Reach	14	n.	Thic Comps	cicu		0.45
Depth		So	il Description				Sample	PID		Boulders:	
<u>,</u>			Ĩ				No.	Reading	Excav.	Count/	Note
0								(ppm)	Effort	Class	No.
0	.5'± Dark brow	wn, fine to medium SAND, some	e Silt, little Gr	avel. (TOPSOI	L/FILL)						
1'									Е	0	
-	D (1.41 0 1	CUDGOU /FU						0	
2'-2	Brown, n .5'±	ine to medium SAND, some Silt,	little Gravel.	(SUBSOIL/FIL	L)				Е	0	
		to medium SAND, some Silt, lit	tle Gravel (F	ПТ)					Е	0	
- 3'		to medium of it (D, some one, ne	tie Gluvel. (1	iee)					2	0	
									Е	3A,2B	
- 4'	Orange-b	rown, fine to coarse SAND and	GRAVEL, litt	le Silt, trace Wo	od. (FILL)					Í	
	-								Е		
- 5											
6' 6'	'±								Е		
6	.5'± Tan, fine	to medium SAND, trace Silt.								↓	
- 7'									Е		1
									М	1C	
- 8'									101	ic	
	Tan-brow	vn, fine to coarse SAND and SIL	T. some Grave	el. (GLACIAL]	TTT)				М	0	
- 9'		,	-,								
									D	0	
10'											
- 11'-									D	0	
11 1	1.5'±								_		
12'	Gray, wea	athered ROCK	10.6						D	0	2,3
		Refusal at	12 reet.								
13'											
— 14'—											
— 15' —											
15											
16'											
Notes:								1			l
		hately 6.5 feet. Excavation side walls		at approximately	8 feet.						
		at 11.5 feet. Excavator bucket refusal its and tamped with excavator bucket		n							
5. Test pit ba	ckrined in 2 to 5 root in	is and tamped with excavator bucket	upon completion								
	Test Pit Plan	Boulder Class		Prop	ortions		Abb	previations	GI	ROUNDWAT	ER
	12'	Letter Size R Designation Classifi		τ	Jsed		F = Fine M = Media			Encountered Not Encounte	red
4'		A 6" -	17"	TRACE (TR.)	0 -	- 10%	C = Coarse				
		B 18" C 36" and		LITTLE (LI.)	10	- 20%		e to medium	Elapse Time		Depth to
	←──	Excavation Effort			20	250/	F/C = Fine GR = Gray		Readin (Hours	ng	Ground- water
	NORTH	EEasy		SOME (SO.)	20	- 35%	BN = Broy	vn	(10dl)		
Volume =	cu. yd.	MDifficult		AND	35	- 50%	YEL = Ye	now			6.5'
	-										
	GZA GeoEnvir	ronmental, Inc.									

GZA GeoEn Engineers/So	vironmental, Inc.			Lot 16 Develo	oment			Test Pit No. Page No.	1	TP-10 of	1
8				Devens, Massac				File No.		19707	
One Edgewa	ater Drive			,				Checked By:		PJM	
	lassachusetts 0206	52						-			
GZA Rep.	Adam Mi	ichonski	Contractor	Excavatio M.P. Crowley	n Equipmen Corp	t		Date		1/7	/2008
1			Operator	Chris Crowley	*			Ground Elev			42'±
Weather	Cool, clou	udy, 50's	Make	CAT	Model	315CL		Time Started			1:00
			Capacity	3 cu.yd	Reach	14	ft.	Time Comple			1:30
			1 5	<u>,</u>							
Depth		Soi	1 Description				Sample	PID		Boulders:	
1			ľ				No.	Reading	Excav.	Count/	Note
0								(ppm)	Effort	Class	No.
0_0).5'± Dark b	prown, fine to medium SAND, some	Silt, little Gr	avel. (TOPSOI	L)				Е	0	
1'											
2'									М	15-20A	
3'		n, fine to coarse SAND and GRAVE Cinder Blocks, Rebar). (FILL)	L, little Silt, (comingled Con	crete, Metal				М		1
4'	1.pe, 0	(* 122)		C W	< N . 1)		S-1		М		
5	5'±			Concrete Wall	(see Note 1)		(4')		М	*	
5									М	0	
6'										0	
- 7'									М		
- 8'									М	0	2
9'	Light k	brown, fine to coarse SAND, some S	Silt_little Gra	vel (GLACIAL	TILL)				М	0	
10'	Light		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		S-2		М	0	
_ 11'							(10')		М	0	
									D	0	
12'									D	0	3
13'		Bottom of Test	Pit at 13 feet.								
<u> </u>											
15'											
<u> </u>											
Notes:											
		untered from 2.5 to 5.5 feet on south and	east sides of te	st pit excavation.							
	ater seepage at approx										
Test pit ba	ackfilled in 2 to 3 foot	t lifts and tamped with excavator bucket u	pon completion	n.							
L				1							
	Test Pit Plan	Boulder Class			ortions			previations		ROUNDWAT	ER
01	14'	Letter Size R Designation Classifi			Jsed		F = Fine M = Mediu	ım		Encountered Not Encounte	red
8'		Ă 6" -	17"	TRACE (TR.)	0 -	10%	C = Coarse				
		B 18" - C 36" and I		LITTLE (LI.)	10 -	20%		e to medium	Elapse		Depth to
	←──						F/C = Fine GR = Gray		Readi	ng	Ground- water
	NORTH	Excavation Effort EEasy		SOME (SO.)	20 -	35%	BN = Brov	vn	(Hour	s)	water
Volume =	cu. yd.	MModerate		AND	35 -	50%	YEL = Yel	llow			8'
	cu. yu.	DDifficult									~
		1								I	
G	GZA GeoEr	nvironmental, Inc.									

	nvironmental, Inc.			L 16D 1				Test Pit No.	<u> </u>	TP-10	
Engineers/S	Scientists			Lot 16 Develop Devens, Massac				Page No. File No.	1	of 19707.	1
One Edgew	ater Drive			Devens, Wassac	luseus			Checked By:		PJM	
_	Aassachusetts 02062										
GZA Rep.	Adam Mich	honski	Contractor	Excavation M.P. Crowley	n Equipmen Corp	ıt		Date		1/7	/2008
r·			Operator	Chris Crowley	<u>r</u>			Ground Elev			42'±
Weather	Cool, cloud	ly, 50's	Make	CAT	Model	315CL		Time Started		1	1:30
			Capacity	3 cu.yd	Reach	14	ft.	Time Comple	eted	12	2:00
		~					~ .		0	D	
Depth		So	oil Description				Sample No.	PID Reading	Excav.	Boulders: Count/	Note
							NO.	(ppm)	Effort	Class	No.
0	0.5'± Dark bro	own, fine to medium SAND, som	ne Silt, little Gr	avel. (TOPSOII	L)			(FF)			
1'									E	0	1
2'									Е	0	
3'			(see Note 1.)						Е	0	
5							S-1		Е	0	
— 4'—							(4')				
5'	O Brown-o	prange, fine to coarse SAND and	GRAVEL, tra	ce to little Silt.					Е	0	
— 6' —	Ĭ,								Е	0	2
7'	7 ft long	g 6" I.D. cast iron pipe at 5.5 ft.							Е	0	
- 8'									Е	0	
9'									Е	0	
101									Е	0	
10'	11'±								Е	0	
- 11'-									М	0	3
- 12'-	Tan, fine	e to medium SAND and SILT, so	ome Gravel. (G	LACIAL TILL)							
13'									М	0	
<u> </u>		Bottom of Test	Pit at 13.5 feet						М		4
— 15'—											
<u> </u>											
Notes:											
1. 16"x16" d	concrete footing with 8"x	x8" pier encountered from 1 to 3 feet.	No noticable diff	ference between exi	isting backfill	led soil direct	ly				
-	to this structure and the s	-		- 4 - C - 1	1) N	11 1100	1.4	1.1. 1 1.000	1		
		at 5.5 feet parallel to north side of te and the surrounding soils.	st pit (one 7'± ler	igin of pipe remove	u). No notica	ible differenc	e between e	xisting backfille	u so11		
	vater seepage at approxin	ě –									
	10 11	ifts and tamped with excavator bucket	upon completion	n.							
	Test Pit Plan	Boulder Class			ortions			reviations		ROUNDWATE	ER
	12'	Letter Size	Range ification		sed		F = Fine M = Mediu			Encountered Not Encounter	ed
6'		A 6"	- 17" ' - 36"	TRACE (TR.)	0 -	10%	C = Coarse V = Very				Depth
			1 Larger	LITTLE (LI.)	10 -	- 20%	F/M = Fine	to medium	Elapse	to	to
		Excavation Effort		SOME (SO.)	20 -	- 35%	F/C = Fine GR = Gray	7	Readin (Hour		Ground- water
	NORTH	EEasy MModerate					BN = Brow YEL = Yel				
Volume =	cu. yd.	DDifficult		AND	35 -	- 50%					11'
	7	-				l				i	
	GZA GeoEnvi	ironmental, Inc.									

GZA GeoEr		ital, Inc.			Lat 16 Develo				Test Pit No.	1	TP-10	
Engineers/S	scientists	_			Lot 16 Develop Devens, Massac				Page No. File No.	1	of 19707.	1
One Edgewa	ater Drive			1	Jevens, massae	nuseus			Checked By:		PJM	
Norwood, N									Checked By.		1 5141	
GZA Rep.		Adam Michonski		Contractor	Excavation M.P. Crowley	n Equipmer	nt		Date		1/7	/2008
ozar nep.	-	Rum Micholiski		Operator	Chris Crowley				Ground Elev	_		42'±
Weather	(Cool, cloudy, 50's		Make	CAT	Model	315CL		Time Started			2:10
	-	, , ,		Capacity	3 cu.yd	Reach	14	ft.	Time Comple			2:50
				1 2					Ĩ			
Depth			Soil	Description				Sample	PID		Boulders:	
								No.	Reading	Excav.	Count/	Note
0									(ppm)	Effort	Class	No.
(0.5'±	Dark brown, fine to medi	um SAND, some S	Silt, little Gra	avel. (TOPSOII	_)				Е	0	
- 1'										Е	0	
2'										Е	0	
3'		6" I.D. cost iron nine at 3	5 6							Е	0	1,2
4'	0	6" I.D. cast iron pipe at 3								Е	0	
		Brown-orange, GRAVEL	and fine to coarse	SAND, trac	e Silt.					М	0	
- 5										М	0	
— 6' —			((see Note 1.)						м	0	
— 7' —										М		
- 8'-										М	0	
9'	9'±									М	0	3
10'		Ton fine to medium SAN	ID and SUT assoc	Crowel (Cl						М	0	
- 11'		Tan, fine to medium SAN	D and SIL1, some	e Gravel. (Gl	LACIAL TILL)					М	0	
-			Bottom of Test Pit	at 11.5 feet.						М	0	4
- 12'-												
13'												
— 14' —												
<u> </u>												
Notes:												
1. 16"x16" c	concrete foo	ting with 8"x8" pier encountered	from 3 to 6 feet. No	o noticable dif	ference between e	xisting backfi	illed soil dired	ctly adjacent	to this structure	and		
	unding soils					8		,,				
	-	encountered at 3.5 feet on north	side of test pit. Pipe	was not remov	ved. No noticable	difference be	etween existin	g backfilled	soil directly ad	jacent to		
		surrounding soils.										
		e encountered at 9 feet.										
4. Test pit b	ackfilled in	2 to 3 foot lifts and tamped with	n excavator bucket up	on completion	L.							
┝───	Test Pit Plar	n I									010-	.
	14'		Boulder Class	70		ortions Jsed			reviations		ROUNDWATH	SK .
11'		Lette Desigr	ation Classifica	tion			10%	F = Fine M = Mediu			Encountered Not Encounter	ed
		AB	6" - 17 18" - 30		TRACE (TR.)	0 -	10%	C = Coarse V = Very		Elapse	-d	Depth
	<u> </u>	č	36" and La		LITTLE (LI.)	10 -	- 20%	F/M = Fine	to medium	Time	to	to
	-		Excavation Effort		SOME (SO.)	20	- 35%	F/C = Fine GR = Gray		Readin (Hour		Ground- water
	NORTH		EEasy		50ML (50.)	20.	3370	BN = Brov YEL = Yel	/n			
Volume =		cu. yd.	MModerate DDifficult		AND	35 -	- 50%	i EL = i el	10 10			9'
	7	I.									<u> </u>	
	G	ZA GeoEnvironmental, Inc.										

GZA GeoEnvironm Engineers/Scientists			Lot 16 Develop	oment			Test Pit No. Page No.	1	TP-1 of	06 1
<u> </u>			Devens, Massac				File No.		19707	
One Edgewater Driv	ve		· · · ·				Checked By:		PJN	
Norwood, Massachu	usetts 02062									
GZA Rep.	Adam Michonski	Contractor	Excavation M.P. Crowley	n Equipmer Corp	nt		Date		1/7	//2008
		Operator	Chris Crowley				Ground Elev		3	43'±
Weather	Cool, cloudy, 50's	Make	CAT	Model	315CL		Time Started			3:15
		Capacity	3 cu.yd	Reach	14	ft.	Time Compl	eted	1	4:20
Dent	0	10				C 1 .	DID	1	D 1.1.	-
Depth	20	oil Description				Sample No.	PID Reading	Excav.	Boulders: Count/	Note
						110.	(ppm)	Effort	Class	No.
0 0.5'±	Dark brown, fine to medium SAND, son	ne Silt, little Gi	ravel. (TOPSOII	_)			41 /			
				,				Е	0	
1								Е	0	
2'										
3'								E	0	
4'		Q	. C'1					Е	0	
5'	Brown-orange, fine to coarse SAND, sor	ne Gravel, littl	e Siit.					Е	0	
5								Е	0	
6'								Е	0	
- 7'										
								Е	0	1
9'								М	0	
10'	Tan-brown, fine to medium SAND and S	SILT, some Gra	avel. (GLACIAL	TILL)				М	0	
- 11'								D	0	
11								_	_	
12'-	Bottom of Test	Pit at 11.5 feet						D	0	2
13'-										
14'										
15'										
16'-										
Notes:							1	1	1	
1. Groundwater seepa	age encountered at 8 feet.									
2. Test pit backfilled	in 2 to 3 foot lifts and tamped with excavator bucket	t upon completio	n.							
Test Pit F	Plan		P					GI	ROUNDWAT	ER
11'	Boulder Class Letter Size	Range		ortions [sed]		F = Fine	previations	(x)	Encountered	
5'		ification - 17"	TRACE (TR.)	0 -	10%	M = Mediu C = Coarse		()	Not Encounte	red
	B 18'	' - 36" 1 Larger	LITTLE (LI.)	10	- 20%	V = Very	e to medium	Elapse Time t		Depth to
↓						F/C = Fine	to coarse	Readin	ng	Ground-
NORT	H Excavation Effort EEasy		SOME (SO.)	20 -	- 35%	GR = Gray BN = Brov	vn	(Hour:	s)	water
Volume =	cu. yd. DDifficult		AND	35 -	- 50%	YEL = Yel	llow			8'
GZ\	GZA GeoEnvironmental, Inc.									

GZA GeoEnvir								Test Pit No.		TP-10	
Engineers/Scie	ntists			Lot 16 Develop				Page No.	1	of	1
0	D			Devens, Massac	husetts			File No.		19707.	
One Edgewater	sachusetts 02062							Checked By:		PJM	
110110000, 11105	suchuseus 02002			Excavatio	n Equipme	nt					
GZA Rep.	Adam Michonsk	ci	Contractor	M.P. Crowley				Date		1/7.	/2008
			Operator	Chris Crowley				Ground Elev		34	42'±
Weather	Cool, cloudy, 50)'s	Make	CAT	Model	315CL		Time Started			:30
			Capacity	3 cu.yd	Reach	14	ft.	Time Comple	eted	3	:00
Depth		Soi	Description				Sample	PID		Boulders:	
Depui		501	Description				No.	Reading	Excav.	Count/	Note
0								(ppm)	Effort	Class	No.
0.3	± Dark brown,	fine to medium SAND, some	Silt, little Gi	ravel. (TOPSOII	L)						
1'									E	0	
1										0	
2'									М	0	
									М	0	
3'										Ű	
- 41									М	0	
4	Brown-orange	e, GRAVEL and SAND, trace	e Silt.								
5'									М	0	
-									м	0	
- 6'									М	0	
									М	0	
— 7'—											
<u>e'</u>									М	0	
8.5	±										
9'									M/D	0	
	Tan-brown, fi	ine to medium SAND and SI	LT, some Gra	avel. (GLACIAL	TILL)				D	0	
10'									D	0	
		Refusal at 1	0.5 feet.						D	0	1,2
— 11'—											,
12'											
12											
13'											
— 14' —											
1.51											
— 15' —											
10											
Notos											
Notes:											
	fusal at 10.5 feet. Possible		1.6								
Test pit back	fined in 2 to 5 foot fifts an	d tamped with excavator bucket u	pon compietio	п.							
	st Pit Plan	Boulder Class			ortions			previations		ROUNDWATE	ER
5'	10'	Letter Size Ra Designation Classific			Jsed	100/	F = Fine M = Mediu	ım		Encountered Not Encounter	ed
		A 6" - 1 B 18" -	17"	TRACE (TR.)	0	- 10%	C = Coarse V = Very		Elapse		Depth
	↑ I	C 36" and L		LITTLE (LI.)	10	- 20%	F/M = Fine	e to medium	Time	to	to
	I	Excavation Effort		SOME (SO.)	20	- 35%	F/C = Fine GR = Gray	7	Readin (Hours		Ground- water
	NORTH	EEasy MModerate					BN = Brow YEL = Yel				
Volume =	cu. yd.	DDifficult		AND	35	- 50%					
GZ	GZA GeoEnvironmo	ental. Inc.									

GZA GeoEnvironn Engineers/Scientist	,		Lot 16 Develo	oment			Test Pit No. Page No.	1	TP-10 of	1
			Devens, Massac				File No.		19707.	00
One Edgewater Dri						_	Checked By:		PJM	
Norwood, Massach	usetts 02062		P	E.	,					
GZA Rep.	Adam Michonski	Contractor	M.P. Crowley	n Equipmen Corp	It		Date		1/7	/2008
OZA Rep.	Adam Micholiski	Operator	Chris Crowley	<u> </u>			Ground Elev			42'±
Weather	Cool, cloudy, 50's	Make	CAT	Model	315CL		Time Started			5:05
,, outlier		Capacity	3 cu.yd	Reach	14	ft.	Time Compl			5:20
		1					1			
Depth	S	oil Description				Sample	PID		Boulders:	
						No.	Reading	Excav.	Count/	Note
0							(ppm)	Effort	Class	No.
0.3'±	Dark brown, fine to medium SAND, son	ne Silt, little Gi	ravel. (TOPSOI	L)				_		
– 1'–								Е	0	
								Б	0	
2'	Brown-orange, fine to coarse SAND and	CPAVEL tro	co Silt					Е	0	
	brown-orange, the to coarse SAND and	OKA VEL, ua	ce sht.					М	0	1
- 3'		(see Note 1.	.) ~					101	0	1
								М	0	
— 4'—			_							
5'					5'±			М	0	
- 6'			I					М	2A	
0										
7'	Brown, fine to coarse SAND, some Grav	el, trace Silt.						М	0	
								М	0	
- 8'-										
9'								М	0	2
								М	0	
10'	Tan-brown, fine to medium SAND and S	SILT, some Gra	avel. (GLACIAL	TILL)					0	
11'	Defeet	11.6.1						D	0	3,4
	Refusal a	it 11 feet.								
12'										
13'										
14'										
15'										
16'										
Notes:							1	I		
	footing with 8"x8" pier encountered from 3 to 6 feet.	No noticable dia	fference between	risting boolet	lled soil dire -	tly adjacer	to this			
structure and the s	° 1		incience between e	visuing DackIII	icu son unec	uy aujacent	10 1115			
 Groundwater seep 	-									
	approximately 11 feet. Possible bedrock encountered	I.								
4. Test pit backfilled	in 2 to 3 foot lifts and tamped with excavator bucke	t upon completio	n.							
	Dies		1							
Test Pit 12'	Boulder Class	D		ortions			previations		ROUNDWATE	ER
5'	Designation Class	Range ification		Jsed	100/	F = Fine M = Media			Encountered Not Encounter	ed
		- 17" ' - 36"	TRACE (TR.)	0 -	10%	C = Coarse V = Very	e	Elapse	ъd	Depth
		1 Larger	LITTLE (LI.)	10 -	- 20%	F/M = Fine	e to medium	Time	to	to
▲	Excavation Effort		SOME (SO.)	20.	- 35%	F/C = Fine GR = Gray	/	Readin (Hours		Ground- water
NORT	TH EEasy					BN = Brow YEL = Ye			-	
Volume =	cu. yd. MModerate DDifficult		AND	35 -	- 50%		**			9'
	GZA GeoEnvironmental, Inc.									

	Invironmental, In	nc.						Test Pit No.		TP-10	
Engineers/S	Scientists			Lot 16 Develop				Page No.	1	of	1
One Edgew	unter Duine			Devens, Massac	husetts			File No. Checked By:		19707. PJM	
-	Massachusetts 0	12062						Checkeu by.		FJIV	
11010000, 1	indistantiasettis o	2002		Excavation	n Equipmen	ıt					
GZA Rep.	Adam	Michonski	Contractor	M.P. Crowley				Date		1/7	/2008
			Operator	Chris Crowley	-			Ground Elev		34	40'±
Weather	Cool,	cloudy, 50's	Make	CAT	Model	315CL		Time Started		1:	5:25
			Capacity	3 cu.yd	Reach	14	ft.	Time Comple	eted	1	5:00
D (1			6 1 D				G 1	DID		D 11	
Depth			Soil Description				Sample No.	PID Reading	Excav.	Boulders: Count/	Note
							140.	(ppm)	Effort	Class	No.
0	0.3'± Da	rk brown, fine to medium SAND,	some Silt, little Gra	avel. (TOPSOII	_)			(11)			
				*	,				Е	0	
- 1'											
- 2'									E	0	
2									_		
3'		ange-brown, fine to coarse SAND	and GRAVEL, trac	ce (+) Silt. App	roximately	10%			Е	0	
	Co	bbles.							Е	0	
- 4'									Б	0	
	5'±								Е	0	
5'											
6'									Е	0	
Ū									F	0	
<u> </u>									Е	0	
									Е	0	
- 8'	Gra	ay-brown, fine to coarse SAND, li	ttle Gravel, trace (-) Silt.							
9'									Е	0	
									Е	0	
10'									-		
— 11'—	11.5'±								E	0	
12'									М	0	1
12	Tai	n, fine to medium SAND and SIL	Г, some Gravel. (G	LACIAL TILL)					М	0	2
13'									101	Ŭ	
— 14'—		Bottom of 7	Cest Pit at 13.5 feet.								
1.51											
- 15'											
16'											
Notes:											
		untered at 11.5 feet.									
Test pit b	backfilled in 2 to 3	foot lifts and tamped with excavator be	icket upon completion	l.							
	Test Pit Plan	Boulder Cla			ortions	T		reviations		ROUNDWATH	R
5'	12'		Size Range Classification		sed	100/	F = Fine M = Mediu	m		Encountered Not Encounter	ed
		Ă B	6" - 17" 18" - 36"	TRACE (TR.)	0 -	10%	C = Coarse V = Very		Elapse		Depth
	Ť		5" and Larger	LITTLE (LI.)	10 -	· 20%		to medium	Time	to	to Ground-
		Excavation Ef	fort	SOME (SO.)	20 -	35%	GR = Gray		Readin (Hours		water
	NORTH	EEasy MModera					BN = Brow YEL = Yel			I	
Volume =	cu. y	yd. DDifficult		AND	35 -	· 50%					11.5'
		I		1						I	
Ĝ	Z GZA Ge	eoEnvironmental, Inc.									

	nvironmental, Inc.						Test Pit No.		TP-11	
Engineers/S	Scientists		Lot 16 Develop Devens, Massac				Page No.	1	of 19707.	1
One Edgew	vater Drive		Devens, Massac	nuseus			File No. Checked By:		19707. PJM	
	Massachusetts 02062						checked by.		1 5101	
		Controctor	Excavation M.P. Crowley	n Equipmen	t		Data		1 /0	/2008
GZA Rep.	Adam Michonski	Contractor Operator	Chris Crowley	Lorp			Date Ground Elev			42008 42'±
Weather	Cool, partly cloudy, 60's	Make	CAT	Model	315CL		Time Started			+2± :10
weather	cool, party cloudy, ou s	Capacity	3 cu.yd	Reach	14	ft.	Time Comple			:25
		cupacity	<u> </u>	1104011		10	rine compr	oteu		.20
Depth		Soil Description				Sample	PID		Boulders:	
						No.	Reading (ppm)	Excav. Effort	Count/ Class	Note No.
0	1.2'± Dark brown, fine to coarse SAND, s	ome Silt, little Grav	vel. (TOPSOIL)					Е	0	
- 1'	Orange-brown, fine to medium SAN	D, some Silt, little	Gravel, little Ro	ots. (SUBSO	OIL)			Е	0	
2'									0	
3'	Orange-brown, GRAVEL and fine to	o coarse SAND, tra	ce Silt. Approxi	mately 5%	Cobbles.			М		
- 4'								М	0	
5'	Bottom of	f Test Pit at 5 feet.						М	0	1
- 6'										
— 7'—										
8'										
9'										
10										
10'										
— 11'—										
- 12'-										
13'										
<u> </u>										
— 15'—										
<u> </u>										
Notes: 1. Test pit l	packfilled in 2 to 3 foot lifts and tamped with excavator b	ucket upon completio	n.							
	Test Pit Plan Boulder Cl 11' Letter			ortions			previations		ROUNDWATE	ER
5'	Designation	Size Range Classification			10%	F = Fine M = Mediu			Encountered Not Encounter	ed
	A B	6" - 17" 18" - 36"	TRACE (TR.)	0 -	1070	C = Coarse V = Very	•	Elapse	ed	Depth
		6" and Larger	LITTLE (LI.)	10 -	20%		to medium	Time	to	to
	Excavation E	ffort	SOME (SO.)	20 -	35%	GR = Gray	,	Readin (Hours		Ground- water
	NORTH EEasy MModer					BN = Brov YEL = Yel				
Volume =	cu. yd. DDifficul		AND	35 -	50%					
	I								1	
G	GZA GeoEnvironmental, Inc.									

GZA GeoEnviron Engineers/Scientis			Lot 16 Develo	oment			Test Pit No. Page No.	1	TP-11 of	1
0			Devens, Massac				File No.		19707.	00
One Edgewater Dr	ive		· · ·				Checked By:		PJM	
Norwood, Massach	nusetts 02062									
				n Equipment	t					
GZA Rep.	Adam Michonski	Contractor	M.P. Crowley	Corp			Date			2008
		Operator	Chris Crowley				Ground Elev			42'±
Weather	Cool, partly cloudy, 60's	Make	CAT	Model	315CL		Time Started			:25
		Capacity	3 cu.yd	Reach	14	ft.	Time Comple	eted	8	:35
Derth		Soil Description				Commis	DID		Dauldana	
Depth		Son Description				Sample No.	PID Reading	Excav.	Boulders: Count/	Note
						140.	(ppm)	Effort	Class	No.
0 0.5'±	Dark brown, fine to coarse SAND, som	ne Silt_little Gra	vel (TOPSOIL)				(ppiii)	Lifeit	Ciuss	110.
0.5 ±	Burk brown, mie to course brit(B, son	ne bin, intie Gru						Е	0	
1'								2	Ŭ	
								Е	0	
2'									-	
	Brown, fine to coarse SAND and GRA	VEL, trace Silt.						Е	0	1
3'					ן ו					
								Е	0	
- 4'					<u> </u>					
-								Е	0	2
5'				-						
								Е	0	
6		(see Note 2.	.)							
7'								М	0	
8'								М	0	
0										
								М	0	3
,	Bottom of T	Test Pit at 9 feet.								
10'										
10										
- 11'										
12'										
13'										
— 14' —										
- 15'										
<u> </u>										
Notes:										
	ning appointered of 2 fact. Name of a 11 - 100	a hatusan a latin l	bool:fill=d=r 'l l'	the odden starts	this -t- t	and d				
	pipe encountered at 3 feet. No noticable difference $\frac{1}{2}$							t to		
	point prior $\frac{1}{2}$ prior	rooung, 8 x8 pier).	ino noucable diff	erence betweet	ii existing ba	ckinied soil	urecuy adjacen	u 10		
	nd the surrounding soils. d in 2 to 3 foot lifts and tamped with excavator buc	ket unon completi-	n							
5. Test pit backfille	a in 2 to 5 root ints and tamped with excavator buc	ket upon completio								
Test Pi	Plan		-					GI	ROUNDWATE	R
13'	Boulder Class	s ize Range		ortions		Abb F = Fine	reviations		Encountered	
7'	Designation Cla	assification	TRACE (TR.)		10%	M = Mediu			Not Encounter	ed
	В	6" - 17" 18" - 36"				C = Coarse V = Very		Elapse	ed	Depth
1 1		and Larger	LITTLE (LI.)	10 -	20%		to medium	Time t	to	to Ground-
	Excavation Effo	ort	SOME (SO.)	20 -	35%	GR = Gray	,	Readin (Hours		water
NOR	TH EEasy					BN = Brov YEL = Yel				
Volume =	cu. yd. MDifficult		AND	35 -	50%	10				
	GZA GeoEnvironmental, Inc.									

GZA GeoE Engineers/S	nvironmental, Inc.			Lot 16 Develo	oment			Test Pit No. Page No.	1	TP-11 of	2
Lingineer s/ c				Devens, Massac				File No.	1	19707.	
One Edgew	ater Drive			Devens, massae	nuseus			Checked By:		PJM	
	Aassachusetts 02062										
				Excavatio	n Equipme	ent					
GZA Rep.	Adam Michonsl	ki	Contractor	M.P. Crowley	Corp			Date		1/8	/2008
			Operator	Chris Crowley				Ground Elev			42'±
Weather	Cool, partly clou	udy, 60's	Make	CAT	Model	315CL		Time Started			:40
			Capacity	3 cu.yd	Reach	14	ft.	Time Comple	eted	8	:55
D 1			15				<i>a</i> 1	DID.		5 11	
Depth		Soi	1 Description				Sample No.	PID Reading	Excav.	Boulders: Count/	Note
- 0	Dark brown,	fine to coarse SAND, some S	lilt, little Grav	vel. (TOPSOIL)				(ppm)	Effort	Class	No.
1'	1.5°±	n, fine to medium SAND, so				SOIL)			Е	0	
2'									Е	0	
3'									Е	0	
4'	Orange-brow	n, fine to coarse SAND and	GRAVEL, tra	ace Silt.					Е	0	
5'									Е	0	
6'									Е	0	1
7'		Bottom of Test	Pit at 6 feet.								
,											
- 8'-											
— 9'—											
10'											
— 11'—											
12'											
— 13'—											
— 14'—											
— 15'—											
- 16'-											
10											
Notes:								-		-	-
1. Test pit b	packfilled in 2 to 3 foot lifts an	nd tamped with excavator bucket u	pon completion	n.							
	Test Pit Plan	Boulder Class		Pro	oortions		Abb	reviations	GF	ROUNDWATH	ER
	11'	Letter Size R Designation Classifi			Jsed		F = Fine M = Mediu			Encountered	ed
7'		A 6" -	17"	TRACE (TR.)	0	- 10%	C = Coarse			Not Encounter	
		B 18" - C 36" and I		LITTLE (LI.)	10	- 20%	V = Very F/M = Fine	to medium	Elapse Time t		Depth to
	←		-				F/C = Fine	to coarse	Readin	ng	Ground-
	NORTH	Excavation Effort EEasy		SOME (SO.)	20	- 35%	GR = Gray BN = Brow	vn	(Hours	5)	water
Volume =	cu. yd.	MModerate DDifficult		AND	35	- 50%	YEL = Yel	low			
		DDifficult									
G	GZA GeoEnvironm	nental, Inc.									

GZA GeoEn Engineers/S	nvironmental, Inc.		Let 16 Decel				Test Pit No.	1	TP-11	
Engineers/S	scientists		Lot 16 Develop Devens, Massac				Page No. File No.	1	of 19707.	1
One Edgew	ater Drive		Devens, Wassae	nuseus			Checked By:		PJM	
	Massachusetts 02062									
				n Equipmen	ıt					
GZA Rep.	Adam Michonski	Contractor	M.P. Crowley	Corp			Date			/2008
		Operator	Chris Crowley				Ground Elev			42'±
Weather	Cool, partly cloudy, 60's	Make	CAT	Model	315CL		Time Started			:00
		Capacity	3 cu.yd	Reach	14	ft.	Time Comple	eted	9	:15
Depth		Soil Description				Sample	PID		Boulders:	
Depui		Son Description				No.	Reading	Excav.	Count/	Note
00		011: 11::1 C	1 (TODGOU)				(ppm)	Effort	Class	No.
	0.3'± Dark brown, fine to coarse SAND, sort 1'± Brown, fine to coarse SAND, little Gr							Е	0	
1'			-					1	Ŭ	
2'								Е	0	
3'								Е	0	
5	Brown, fine to coarse SAND, some G	ravel trace Silt	Approvimately 5	% Cobbles		S-1		Е	0	
4'	brown, fine to coarse SAND, some G	lavel, llace Sht.	Approximatery 5	70 CODDies.		(4')		Е	0	
5'								М	0	
6'								М	0	1
0	Bottom of '	Fest Pit at 6 feet.								
— 7'—										
- 8'-										
9'										
10'										
— 11'—										
12'										
13'										
— 14'—										
14										
— 15'—										
<u> </u>										
Notes:										
1. Test pit b	backfilled in 2 to 3 foot lifts and tamped with excavator but	cket upon completio	n.							
	Test Pit Plan Roulder Class		D	ortions			maniation	GI	ROUNDWATE	ER
		ize Range		Ised		F = Fine	previations	()	Encountered	
4'	Designation C A	lassification 6" - 17"	TRACE (TR.)	0 -	10%	M = Media C = Coarse		(x)	Not Encounter	ed
	В	18" - 36"				V = Very		Elapse		Depth
	← C 36'	and Larger	LITTLE (LI.)	10 -	- 20%	F/M = Fine F/C = Fine	e to medium to coarse	Time Readi		to Ground-
	Excavation Effe	ort	SOME (SO.)	20 -	35%	GR = Gray	,	(Hour		water
	NORTH EEasy MModerate	x				BN = Brow YEL = Ye				
Volume =	cu. yd. MModerati	-	AND	35 -	- 50%					
			1							
C	GZA GeoEnvironmental, Inc.									

GZA GeoE Engineers/S	nvironmental, Inc.			Lot 16 Develop	ment			Test Pit No. Page No.	1	TP-11 of	4
Eligineers/s]	Devens, Massacl				File No.	1	19707.	
One Edgew	ater Drive			,				Checked By:		PJM	
Norwood, N	Massachusetts 02062										
GZA Rep.	Adam Michonsl	ki	Contractor	Excavation M.P. Crowley		nt		Date		1/8	/2008
OZATROP.			Operator	Chris Crowley	Joip			Ground Elev			42'±
Weather	Cool, partly clou	udy, 60's	Make	CAT	Model	315CL		Time Started			:00
			Capacity	3 cu.yd	Reach	14	ft.	Time Comple	eted	9	:30
Depth		Soi	1 Description				Sample No.	PID Reading	Excav.	Boulders: Count/	Note
							INO.	(ppm)	Effort	Class	No.
0	0.5'± Dark brown,	fine to coarse SAND, some S	ilt, little Grav	vel. (TOPSOIL)				(pp)			1101
1'	Drown first	to coarse SAND, some Silt, so	Convel						М	0	
	2'±	to coarse SAIND, some Shi, so	one Graver.						М	0	
2'									М	0	1
3'	Orange-brow	n, fine to coarse SAND and C	GRAVEL, litt	le Silt.					М	0	
4'	(5	see Note 1.)									
5'									М	0	
- 6'		Bottom of Test I	Pit at 5.5 feet.						М	0	2
— 7'—											
8'											
0											
9											
10'											
— 11'—											
- 12'-											
13'											
— 14'—											
<u> </u>											
- 16'-											
10											
Notes:								-		-	
1. 4" wide o	concrete foundation wall encou	untered from 3 to 5.5 feet in the m	iddle of the test	pit going north to	south. No no	oticable diffe	rence betwe	en existing back	filled soil		
	adjacent to this structure and th			100				e			
2. Test pit b	packfilled in 2 to 3 foot lifts an	nd tamped with excavator bucket u	pon completior	1.							
	Test Pit Plan	Boulder Class		Pron	ortions		Δbł	previations	GI	ROUNDWATE	ER
	8'	Letter Size R			sed		F = Fine		()	Encountered	
8'		Designation Classifier A 6" -	17"	TRACE (TR.)	0 -	10%	M = Media C = Coarse			Not Encounter	
		B 18" - C 36" and I		LITTLE (LI.)	10 -	- 20%		e to medium	Elapse Time		Depth to
	→	Excavation Effort					F/C = Fine GR = Gray	to coarse	Readin (Hour	ng	Ground- water
	NORTH	EEasy		SOME (SO.)	20	- 35%	BN = Broy	vn	(Hour	3)	
Volume =	cu. yd.	MModerate DDifficult		AND	35 -	- 50%	YEL = Ye	llow			
G	GZA GeoEnvironm	nental, Inc.									

GZA GeoE		ntal, Inc.		Lot 16 Develop				Test Pit No.		TP-11	5
Engineers/S	Scientists					Page No.	1		1		
One Edam	unter Duine			Devens, Massac	husetts			File No.		19707.	
One Edgew		setts 02062						Checked By:		PJM	
1101 0000, 1	widssachus	643 02002		Excavatio	n Equipme	nt					
GZA Rep.		Adam Michonski	Contractor	M.P. Crowley				Date		1/8	/2008
	•		Operator	Chris Crowley				Ground Elev		3	34'±
Weather		Cool, partly cloudy, 60's	Make	CAT	Model	315CL		Time Started):30
			Capacity	3 cu.yd	Reach	14	ft.	Time Comple	eted	1	1:00
Depth	1		Soil Description				Sample	PID		Boulders:	
Deptil			Son Description				No.	Reading	Excav.	Count/	Note
_ 0 _								(ppm)	Effort	Class	No.
0	0.5'±	Dark brown, fine to coarse SAND,	some Silt, little Gra	vel. (TOPSOIL)							
1'									Е	2C	
1		Brown, fine to coarse SAND, some	e Gravel, some Silt.	(FILL)							
2'	2.5%								Е		
	2.5'± 3.2'±	Brown, fine to medium SAND, so	me Silt_little Gravel	little Roots (BI	IRIED TO	PSOIL)			Е	•	
- 3'	0.22		ine bin, nute church,	nitite recotor (D e		, 501L)					
41		Orange-brown, fine to coarse SAN	D, some Gravel, son	ne Silt, trace Roo	ots.				Е	0	
— 4'—	4.5'±			(1	BURIED S	UBSOIL)					
5'									М	0	
5										0	
- 6'									М	0	
									М	0	
— 7'—	1								101	0	
8'		Brown, GRAVEL and fine to coard	rse SAND, trace Silt.						М	0	
9'									Μ	0	
										0	
10'	-								М	0	
	11'±								М	0	
- 11'-		Tan-brown, fine to medium SAND	and SILT, some Gra	avel. (GLACIAL	TILL)					-	
12'			usal at 11.5 feet.						D	0	1,2
12											
— 13' —	-										
— 14' —	1										
1.51											
— 15' —	1										
<u> </u>											
10											
Nietza											
Notes:											
		untered at 11.5 feet. Possible bedrock enco									
2. Test pit	backfilled in	1 2 to 3 foot lifts and tamped with excavator	bucket upon completio	on.							
	Test Pit Pla	an Boulder	Class		oortions			previations		ROUNDWATE	ER
	13'	Letter Designation	Size Range Classification		Jsed		F = Fine M = Media	ım		Encountered Not Encounter	ed
6'		A B	6" - 17" 18" - 36"	TRACE (TR.)	0	- 10%	C = Coarse V = Very				Depth
	~	C	36" and Larger	LITTLE (LI.)	10	- 20%	F/M = Fine	e to medium	Elapse Time	to	to
	/	Excavation	Effort	SOME (SO.)	20	- 35%	F/C = Fine GR = Gray	/	Readin (Hours		Ground- water
	NORTH	EEasy					BN = Brow YEL = Ye	vn			
Volume =		cu. yd. MDiffi		AND	35	- 50%					11'
		I									
	7	GZA GeoEnvironmental, Inc.									
		JZA GEOEIIVIIOIIIIIEIItäl, IIIC.									

	nvironmental, Inc.			Lot 16 Develop				Test Pit No.		TP-11	
Engineers/S	Scientists					Page No.	1	of	1		
One Edgew	ator Drivo		1	Devens, Massac	nusetts			File No. Checked By:		19707. PJM	
-	Massachusetts 02062							Checked Dy.		1 5101	
1101110000,1				Excavation	1 Equipme	nt					
GZA Rep.	Adam Mich	ionski	Contractor	M.P. Crowley				Date		1/8	/2008
_			Operator	Chris Crowley				Ground Elev.		3:	29'±
Weather	Cool, partly	cloudy, 60's	Make	CAT	Model	315CL		Time Started		1	1:30
			Capacity	3 cu.yd	Reach	14	ft.	Time Comple	eted	1	1:43
Depth		Soi	1 Description				Sample	PID	F	Boulders:	Net
							No.	Reading (ppm)	Excav. Effort	Count/ Class	Note No.
- 0	0.2'± ASPHAI	(T						(ppm)	LIIOIT	Class	140.
									Е	0	
1'											
									Е	0	
2'											
3'	Brown, f	fine to coarse SAND and GRAVE	L, trace Silt. (FILL)					Е	0	
5											
4'									Е	0	
	4.5'±		1.41 0 1						F	0	
5'	$5'\pm$ Brown, f	fine to medium SAND, some Silt,	little Gravel.	(BURIED TOPS	SOIL)				Е	0	
	6'± Brown, f	fine to coarse SAND, some Silt, li	ttle Gravel. (B	SURIED SUBSC	DIL)				Е	0	
- 6'	0±								L	0	
									Е	0	
- 7'	Brown, f	fine to coarse SAND and GRAVE	L, trace Silt.								
	,		<i>.</i>	(see Note 1.)					Е	0	
- 8'-											
9'		Bottom of Test I	Pit at 8.5 feet.						D	0	1,2
10'											
10											
- 11'-											
12'											
13'											
1.41											
— 14' —											
— 15' —											
15											
-											
Notee										1	
Notes:											
		feet. Stopped test pit excavation. No	noticable differe	ence between exist	ing backfille	ed soil directly	adjacent to	this structure an	d the		
	ling soils. backfilled in 2 to 3 foot li	fts and tamped with excavator bucket	mon completion								
2. Test pit t	backfilled III 2 to 5 foot II	its and tamped with excavator bucket	ipon completion								
	Test Pit Plan	Boulder Class		Pron	ortions		Abb	reviations	GF	ROUNDWATH	ER
_	13'	Letter Size R			sed		F = Fine			Encountered	ad
7'		Designation Classifi A 6" -	17"	TRACE (TR.)	0	- 10%	M = Mediu C = Coarse			Not Encounter	
	I	B 18" - C 36" and 1		LITTLE (LI.)	10	- 20%	V = Very F/M = Fine	to medium	Elapse Time t		Depth to
	¥		-				F/C = Fine GR = Gray	to coarse	Readin	ng	Ground- water
	NORTH	Excavation Effort EEasy		SOME (SO.)	20	- 35%	BN = Brow	/n	(Hours	» <i>)</i>	
Volume =	cu. yd.	MDifficult		AND	35	- 50%	YEL = Yel	low			
		2 Dintar									
G	GZA GeoEnvi	ronmental, Inc.									

GZA GeoEnvir	onmental, Inc.							Test Pit No.		TP-11	7
Engineers/Scier	ntists			Lot 16 Develo				Page No.	1	of	1
				Devens, Massac	husetts			File No.		19707.	
One Edgewater	Drive sachusetts 02062							Checked By:		PJM	
Norwood, Wass	sachuseus 02002			Excavatio	n Equipmer	nt					
GZA Rep.	Adam Michonski		Contractor	M.P. Crowley				Date		1/8	/2008
			Operator	Chris Crowley				Ground Elev			36'±
Weather	Cool, partly cloudy, 60's		Make	CAT	Model	315CL		Time Started			2:00
		(Capacity	3 cu.yd	Reach	14	ft.	Time Compl	eted	1	2:30
Depth		Soil I	Description				Sample	PID		Boulders:	
Dopui		5011	Desemption				No.	Reading	Excav.	Count/	Note
0	± Dark brown, fine to coarse SAND, so	me Sil	t little Grav	vel (TOPSOIL)				(ppm)	Effort	Class	No.
0.5		ine si	it, intite Ofa						Е	0	
- 1'											
2'		6" C	Concrete Wa	all					Е	0	1
_	Brown, fine to coarse SAND and GRAVEL, little Silt.	T.	Orange-b	rown, fine to me	idum SAN	D some			Е	0	
3'	GRAVEL, Inte Ont.	1		Gravel. (BURI					L	0	
									Е	0	
+			D						N	0	
5' 5.5'	±		trace Silt.	ine to coarse SA	ND, some C	fravel,			М	0	
6'									М	0	
71	Brown, fine to coarse SAND.								М	0	
									м	0	2
8'	Bottom of	Test P	it at 8 feet.						М	0	2
9'											
10'											
- 11'											
- 12'-											
13'											
<u> </u>											
- 15'											
<u> </u>											
Notes:											
1. 6" concrete fo	bundation wall encountered from 2.5 to 5.5 feet. No ne	oticable	e difference b	etween existing ba	ckfilled soil d	lirectly adjace	ent to west s	ide of this struct	ure and the	2	
surrounding s 2. Test pit backf	soils. Filled in 2 to 3 foot lifts and tamped with excavator but	aket	on committee	n							
2. Test pit backi	inted in 2 to 5 root ints and tamped with excavator but	ckei up	on completio								
Tas	st Pit Plan										-D
	Boulder Clas	ss Size Rang	ge		oortions Jsed		Abb F = Fine	previations		ROUNDWATH	sĸ
9'		lassificat 6" - 17	tion	TRACE (TR.)	0 -	10%	M = Media C = Coarse			Not Encounter	red
	В	18" - 36 and La	6"		10	20%	V = Very	e to medium	Elapse		Depth to
			1501	LITTLE (LI.)		- 20%	F/C = Fine	to coarse	Time Readin	ng	Ground-
N	VORTH Excavation Effe			SOME (SO.)	20	- 35%	GR = Gray BN = Brow	vn	(Hour	s)	water
Volume =	cu. yd. DDifficult	e		AND	35	- 50%	YEL = Ye	llow			
GZ	GZA GeoEnvironmental, Inc.										

GZA GeoEnviron			Lat 16 Danala				Test Pit No.	1	TP-11	
Engineers/Scienti	SIS		Lot 16 Develo Devens, Massa				Page No. File No.	1	of 19707.	1
One Edgewater D	rive		Devens, wassa	Inuseus			Checked By:		PJM	
Norwood, Massac							chiera Dy.		1011	
GZA Rep.	Adam Michonski	Contractor	Excavatio M.P. Crowley	n Equipmer Corp	nt		Date		1/8	/2008
		Operator	Chris Crowley	<u> </u>			Ground Elev			30'±
Weather	Cool, partly cloudy, 60's	Make	CAT	Model	315CL		Time Started	I	1.	3:30
		Capacity	3 cu.yd	Reach	14	ft.	Time Compl	eted	14	4:00
								I		
Depth		Soil Description				Sample	PID Decision	D ecourt	Boulders:	Mata
						No.	Reading (ppm)	Excav. Effort	Count/ Class	Note No.
0 <u>0.2'±</u>	ASPHALT					S-1	(ppiii)	Lifort	Class	110.
0.7'±	Brown, fine to medium SAND, some S	ilt, some Gravel	, trace Roots. (T	OPSOIL)		(0.5')		М	0	
- 1'	Orange-brown, fine to medium SAND,									
1.8'±	Orange-brown, fine to medium SAND,	some sm, some	Glavel, trace K	.001s. (SUB:	SOIL)			М	0	
2										
3'								М	0	
									0	
— 4' —								М	0	
								М	0	
5'	Brown, fine to coarse SAND, some Gra	wel, trace Silt.					-			
						S-2		М	0	
6						(6')				
- 7'								М	0	
8'					М	0				
					М	0				
9'9.5'±									0	
10'								М	0	1
- 11'	Tan-brown, fine to medium SAND and	SILT, little Gra	vel. (GLACIAL	TILL)				М	0	
12'								М	0	
	Refusal a	at 12.5 feet.						D	0	2,3
13'										7-
<u> </u>										
15'										
16'										
10										
Notes:							•		•	
 Groundwater en 	countered at 9.5 feet.									
	t refusal at 12.5 feet. Possible bedrock encountered.									
3. Test pit backfille	ed in 2 to 3 foot lifts and tamped with excavator buck	et upon completion	n.							
Test P	it Plan				GI	ROUNDWATI	R			
13'	Boulder Class Letter Siz	e Range		portions Used		F = Fine	previations	(x)	Encountered	
6'	Ă 6	sification 5" - 17"	TRACE (TR.)	0 -	10%	M = Mediu C = Coarse		()	Not Encounter	ed
	B 1	8" - 36" nd Larger	LITTLE (LI.)	10.	- 20%	V = Very	e to medium	Elapse Time		Depth to
/						F/C = Fine GR = Gray	to coarse	Readi	ng	Ground- water
NOF			SOME (SO.)	20 -	- 35%	BN = Brov	vn	(Hour	8)	walci
Volume =	cu. yd. MDifficult		AND	35 -	- 50%	YEL = Yel	llow			9.5'
GZ	GZA GeoEnvironmental, Inc.									

GZA GeoEnviro			Lat 16 Danala				Test Pit No.	1	TP-11	
Engineers/Scient			Lot 16 Develo Devens, Massa				Page No. File No.	1	of 19707.	1
One Edgewater I	brive		Devens, Massa	indsetts			Checked By:		PJM	
Norwood, Massa										
CZA Der	Adam Mishandri	Controlation		n Equipme	nt		Data		1/0	2008
GZA Rep.	Adam Michonski	Contractor Operator	M.P. Crowley Chris Crowley	A		<u> </u>	Date Ground Elev			/2008 40'±
Weather	Cool, cloudy, light rain, 50's	Make	CAT	Model	315CL	<u> </u>	Time Started			40± 3:25
,, edulor	essi, cloudy, light full, 500	Capacity	3 cu.yd	Reach	14	ft.	Time Comple			3:45
						<u> </u>				
Depth	So	oil Description				Sample	PID		Boulders:	
						No.	Reading	Excav.	Count/	Note
0							(ppm)	Effort	Class	No.
	Brown, fine to medium SAND, some Sil	t, some Gravel	. (FILL)					Е	0	
2'±								М	0	
2'								IVI	0	
3'								М	0	
								М	0	
								М	0	
5'	Brown, fine to coarse SAND and GRAV			105.6.4	``			м	0	
- 6'	(6" brown, fine to coarse SAND, some G	ravel, trace (-)	Slit layer at 3 a	10 9.5± Ieei)			М	0	
- 7'								М	0	
8'					М	1B				
0'						М	0			
10'±								М	0	
10'										
- 11'	Tan-brown, fine to medium SAND and S	SILT, little Gra	vel. (GLACIAL	TILL)				М	1C	
- 12'-								М	0	
13'	Refusal at	12.5 feet.						М	0	1,2
14'										
- 15'-										
16'										
Notos										
Notes:										
	et refusal at 12.5 feet. Bedrock encountered. ed in 2 to 3 foot lifts and tamped with excavator bucket		_							
2. Test pit backin	ed in 2 to 5 foot ints and tamped with excavator bucket	upon completio	11.							
	Pit Plan		1							
14 Test	Boulder Class	Range		portions Jsed		Abb F = Fine	previations		ROUNDWATI Encountered	ER
6'	Designation Classi	ification - 17"	TRACE (TR.)		- 10%	M = Media C = Coarse			Not Encounter	red
	B 18'	- 36"				V = Very		Elapse		Depth
.	C 36" and	l Larger	LITTLE (LI.)	10	- 20%	F/C = Fine		Time Readi		to Ground-
NC	RTH EEasy		SOME (SO.)	20	- 35%	GR = Gray BN = Broy		(Hour		water
Volume =	MModerate		AND	35	- 50%	YEL = Ye				
	cu. yu. DDifficult									
GZ	GZA GeoEnvironmental, Inc.									
	GLA GeoEnvironmental, Inc.									

GZA GeoEnvironm Engineers/Scientists			5				0 1			
			Lot 16 Develop Devens, Massac			<u> </u>	File No.			
One Edgewater Driv	ve		.,			<u> </u>	Checked By:		PJM	
Norwood, Massachu							,			
GZA Rep.	Adam Michonski	Contractor	Excavatio M.P. Crowley	n Equipment Corp			Date		1/9	/2008
F-		Operator	Chris Crowley	- • · P			Ground Elev	_		4'±
Weather	Cool, cloudy, light rain, 50's	Make	CAT	Model	315CL		Time Started			:00
,, eather	2001, 010449, 11gin 14in, 005	Capacity	3 cu.yd	Reach	14	ft.	Time Comple			:15
		cupacity	5 cu.yu	Reach		11.	Thile Compi	eieu		.15
Depth	S	oil Description				Sample	PID		Boulders:	
Deptil		on Description				No.	Reading	Excav.	Count/	Note
						110.	(ppm)	Effort	Class	No.
0							(ppiii)	Liton	Cluss	110.
1'±	Dark brown, fine to medium SAND, sor	ne Silt, little Gi	ravel. (TOPSOIL	.)				Е	0	
1'								Ľ	0	
	Orange-brown, fine to medium SAND,	omo Crovol ac	ma Silt (SUDS)					Е	0	
2' 2 5'	Orange-brown, fine to medium SAND,	some Graver, sc	one snt. (SODS	OIL)				Б	0	
2 2.5'±								Е	0	
3'								E	0	
	Orange-brown, fine to coarse SAND and	l GRAVEL, tra	ce Silt.					Б	0	
4'-4.5'								Е	0	
4 4.5'±									0	
5'								E	0	
-		~ ~ ~							0	
- 6'	Tan, fine to coarse SAND, little Gravel,	trace Silt.						Е	0	
								-		
— 7' — ^{7'±}								Е	0	1
								М	0	
- 8'	Tan-brown, fine to medium SAND and		avel (GLACIAI	TILI)				IVI	0	
	Tail-blown, line to medium SAND and	SIL1, Some Ora	avel. (OLACIAL	TILL)				М	0	
- 9'								IVI	0	
								D	0	2,3
10'	Refusal	at 10 feet.						D	0	2,5
	Terusur									
— 11'—										
12'										
13'										
1.41										
— 14' —										
15'										
— 15' —										
16										
- 16'										
Notes:										
1. Groundwater enco	untered at 7 feet.									
	refusal at 10 feet. Bedrock encountered.									
	in 2 to 3 foot lifts and tamped with excavator bucket	t upon completio	n.							
	r r									
Test Pit F	Plan		P		I			GI	ROUNDWATE	R
12'	Boulder Class	Range		ortions Jsed		Abb F = Fine	reviations		Encountered	
5'	Designation Class	sification	TRACE (TR.)	0 - 1	0%	M = Mediu			Not Encounter	ed
		" - 17" " - 36"	INTEL (IR.)	0 - 1	0.0	C = Coarse V = Very		Elapse	•d	Depth
ĸ		d Larger	LITTLE (LI.)	10 - 2	20%	F/M = Fine	to medium	Time	to	to
	Excavation Effort		SOME (SO.)	20 - 3	35%	F/C = Fine GR = Gray		Readin (Hours		Ground- water
NORT	H EEasy		50ME (50.)	20-2	5570	BN = Brow YEL = Yel	/n			
Volume =	cu. yd. MModerate DDifficult		AND	35 - 5	50%	1 LL = 1 el	юw			7'
	GZA GeoEnvironmental, Inc.									

GZA GeoE		ntal, Inc.			Lot 16 Develo				Test Pit No.		TP-12	
Engineers/S	Scientists	_			Page No.	1	-	1				
One Edgew	ator Drive				Devens, Massac	husetts			File No. Checked By:		19707. PJM	
Norwood, N									Checkeu by.		I JIVI	
					Excavatio	n Equipmer	nt					
GZA Rep.		Adam Michonski		Contractor	M.P. Crowley	Corp			Date		1/9	/2008
				Operator	Chris Crowley				Ground Elev			11'±
Weather		Cool, cloudy, light rain,	50's	Make	CAT	Model	315CL		Time Started			:20
				Capacity	3 cu.yd	Reach	14	ft.	Time Comple	eted	9	:35
Depth			Soil	Description				Sample	PID		Boulders:	
Depui			301	Description				No.	Reading	Excav.	Count/	Note
0	0.7'±	Dark brown, fine to m	edium SAND some	Silt_little Gr	avel (TOPSOII)			(ppm)	Effort	Class	No.
-	0.7 =	Duni crown, nie to n		Shiq hitle Of		.)				Е	0	
- 1'		Orange-brown, fine to	medium SAND, sor	ne Gravel, so	ome Silt. (SUBS	OIL)						
- 21	2'±									Е	0	
2											0	
3'										E	0	
4'		Brown, fine to coarse	SAND and GRAVE	L, trace Silt.						Е	0	
										Е	2B,4A	
5'											,	
6'	6'±									Е		
7'										М		
,		Tan-brown, fine SAN (GLACIAL TILL)	D and SILT, little Gr	avel. Approx	ximately 5 to 10	% Cobbles.				М		
- 8'-	- 8'- (GLACIAL TILL)									101		
9'			Refusal at	0 faat						D	•	1,2
			Refusal at	9 1001.								
10'												
— 11'—												
- 12'-												
<u> </u>												
— 14'—												
1.51												
— 15' —												
<u> </u>												
Notes:												
1. Excavato	or bucket re	fusal at 9 feet. Bedrock enco	untered.									
2. Test pit b	backfilled ir	a 2 to 3 foot lifts and tamped	with excavator bucket u	pon completion	n.							
	Test Pit Pla	ın	Boulder Class		Prov	oortions		A 1-1	previations	GI	ROUNDWATE	ER
	12'		Letter Size Ra			Jsed		F = Fine			Encountered	
5'			A 6" - 1	17"	TRACE (TR.)	0 -	10%	M = Media C = Coarse			Not Encounter	
			B 18" - 18 C 36" and L		LITTLE (LI.)	10 -	- 20%	V = Very F/M = Fine	e to medium	Elapse Time		Depth to
	•	·		-				F/C = Fine GR = Gray	to coarse	Readi	ng	Ground- water
	NORTH		Excavation Effort EEasy		SOME (SO.)	20 -	- 35%	BN = Broy	vn	(Hour	s)	water
Volume =		cu. yd.	MModerate DDifficult		AND	35 -	- 50%	YEL = Ye	llow			
L *			DDifficult									
		GZA GeoEnvironmental, Inc.										

GZA GeoEn Engineers/S	nvironmental, Inc.			Lot 16 Develop	oment			Test Pit No. Page No.	1	TP-12 of	1
]	Devens, Massac				File No.		19707.	
One Edgewa								Checked By:		PJM	
Norwood, M	lassachusetts 02062										
CZA Der	A dam Mishan	.1.:	Controlator		n Equipmer	nt		Data		1/0	/2008
GZA Rep.	Adam Michons	SKI	Contractor Operator	M.P. Crowley Chris Crowley	Corp			Date Ground Elev			/2008 07'±
Weather	Cool, cloudy, li	ight rain, 50's	Make	CAT	Model	315CL		Time Started			:45
() outifor	<u></u>		Capacity	3 cu.yd	Reach	14	ft.	Time Comple):00
Depth		Soi	1 Description				Sample	PID		Boulders:	
							No.	Reading	Excav.	Count/	Note
0	Dark brown	, fine to medium SAND, some	Silt little Gr	avel (TOPSOII)			(ppm)	Effort	Class	No.
11	l'±	wn, fine to medium SAND, some							Е	0	
		with the to medium britter, so	ine Gravei, so		51L)				Е	0	
2									Е	0	
3'	Duran Car		T. (C'1)						F	0	
4'	Brown, fine	to coarse SAND and GRAVE	L, trace Siit.						E		
5'									E	0	
6'-	5.5'±								Е	0	
7'									М	0	1
01	Tan-brown,	fine SAND and SILT, little G	ravel. (GLAC	IAL TILL)					D	0	2,3
- 8'		Refusal at	8 feet.								
- 9'-											
10'											
11'											
12'											
— 13'—											
— 14'—											
<u> </u>											
<u> </u>											
Notes											
Notes:											
	ater seepage encountered at (
	r bucket refusal at 8 feet. Be ackfilled in 2 to 3 foot lifts a	arock encountered. and tamped with excavator bucket u	non completion	n.							
5. Test pit of			ipon compiction								
	Test Pit Plan								0	ROUNDWATH	D
	10'	Boulder Class Letter Size R	ange		ortions		Abb F = Fine	previations		Encountered	
5'		Designation Classifi A 6" -	cation	TRACE (TR.)	0 -	- 10%	M = Mediu C = Coarse			Not Encounter	ed
	I	B 18" - C 36" and I	36"		10	- 20%	V = Very	e to medium	Elapse		Depth
			Jurger	LITTLE (LI.)	10	- 20%	F/C = Fine	to coarse	Time Readi	ng	to Ground-
	NORTH	Excavation Effort EEasy		SOME (SO.)	20	- 35%	GR = Gray BN = Broy	vn	(Hour	s)	water
Volume =	cu. yd.	MModerate DDifficult		AND	35	- 50%	YEL = Yel	llow			6.5'
	I			I			L			<u> </u>	
G	GZA GeoEnviron	mental, Inc.									

GZA GeoEn Engineers/Sc	vironmental, Inc.			Lot 16 Develop	oment			Test Pit No. Page No.	1	TP-12 of	1
				Devens, Massac				File No.		19707.	00
One Edgewa								Checked By:		PJM	
Norwood, M	assachusetts 02062			P	F						
GZA Rep.	Adam Michonsl	ki	Contractor	M.P. Crowley	n Equipmer	nt		Date		1/9	/2008
OZA Rep.	Adam Wichonsk	KI	Operator	Chris Crowley	<u>^</u>			Ground Elev			03'±
Weather	Cool, partly clou	udy, light rain, 50's	Make	CAT	Model	315CL		Time Started):10
			Capacity	3 cu.yd	Reach	14	ft.	Time Comple	eted	10):30
Depth		So	il Description				Sample	PID	-	Boulders:	
							No.	Reading	Excav. Effort	Count/ Class	Note No.
0	. Dark brown,	fine to medium SAND, som	e Silt, little Gr	ravel. (TOPSOIL)			(ppm)			INO.
- 1'	Έ	n, fine to medium SAND, so							E	1C	
2' 2'	'±				,				E	0	
3'	Brown, fine t	to coarse SAND and GRAVI	EL, trace Silt.						E	0	
4'									E	0	
5'5	'±								Е	0	1
6'	Trans Constant								М	0	
7'	Tan, fine to f	nedium SAND and SILT, so	ille Glavel. (G	ILACIAL TILL)					М	0	
8'		Refusal at	7.5 feet.						D	0	2,3
- 9'											
10'											
- 11'											
12'											
13'											
— 14' —											
15'											
<u> </u>											
Notes:											
	ter seepage encountered at 5										
	bucket refusal at 7.5 feet. B			_							
5. Test pit ba	ickfilled in 2 to 3 foot lifts an	nd tamped with excavator bucket	upon completion	n.							
	Test Pit Plan			n					CI	ROUNDWATE	R
	12'	Boulder Class Letter Size I			ortions Jsed		F = Fine	previations	(x)	Encountered	
6'		Ă 6"	fication - 17"	TRACE (TR.)	0 -	- 10%	M = Media C = Coarse		()	Not Encounter	ed
			- 36"	LITTLE (LI.)	10	- 20%	V = Very	e to medium	Elapse Time		Depth to
	←						F/C = Fine	to coarse	Readi	ng	Ground-
	NORTH	Excavation Effort EEasy		SOME (SO.)	20	- 35%	GR = Gray BN = Broy	vn	(Hour	s)	water
Volume =	cu. yd.	MModerate DDifficult		AND	35	- 50%	YEL = Yel	llow			5'
				1						I	
	GZA GeoEnvironm	iental, Inc.									

GZA GeoE Engineers/S		tal, Inc.			Lot 16 Develo	mont			Test Pit No. Page No.	1	TP-12 of	
Engineers/3	Scientists	_			Devens, Massac				File No.	1	19707	1
One Edgew	vater Drive				Devens, Massac	nuseus			Checked By:		PJN	
Norwood, N		etts 02062							cheened by		101	
					Excavatio	n Equipmer	nt					
GZA Rep.	I	Adam Michonski		Contractor	M.P. Crowley				Date		1/9	/2008
_	-			Operator	Chris Crowley	-			Ground Elev		2	99'±
Weather	(Cool, cloudy, light rai	n, 50's	Make	CAT	Model	315CL		Time Started		1	1:15
				Capacity	3 cu.yd	Reach	14	ft.	Time Comple	eted	1	1:30
Depth			Soi	1 Description				Sample	PID	_	Boulders:	
								No.	Reading	Excav.	Count/	Note
- 0									(ppm)	Effort	Class	No.
	11.	Dark brown, fine to	medium SAND, some	silt, little Gr	avel. (TOPSOII	.)					0	
- 1'	1'±									Е	0	
	21.	Orange-brown, fine	e to medium SAND, so	me Gravel, so	me Silt. (SUBS	OIL)				Б	2D 1C	
- 2'	2'±									Е	3B,1C	
										Е		
- 3'										Ľ		
		Brown, fine to coar	se SAND, some Grave	l. trace Silt. A	opproximately 5	to 10% Coł	bbles.			Е		
- 4'		,, _,		-,								
										Е		
5'	5.5'±											
61										М	•	
0												
7'										М	2B,2C	
											L T	
- 8'-		T 1 C .				М						
		Tan-brown, fine to	medium SAND and SI	L1, some Gra	ivel. (GLACIAL	TILL)		S-1		м		
<u> </u>								S-1 (9')		М		
								(9)		М		
10'										141		
										М		
- 11'-												
12			Bottom of Test P	it at 11.5 feet						М	•	1
- 12'-												
— 13' —												
15												
— 14' —												
— 15' —												
- 16' -												
Notes:												
1 Test nit l	backfilled in	2 to 3 foot lifts and tamp	ed with excavator bucket	non completion	1							
ii iost pit t	ouennieu m	2 to 5 100t into and amp		.pon compiction								
	Test Pit Plan	1	Boulder Class			ortions		Abl	previations	GI	ROUNDWAT	ER
	11'	- I	Letter Size R Designation Classifi			Ised		F = Fine M = Mediu			Encountered Not Encounte	red
5'			A 6" -	17"	TRACE (TR.)	0 -	10%	C = Coarse				
			B 18" - C 36" and 1		LITTLE (LI.)	10 -	- 20%	V = Very F/M = Fine	e to medium	Elapse Time t		Depth to
	/			-				F/C = Fine	to coarse	Readin	ng	Ground-
	NORTH		Excavation Effort EEasy		SOME (SO.)	20 -	- 35%	GR = Gray BN = Brow	vn	(Hour:	s)	water
Volume =		cu. yd.	MModerate DDifficult		AND	35 -	- 50%	YEL = Yel	llow		I	
			Dillicuit									
												
	Z G	ZA GeoEnvironmental, I	inc.									

GZA GeoEnviron			1.165.1				Test Pit No.		TP-12	
Engineers/Scientis	ts		Lot 16 Develop				Page No.	1	of	1
One Edgewater Dr			Devens, Massac	husetts			File No. Checked By:		19707. PJM	
Norwood, Massach							Checked By.		1 5101	
GZA Rep.	Adam Michonski	Contractor	Excavatio M.P. Crowley	n Equipmer Corp	nt		Date		1/9	/2008
F-		Operator	Chris Crowley	· F			Ground Elev			11'±
Weather	Cool, cloudy, light rain, 50's	Make	CAT	Model	315CL		Time Started			2:00
		Capacity	3 cu.yd	Reach	14	ft.	Time Comple	eted	12	2:15
Depth		Soil Description				Sample	PID	F	Boulders:	Net
						No.	Reading (ppm)	Excav. Effort	Count/ Class	Note No.
0	Dark brown, fine to medium SAND, s	ome Silt, little Gi	ravel. (TOPSOIL	.)			(ppiii)			110.
1'±	, , ,	,		,				E	0	
2'	Orange-brown, fine to medium SAND	, some Gravel, so	ome Silt. (SUBS	OIL)				Е	0	
3'								Е	0	
	Brown, fine to coarse SAND and GRA	VEL, trace Silt.						Е	3C	
4								Е		
5' <u>5.5'</u> ±								М		
6'										
- 7'								М		
- 8'	Tan-brown, fine to medium SAND and	d SILT, some Gra	avel. (GLACIAL	TILL)				М		
9'					М		1			
10'								D	*	2,3
10	Refusa	l at 10 feet.								
- 11'										
- 12'-										
13'										
<u> </u>										
15'										
— 16'—										
Notes:							-	-	-	
 Groundwater see 	page encountered at 9 feet.									
	refusal at 10 feet. Bedrock encountered.									
	d in 2 to 3 foot lifts and tamped with excavator buc	ket upon completio	n.							
Test Pit	Plan							CI	ROUNDWATE	R
10'	Boulder Class Letter S	ize Range		ortions Jsed		Abb F = Fine	previations		Encountered	
4'		assification 6" - 17"	TRACE (TR.)	0 -	10%	M = Mediu C = Coarse			Not Encounter	ed
	В	18" - 36"				V = Very		Elapse		Depth
	C 36"	and Larger	LITTLE (LI.)	10 -	- 20%	F/C = Fine		Time Readin		to Ground-
NOP	Excavation Effor TH EEasy	ort	SOME (SO.)	20 -	- 35%	GR = Gray BN = Broy		(Hour		water
NOR Volume =	TH EEasy MModerate DDifficult		AND	35 -	- 50%	YEL = Yel				9'
	I		1					I		
GZ \	GZA GeoEnvironmental, Inc.									

	nvironmental, Inc.						Test Pit No.		TP-12	.6
Engineers/S	cientists		Lot 16 Develop				Page No.	1	of	1
One Edgewa	ator Driva		Devens, Massac	husetts			File No. Checked By:		19707. PJM	
	Jassachusetts 02062						Checkeu by.		I JIVI	
		Gardenstein		n Equipmer	nt		Dete		1/0	/2008
GZA Rep.	Adam Michonski	Contractor Operator	M.P. Crowley Chris Crowley	Corp			Date Ground Elev			/2008)0'±
Weather	Cool, cloudy, light rain, 50's	Make	CAT	Model	315CL		Time Started			5:00
		Capacity	3 cu.yd	Reach	14	ft.	Time Comple			5:15
Depth		Soil Description				Sample No.	PID Reading	Excav.	Boulders: Count/	Note
0							(ppm)	Effort	Class	No.
1'	1'± Dark brown, fine to medium SAN	D, some Silt, little G	ravel. (TOPSOIL)				Е	0	
								E	0	
3'	Brown, fine to coarse SAND and	GRAVEL, trace Silt,	trace Roots.					Е	0	
								Е	0	
4'	5'±							Е	0	
5'	-							М	0	
- 6'										
— 7'—	Tan-brown, fine to medium SANI	D and SIL1, some Gra	avel. (GLACIAL	TILL)				М	0	
- 8'-								М	0	
9'	Re	fusal at 8.5 feet.						М	0	1,2
10'										
— 11'—										
12'-										
13'										
<u> </u>										
15'										
- 16'-										
Notes:										
1. Excavator	r bucket refusal at 8.5 feet. Bedrock encountered.									
2. Test pit b	ackfilled in 2 to 3 foot lifts and tamped with excavato	or bucket upon completio	n.							
			-							
	Test Pit Plan Boulder 10' Letter			ortions		Abb F = Fine	previations		ROUNDWATE Encountered	ĨR
5'	Designation	Size Range Classification	TRACE (TR.)		10%	M = Mediu			Not Encounter	ed
	A B	6" - 17" 18" - 36"				C = Coarse V = Very		Elapse		Depth
	c c	36" and Larger	LITTLE (LI.)	10 -	- 20%	F/C = Fine		Time Readin	ng	to Ground-
	NORTH EEasy		SOME (SO.)	20 -	- 35%	GR = Gray BN = Brow		(Hour		water
Volume =	cu. yd. DDiff	derate	AND	35 -	- 50%	YEL = Yel				
	·	Kun								
G	GZA GeoEnvironmental, Inc.									

	nvironmental, Inc.							Test Pit No.		TP-12	
Engineers/S	Scientists			Lot 16 Develo				Page No.	1	0.2	1
One Edgew	ater Drive			Devens, Massac	nusetts			File No. Checked By:		19707. PJM	
	Massachusetts 02062	2						checked by.		1 5101	
				Excavatio	n Equipmer	nt					
GZA Rep.	Adam Mic	chonski	Contractor	M.P. Crowley				Date		1/9	/2008
			Operator	Chris Crowley				Ground Elev)1'±
Weather	Cool, clou	ıdy, light rain, 50's	Make	CAT	Model	315CL		Time Started			5:30
			Capacity	3 cu.yd	Reach	14	ft.	Time Comple	eted	1	5:45
Depth		S	oil Description				Sample	PID		Boulders:	
Deptii		50	n Description				No.	Reading	Excav.	Count/	Note
0								(ppm)	Effort	Class	No.
0	Dark bi	rown, fine to medium SAND, som	e Silt, little Gi	ravel. (TOPSOII	.)						
1'	Γ±								E	0	
2'	2'±	e-brown, fine to medium SAND, se	ome Gravel, so	ome Silt. (SUBS	OIL)				Е	0	
3'									Е	0	
_ 3 _	Oranga	e-brown, fine to coarse SAND and	CPAVEL tro	co Silt					Е	1C	
- 4'	Orange	-orown, nue to coarse SAND allu	UNA VEL, ITà	ce ont.							
5'	5.5'±								Е	0	
6'									М	0	
7'									М	0	
	Tan-bro	own, fine to medium SAND and S	ILT. some Gra	avel. (GLACIAI	TILL)				М	1C	
- 8'-		,,	,		,						
— 9'—									М		
10'									D		
		Refusal at	10.5 feet.						D	•	1,2
— 11'—											
12'											
13'											
— 14'—											
15'											
— 15' —											
<u> </u>											
Notos								1			
Notes:	or bucket refusal at 10.5	5 feet. Bedrock encountered.									
		lifts and tamped with excavator bucket	upon completio	n.							
		-									
	Test Pit Plan			1					-		'n
	14'	Boulder Class Letter Size	Range		oortions Jsed		Abb F = Fine	previations		ROUNDWATE Encountered	к
5'		Designation Classi	fication - 17"	TRACE (TR.)		- 10%	M = Mediu			Not Encounter	ed
]	B 18"	- 36"				C = Coarse V = Very		Elapse		Depth
	Ť	C 36" and	Larger	LITTLE (LI.)	10	- 20%	F/M = Fine F/C = Fine	to medium to coarse	Time Readin	to	to Ground-
	1	Excavation Effort		SOME (SO.)	20	- 35%	GR = Gray BN = Broy	r	(Hour		water
	NORTH	EEasy MModerate		AND	25	- 50%	BN = Brow YEL = Yel				
Volume =	cu. yd.	DDifficult		AND	22	- 50%				<u> </u>	
		1								1	
G	GZA GeoEn	vironmental, Inc.									

GZA GeoEnvironm Engineers/Scientist			Lot 16 Develop	oment			Test Pit No. Page No.	1	TP-12 of	28
-B	<u> </u>		Devens, Massac				File No.		19707.	
One Edgewater Dri	ve		,				Checked By:		PJM	
Norwood, Massach							-			
GZA Rep.	Adam Michonski	Contractor	Excavation M.P. Crowley	n Equipmen Corp	nt		Date		1/9	/2008
1		Operator	Chris Crowley	1			Ground Elev			08'±
Weather	Cool, cloudy, light rain, 50's	Make	CAT	Model	315CL		Time Started			6:00
		Capacity	3 cu.yd	Reach	14	ft.	Time Comple			6:15
Depth		Soil Description				Sample	PID		Boulders:	
						No.	Reading	Excav.	Count/	Note
0							(ppm)	Effort	Class	No.
0	Dark brown, fine to medium SAND	, some Silt, little Gr	avel. (TOPSOIL	.)				Е	0	
1'			011. (OLD 0							
2' <u>2.5'</u> ±	Orange-brown, fine to medium SA	ND, some Gravel, so	ome Silt. (SUBS)	JIL)				E	0	
- 3'								Е	0	
4'								Е	0	
5'	Brown-tan, fine to coarse SAND an	d GRAVEL, trace S	ilt.					Е	0	
6'								М	0	
7'								М	0	1
8'								М	0	
0	Tan-brown, fine to medium SAND	and SILT, some Gra	wel. (GLACIAL	TILL)				М	0	
								D	0	2,3
10'	Ref	usal at 10 feet.								_,_
11'										
12'										
13'										
— 15' —										
16'										
Notes:										
1. Groundwater seep										
	refusal at 10 feet. Bedrock encountered.									
Test pit backfilled	in 2 to 3 foot lifts and tamped with excavator	bucket upon completion	n.							
	DI		1							
Test Pit	Boulder C			ortions			reviations		ROUNDWATH	ER
5'	Letter Designation	Size Range Classification		Ised	10.0	F = Fine M = Mediu	m		Encountered Not Encounter	red
5	Ă	6" - 17"	TRACE (TR.)	0 -	10%	C = Coarse				
,	B C	18" - 36" 36" and Larger	LITTLE (LI.)	10 -	- 20%		to medium	Elapse Time		Depth to
						F/C = Fine GR = Gray	to coarse	Readin	ng	Ground- water
NORT	TH Excavation EEasy	Enort	SOME (SO.)	20 -	- 35%	BN = Brow	/n	(Hour:	5)	water
Volume =	cu. yd. DDiffic	rate ult	AND	35 -	- 50%	YEL = Yel	low			7'
GZ \	GZA GeoEnvironmental, Inc.									

GZA GeoEnviro Engineers/Scient			Lot 16 Develo	oment			Test Pit No. Page No.	1	TP-12 of	1
8			husetts			File No.		19707		
One Edgewater I	rive		·				Checked By:		PJM	
Norwood, Massa	chusetts 02062									
GZA Rep.	Adam Michonski	Contractor	Excavatio M.P. Crowley	n Equipmen Corp	nt		Date		1/10)/2008
		Operator	Chris Crowley				Ground Elev		3	15'±
Weather	Cool, cloudy, 50's	Make	CAT	Model	315CL		Time Started		8	:30
		Capacity	3 cu.yd	Reach	14	ft.	Time Comple	eted	8	:45
							-		-	
Depth		Soil Description				Sample	PID	-	Boulders:	
						No.	Reading	Excav.	Count/	Note
0	Dark brown, fine to medium SAND, so	ome Silt_little Gr	ravel (TOPSOII)			(ppm)	Effort	Class	No.
1' <u>1'</u> ±								E	0	
2' <u>2'</u> ±	Orange-brown, fine to medium SAND,	some Gravel, so	ome Silt. (SUBS	OIL)				Е	0	
	Orange-brown, fine to coarse SAND at Cobbles.	nd GRAVEL, tra	ce Silt. Approx	mately 10 to	o 15%			Е	0	
	Tan, fine to coarse SAND, trace Silt.							М	0	
4 <u>4.5'</u> ±								М	1B,3C	
5'								М		
6'	Brown, fine to meidum SAND and GR	AVEL, trace Sil	t. Approximate	y 5% Cobbl	les.			IVI		
- 7'								М	•	
- 8'-								М	3C	1
0'								М		
,	Brown, fine to medium SAND and SIL	T, some Gravel.	••••••	5 to 10% Co GLACIAL T				М		
10'			,)				•	
11'	Refusa	at 11 feet.						D		2,3
12'										
13'										
<u> </u>										
15'										
16'										
Notes:										
1. Rapid groundy	ater seepage at 7.5 feet. Approximately 5 gallons see	ped into bottom of	test pit in 5 minut	es.						
	et refusal at 11 feet. Bedrock encountered.									
3. Test pit backfi	ed in 2 to 3 foot lifts and tamped with excavator buch	tet upon completio	n.							
	Y, DI									
	bit Plan Boulder Class			ortions			reviations		ROUNDWATI	ER
6'	Designation Cla	e Range ssification		Jsed	100/	F = Fine M = Media	im		Encountered Not Encounter	red
		6" - 17" .8" - 36"	TRACE (TR.)	0 -	10%	C = Coarse V = Very	•	Elapse	d	Depth
)		and Larger	LITTLE (LI.)	10 -	- 20%	F/M = Fine	to medium	Time t	to	to
	Excavation Effor	t	SOME (SO.)	20	- 35%	F/C = Fine GR = Gray		Readir (Hours		Ground- water
NO	RTH EEasy	-	50 ME (50.)	20 -	- 5570	BN = Brow YEL = Yel	vn	(1000)		
Volume =	cu. yd. MDifficult		AND	35 -	- 50%	I EL = Y el	юw			7.5'
	GZA GeoEnvironmental, Inc.									

GZA GeoEnv Engineers/Sci	ironmental, Inc.		Lot 16 Develo	pment			Test Pit No. Page No.	1	TP-13 of	1
Engineers/Ser			Devens, Massac				File No.		19707.	
One Edgewat	er Drive						Checked By:		PJM	
	ssachusetts 02062						-			
GZA Rep.	Adam Michonski	Contractor	Excavatio M.P. Crowley	n Equipmen Corp	t		Date		1/10	0/2008
		Operator	Chris Crowley				Ground Elev		3	14'±
Weather	Cool, cloudy, 50's	Make	CAT	Model	315CL		Time Started	l	9	:00
		Capacity	3 cu.yd	Reach	14	ft.	Time Comple	eted	9	:25
Depth		Soil Description	l			Sample	PID	F	Boulders:	Net
						No.	Reading (ppm)	Excav. Effort	Count/ Class	Note No.
0	Dark brown, fine to medium SAND, s	ome Silt, little G	ravel. (TOPSOII	.)			(ppiii)			110.
- 1'-	±							Е	0	
2'	Orange-brown, fine to medium SANE	, some Gravel, so	ome Silt. (SUBS	OIL)				Е	0	
2 2.	5'±							Е	0	
5								Е	0	
4'	Orange-brown, fine to coarse SAND a Cobbles.	nd GRAVEL, tra	ace Silt. Approx	imately 5 to	10%			Е	3B,3A	
5'									51,511	1
6'	<u>-</u>							Е		1
— 7'—					7'±			Е	•	
- 8'-								М	4A,3B	
9'								М		
10'	Tan-brown, fine to medium SAND an		avel. Approxima	tely 10 to 15	5%			М	•	
11'	Cobbles and Boulders. (GLACIAL TI	LL)						М	5A,2B	
								D		
- 12'-								D		
13'		. 12.5.6								
<u> </u>	Kerusa	at 13.5 feet.						D	•	2,3
<u> </u>										
16'										
Notes:										
1. Groundwat	er seepage at 6 feet. Slight seepage, walls started caving	in from 11 to 13 fe	et.							
	pucket refusal at 13.5 feet. Bedrock encountered.									
3. Test pit bac	kfilled in 2 to 3 foot lifts and tamped with excavator but	ket upon completio	on.							
	'est Pit Plan									- D
	Boulder Clas	s ize Range		portions Used		Abb F = Fine	reviations		ROUNDWATH Encountered	SK.
6'	Designation C	assification	TRACE (TR.)		10%	M = Mediu			Not Encounter	ed
	AB	6" - 17" 18" - 36"				C = Coarse V = Very		Elapse		Depth
	C 36'	and Larger	LITTLE (LI.)	10 -	20%		to medium	Time Readin	to	to Ground-
	Excavation Effe	ort	SOME (SO.)	20 -	35%	GR = Gray	,	(Hour		water
	NORTH EEasy MModerate					BN = Brow YEL = Yel				
Volume =	cu. yd. DDifficult		AND	35 -	50%					6'
	L		1						1	
G	GZA GeoEnvironmental, Inc.									

	Invironmental, Inc.							Test Pit No.		TP-13	
Engineers/S	Scientists			Lot 16 Develop Devens, Massac				Page No. File No.	1	of 19707.	1
One Edgew	ater Drive			Devens, Massac	nuseus			Checked By:		19707. PJM	
	Massachusetts 02062	2									
					n Equipmer	nt					
GZA Rep.	Adam Mic	honski	Contractor	M.P. Crowley	Corp			Date)/2008
Weather	Cool, cloud	ty 50's	Operator Make	Chris Crowley CAT	Model	315CL		Ground Elev Time Started			10'± :40
weather	2001, 21000	ly, 50 s	Capacity	3 cu.yd	Reach	14	ft.	Time Started):00
								r-			
Depth		So	il Description				Sample	PID		Boulders:	
							No.	Reading	Excav.	Count/	Note
— 0 —								(ppm)	Effort	Class	No.
	1'± Dark bro	own, fine to medium SAND, some	e Silt, little Gi	ravel. (TOPSOIL	.)				Е	0	
- 1'		1		City (CLIDG				-			
	2'±	brown, fine to medium SAND, so	me Gravel, sc	ome siit. (SUBS	JIL)				Е	0	
2									_		
3'	D	Carto and CAND and CDAVI	T. (Е	0	
	Brown,	fine to coarse SAND and GRAVE	L, trace Sht.						Е	0	
- 4'-	4.5'±								Ľ	0	
5'									М	1C,2B	1
5										↓	
- 6'									М		
	Tan-bro	wn, fine to medium SAND and Sl	LT. some Gra	avel. (GLACIAL	TILL)				М	2B	
— 7'—		,			,						
- 8'-									М	1B	
01		Bottom of Test	Pit at 8.5 feet.						М	0	2
9											
10'											
10											
— 11'—											
12'											
12											
13'											
— 14' —											
15'											
16'											
Notes:											
	oundwater seepage at 4.5										
2. Test pit	backfilled in 1 to 2 foot 1	lifts and tamped with excavator bucket	upon completio	n.							
L	m			1							
	Test Pit Plan 10'	Boulder Class			ortions Jsed			previations		ROUNDWATH	ER
5'	10	Letter Size R Designation Classifi	ication	TRACE (TR.)		- 10%	F = Fine M = Media			Encountered Not Encounter	ed
		A 6" - B 18"	- 36"				C = Coarse V = Very		Elapse		Depth
	Ţ	C 36" and	Larger	LITTLE (LI.)	10	- 20%	F/M = Fine F/C = Fine	to medium to coarse	Time Readin	to	to Ground-
	NOPTH	Excavation Effort		SOME (SO.)	20	- 35%	GR = Gray BN = Broy	7	(Hour		water
Volume =	NORTH cu. yd.	EEasy MModerate		AND	35	- 50%	YEL = Yel				4.5'
	cu yu	DDifficult									
G	GZA GeoEnv	vironmental, Inc.									

GZA GeoEnvir							Test Pit No.		TP-13	32
Engineers/Scie	tists		pment			Page No.	1	of	1	
One Edgewater	Drive		Devens, Massac	husetts			File No. Checked By:		19707 PJM	
	achusetts 02062						Checkeu by.		F J IV.	1
			Excavatio	n Equipme	ent					
GZA Rep.	Adam Michonski	Contractor	M.P. Crowley	Corp			Date		1/10	0/2008
		Operator	Chris Crowley				Ground Elev			10'±
Weather	Sunny, cool, 50's	Make	CAT	Model	315CL		Time Started			0:15
		Capacity	3 cu.yd	Reach	14	ft.	Time Comple	eted	1	0:35
Depth	S	oil Description	1			Sample	PID		Boulders:	
Depui		on Desemption				No.	Reading	Excav.	Count/	Note
0	Dark brown, fine to medium SAND, son	ne Silt, little G	ravel. (TOPSOII	.)			(ppm)	Effort	Class	No.
1' <u>1'</u> ±	, , .	,		,				Е	0	
2'-2.5'	Orange-brown, fine to medium SAND, s	some Silt, little	Gravel. (SUBSO	DIL)				Е	0	
3'	-							Е	0	
								Е	0	
	Tan-brown, fine to coarse SAND and G	RAVEL, trace	Silt.					М	0	
56'±								М	0	1
6'	Tan-brown, fine to medium SAND and	SILT, some Gr	avel. (GLACIAI	L TILL)				М	0	2
- 7'	Bottom of Te	st Pit at 7 feet.						101	0	2
- 8'										
9'										
10'										
11'										
12'-										
13'										
<u> </u>										
15'										
- 16'-										
Notes:										
	water seepage at 6 feet±. 6" of water at bottom of test pi illed in 1 to 2 foot lifts and tamped with excavator bucke									
2. Test pit back	ince in 1 to 2 root into and tamped with excavator bucke	a upon completio								
Ta	Pit Plan		1			1		-		
	Boulder Class	Range		oortions Jsed		Abb F = Fine	previations		ROUNDWAT	EK
4'	Designation Class	sification " - 17"	TRACE (TR.)	0	- 10%	M = Media C = Coarse			Not Encounte	red
	В 18	" - 36"		10	200/	V = Very		Elapse		Depth
•	C 36" an	d Larger	LITTLE (LI.)	10) - 20%	F/C = Fine		Time t Readir	ıg	to Ground-
	ORTH EEasy		SOME (SO.)	20) - 35%	GR = Gray BN = Broy		(Hours		water
Volume =	MModerate		AND	35	i - 50%	YEL = Ye				6'±
	Cu. yu. DDifficult									
C 3										
	GZA GeoEnvironmental, Inc.									

GZA GeoEnvironn Engineers/Scientist			Lot 16 Develo	mant			Test Pit No.	1	TP-13 of	1
Engineers/Scientis			Devens, Massac				Page No. File No.	1	19707.	
One Edgewater Dri			Devens, Massae	nuseus			Checked By:		PJM	
Norwood, Massach										
GZA Rep.	Adam Michonski	Contractor	Excavatio M.P. Crowley	n Equipmen Corp	ıt		Date		1/10	0/2008
		Operator	Chris Crowley	<u>^</u>			Ground Elev			06'±
Weather	Sunny, cool, 50's	Make	CAT	Model	315CL		Time Started			1:10
		Capacity	3 cu.yd	Reach	14	ft.	Time Comple	eted	1	1:50
Depth	2	Soil Description				Sample No.	PID Reading	Excav.	Boulders: Count/	Note
						INO.	(ppm)	Effort	Class	No.
0	Dark brown, fine to medium SAND, so	me Silt, little Gi	ravel. (TOPSOIL	.)			(ppm)			110.
1'								E	0	
2'	Orange-brown, fine to medium SAND,	some Gravel, so	ome Silt. (SUBS	OIL)				Е	0	
- 3'- ^{3'±}								Е	0	
4'		151 · 011		5 · 100/ G				Е	0	
5'	Brown, fine to coarse SAND and GRA	EL, trace Slit.	Approximately	5 to 10% Co	obbles.			Е	0	
6'±								М	0	
0								М	0	1
	Tan-brown, fine to medium SAND and	SILT, some Gra	avel. (GLACIAL	TILL)		S-1		D	0	2,3
8'-						(8.5')		D	0	2,5
9'	Refusal	at 8.5 feet.								
10'										
- 11'										
- 12'-										
— 14' —										
15'										
16'										
Notosi										
Notes:										
 Groundwater seep Encounter busilist 										
	refusal at 8.5 feet. Highly fractured bedrock encour d in 1 to 2 foot lifts and tamped with excavator buck		n							
5. Test pit backfillet	I II I to 2 root into and tamped with excavator buck	et upon completio								
Test Pit	Plan Dit -		р	ortions				GI	ROUNDWATE	ER
10'		Range		Jsed		F = Fine	reviations	(x)	Encountered	
5'	Ă 6	sification " - 17"	TRACE (TR.)	0 -	10%	M = Mediu C = Coarse		()	Not Encounter	
\	B 13	3" - 36" nd Larger	LITTLE (LI.)	10 -	· 20%	V = Very	to medium	Elapse Time		Depth to
1 1						F/C = Fine GR = Gray	to coarse	Readin	ng	Ground- water
NOR			SOME (SO.)	20 -	- 35%	BN = Brov	/n	(Hour	5)	mater
Volume =	cu. yd. MDifficult		AND	35 -	- 50%	YEL = Yel	IOW			6'
	1									
GZ \	GZA GeoEnvironmental, Inc.									

GZA GeoEnvironmental, Inc. Engineers/Scientists		Lot 16 Develop	oment			Test Pit No. Page No.	1	TP-13 of	34 1		
		Devens, Massac	husetts			File No.		19707.			
One Edgewater Drive						Checked By:		PJM			
Norwood, Massachusetts 02062 GZA Rep. Adam Michonski	Contractor	Excavation M.P. Crowley		nt		Date		1/10	0/2008		
·	Operator	Chris Crowley	<u> </u>			Ground Elev		30	06'±		
Weather Sunny, cool, 50's	Make	CAT	Model	315CL		Time Started			1:30		
	Capacity	3 cu.yd	Reach	14	ft.	Time Comple	eted	12	2:00		
Depth	Soil Description				Sample	PID		Boulders:			
	I I I				No.	Reading (ppm)	Excav. Effort	Count/ Class	Note No.		
Dark brown, fine to medium SAND, so	me Silt, little G	ravel. (TOPSOIL)				E	0			
Orange-brown, fine to medium SAND,	some Gravel, so	ome Silt. (SUBS	DIL)				Е	0			
- 3'							Е	0			
4' Tan-brown, fine to coarse SAND, little	Gravel, trace Si	lt.					Е	0			
5'5.5'±							Е	1C			
6' 							M/D	0			
— 7' — Tan-brown, fine to medium SAND and		avel. Approxima	tely 10 to 1	15%			M/D	2B,1C			
8' Cobbles and Boulders. (GLACIAL TIL			D D	3A,1B							
9' Bottom of Te	9' Bottom of Test Pit at 9 feet.										
10'											
_ 11'											
12'											
13'-											
— 14' —											
- 15'-											
- 16'-											
Notes:											
1. Test pit backfilled in 1 to 2 foot lifts and tamped with excavator buck	et upon completio	n.									
Test Pit Plan									- D		
10' Boulder Class 5' Designation A 6 B 11	e Range ssification 5" - 17" 8" - 36" nd Larger			- 10% - 20%	F = Fine M = Medin C = Coarse V = Very		() (x) Elapse				
NORTH EEasy	-	SOME (SO.)		- 35%	F/C = Fine GR = Gray BN = Brow	to coarse vn	Time t Readin (Hours	ıg	Ground- water		
Volume =Cu. yd. DDifficult		AND	35	- 50%	YEL = Yel						
GZA GeoEnvironmental, Inc.		1			L		1	<u> </u>			

GZA GeoEnviror							Test Pit No.		TP-13	
Engineers/Scient	sts		Lot 16 Develop	L			Page No.	1		1
One Edgewater E	rive		Devens, Massac	husetts			File No. Checked By:		19707. PJM	
Norwood, Massa							Checked Dy.		1 5101	
1101110004, 1114554			Excavatio	n Equipmer	nt					
GZA Rep.	Adam Michonski	Contractor	M.P. Crowley				Date		1/10)/2008
_		Operator	Chris Crowley				Ground Elev		34	41'±
Weather	Sunny, cool, 50's	Make	CAT	Model	315CL		Time Started		13	3:20
		Capacity	3 cu.yd	Reach	14	ft.	Time Compl	eted	13	3:55
						~ .				
Depth	8	Soil Description				Sample No.	PID Reading	Excav.	Boulders: Count/	Note
						INO.	(ppm)	Excav. Effort	Class	No.
0	Dark brown, fine to medium SAND, sor	ne Silt_little Gr	avel (TOPSOII)			(ppm)			110.
1' <u>1'</u> ±		ne shi, nue si		.)				Е	0	
- 2'	Orange-brown, fine to medium SAND,	some Gravel, so	ome Silt. (SUBS	OIL)				Е	0	
2 <u>2.5'</u> ±								Е	0	
- 3'	Tan, fine to coarse SAND, little Gravel,	trace Silt.								
4'								Е	0	
5'	Brown, fine to coarse SAND and GRAV	/EL trace Silt						М	0	
6'	brown, fine to coarse SAIND and OKA	EL, trace Sht.						М	0	
. 7'±								М	0	
7'										
- 8'	Tan, fine to coarse SAND, little Gravel,	trace Silt.						E	0	
9'-0.5'+								Е	0	
9.5'±								М	0	1
10'								М	0	
- 11'										
12'								М	0	
13'	Tan-brown, fine to medium SAND and	SILT, little Grav	vel. (GLACIAL	TILL)				М	0	
14'								D	0	
1.51								D	0	
- 15'								D	0	2,3
16'	Refusal	at 16 feet.						<u>u</u>	0	2,3
2. Excavator buck	ater sweepage at 9.5 feet. Sidewalls began caving in at et refusal at 16 feet. Bedrock encountered. ed in 2 to 3 foot lifts and tamped with excavator bucke		n.							
5'	Designation Class A 6 B 18 C 36" ar Excavation Effort RTH EEasy	e Range sification " - 17" " - 36" id Larger	TRACE (TR.) LITTLE (LI.) SOME (SO.)	10 20	- 10% - 20% - 35%	F = Fine M = Medin C = Coarse V = Very	e to medium to coarse vn	(x)	to 1g	ed Depth to Ground- water
Volume =	cu. yd. MDifficult		AND	35	- 50%	100 - 10	**			9.5'
GZ	GZA GeoEnvironmental, Inc.									

GZA GeoEnvi Engineers/Scie				Lot 16 Develop	oment			Test Pit No. Page No.	1	TP-13 of	36
Lingineeris, Bere				Devens, Massac				File No.		19707	
One Edgewate	Drive			,				Checked By:		PJM	
Norwood, Mas	sachusetts 02062										
GZA Rep.	Adam Michonski		Contractor	Excavation Mp Crowley C	n Equipmen orp	nt		Date		1/10	0/2008
_			Operator	Chris Crowley	-			Ground Elev		3	26'±
Weather	Sunny, cool, 50's		Make	CAT	Model	315CL		Time Started		1	4:15
			Capacity	3 cu.yd	Reach	14	ft.	Time Comple	eted	1-	4:35
			15				a 1	DID		D 11	
Depth		Soi	1 Description				Sample No.	PID Reading	Excav.	Boulders: Count/	Note
							INO.	(ppm)	Effort	Class	No.
0 0.5	'+ Dark brown, fin	e to medium SAND, some	Silt, little Gr	avel. (TOPSOII	.)			(ppiii)	Enon	Clubb	110.
	,		~		/				Е	0	
1'											
	Orange-brown,	fine to medium SAND, so	me Gravel, so	ome Silt, trace Re	oots. (FILL))			Е	0	1
2.5		(see Note 1.)									
3'2.8									Е	0	
3.5	± BURIED SUBS	OIL									
4'									Е	0	
									М	0	
5'	Orange-brown	fine to coarse SAND and C	GRAVEL tra	ce Silt					IVI	0	
	Orange-brown,	The to coarse SAND and C	JKA VEL, ua	ee sht.					М	0	
6' 6.5	'±									Ŭ	
7'		A STATE CANTE I ST							M/D	0	2
_ /	Tan-brown, fine	e to medium SAND and SI	LT, little Grav	vel. (GLACIAL	TILL)						
8'		Refusal at 7	7.5 feet.						D	0	3,4
Ŭ											
9'											
10'											
_ 111_											
- 11'-											
12'											
13'											
— 14' —											
— 15' —											
16'											
Notes:											•
1 15'x 15'co	ncrete footing approximately	1 foot high encountered at 2 fe	et No noticab	le difference betwe	en existing h	ackfilled soil	directly adi	acent to this stru	cture and		
the surround			instactio		, i insung b						
	lwater seepage at 6.5 feet.										
3. Excavator bu	icket refusal at 7.5 feet. Bedr	ock encountered.									
Test pit back	filled in 2 to 3 foot lifts and t	amped with excavator bucket u	pon completion	n.							
	st Bit Blan			1							
Te	st Pit Plan 10'	Boulder Class	220		ortions Jsed			previations		ROUNDWAT	ER
5'		Letter Size Ri Designation Classifi	cation	TRACE (TR.)		10%	F = Fine M = Media			Encountered Not Encounte	red
		A 6" - B 18" -	36"	INACE (IK.)	0 -	1070	C = Coarse V = Very	•	Elapse	ed	Depth
	• I	C 36" and I		LITTLE (LI.)	10 -	- 20%		e to medium	Time	to	to Ground-
	-	Excavation Effort		SOME (SO.)	20 -	- 35%	GR = Gray	/	Readin (Hour		water
	NORTH	EEasy MModerate					BN = Brow YEL = Ye				
Volume =	cu. yd.	DDifficult		AND	35 -	- 50%					6.5'
				1						1	
G 7	GZA GeoEnvironment	al Inc									

GZA GeoE		ental, Inc.				Lot 16 Doval	nmont			Test Pit No.	1	TP-13	
Engineers/S	scientists					Lot 16 Develo Devens, Massa				Page No. File No.	1	of 19707.	1
One Edgew	ator Driv	9				Devens, Massa	cilusetts			Checked By:		19707. PJM	
Norwood, N										Checked By.		1 510	
GZA Rep.		Adam Michonsk	i		Contractor	Excavati M.P. Crowley	on Equipme	nt		Date		1/1()/2008
OZA Rep.		Adam Witcholisk	1		Operator	Chris Crowley				Ground Elev			36'±
Weather		Sunny, cool, 50's	3		Make	CAT	Model	315CL		Time Started			4:50
					Capacity	3 cu.yd	Reach	14	ft.	Time Compl			5:20
										-			
Depth				Soi	il Description				Sample	PID		Boulders:	
									No.	Reading	Excav.	Count/	Note
0										(ppm)	Effort	Class	No.
-	1'±	Dark brown, f	fine to mediu	n SAND, some	e Silt, little Gi	ravel. (TOPSOI	L)				Е	0	
		0 1	C*		011-11-1		OH)	21			Б	0	
2'	2.5'±	Orange-brown	n, fine to med	ium SAND, so	me Silt, little	Gravel. (SUBS	OIL)	2			E	0	
— 3'—											Е	0	
4'		Tan-brown, fi	ne to coarse s	SAND, little Gr	ravel, trace Si	lt.					Е	0	
	5'±										Е	0	
											М	0	
— 6' —													
— 7'—											М	0	
— 8' —		Brown, fine to	o coarse SAN	D and GRAVE	EL, trace Silt.	Approximately	5 to 10% C	obbles.			М	0	
Brown, fine to coarse SAND and GRAVEL, trace Silt. Approximately 5 to 10% Cobbles.												0	
- 10'-											М	0	
											М	0	
— 11'—											М	0	
- 12'-	12.5'±												1
13'											М	0	1
<u> </u>		Tan-brown, fi Cobbles. (GL			LT, little Gra	vel. Approxima	tely 5 to 10	%			D	0	
15'				Refusal at	15 faat						D	0	2,3
— 16' —				Kelusai al	1.3 1001.								
10													
Notes:													
1 Slight are	oundwater	sweepage at 12.5 fee	at										
		sweepage at 12.5 feet. Bec		red.									
		n 2 to 3 foot lifts and			upon completio	n.							
-													
L	_					1							
	Test Pit Pl	an		Boulder Class			portions			previations		ROUNDWAT	ER
6'	15'	-, I	Letter Designat	Size R ion Classifi			Used	10.0	F = Fine M = Mediu	ım		Encountered	red
			A B	6" - 18" -	17"	TRACE (TR.)	0	- 10%	C = Coarse V = Very				Depth
	K		C	36" and 1		LITTLE (LI.)	10	- 20%	F/M = Fine	to medium	Elapse Time	to	to
			T	Excavation Effort		SOME (SO.)	20	- 35%	F/C = Fine GR = Gray		Readi (Hour		Ground- water
	NORTH	L I	I	EEasy		SOME (SU.)	20	- 33%	BN = Brow	vn	(21001	-/	
Volume =		cu. yd.		AModerate DDifficult		AND	35	- 50%	YEL = Yel	now			12.5'
												1	
G	Z	GZA GeoEnvironme	ental, Inc.										



Appendix B.2 – 2012 Boring Logs

G		GZA GeoEi Inginee	nviron ers and S	mer Scient	ital,	Inc.		Geis Construction Lot 16, Jackso Devens, Massa	on Road		EXPLORATIC SHEET: PROJECT NC REVIEWED B	1): 04	of 1 4.0029	496.00	
Drill	ged By: ling Co.: eman:	New		nire B	oring	, Inc.	Rig	rpe of Rig: CME 45 Truck g Model: 550 illing Method: HSA	Ground S Final Bor	Surface Elev ing Depth (f	. (ft.) : 343	16/2	012	H. Dat V. Dat	um: um: NGVD29
Han	nmer Ty	pe: Au	tomatic	Ham	mer		Sa	mpler Type: SS			Groundv			<u>, ,</u>	
Ham	nmer We nmer Fa er or Ca	ll (in.):	30		in.):	3.25 I.D.	Sa	Impler O.D. (in.): 2.0 Impler Length (in.): 24 Iock Core Size:		Date 1/16/12	Time		later D encou	intered	Stab. Time 5 min.
Deptl (ft)	Casing h Blows/ Core	No.	Depth		Rec.	Blows (per 6 in.)	SPT			d Identificatio Procedure)	on	Remark	Field Test Data	Cepth (ft.)	Stratum . Description 👜
. ,	Rate	S-1	(ft.) 0-2	(in) 24	(in) 11	56	value	S-1 : Medium dense, br			ND, some	R.	Data		TOPSOIL 34
	-	S-2	2-4	24	16	98 712 1915	15 31	Silt, little Gravel. S-2 : Dense, brown, find Silt.	e to coarse	SAND and	Gravel, little				
5_	-	S-3	4-6	24	13	17 18 21 17	39	S-3 : Dense, brown, find Silt.	e to coarse	e SAND and	Gravel, little			SAND	AND GRAV
	-	S-4	6-8	24	18	15 15 17 17	32	S-4 : Dense, brown, fine Silt.	e to coarse	e SAND and	Gravel, little			8	33
10 _	-	S-5	8-10	24	15	22 24 30 30	54	S-5 : Very dense, brown trace Gravel. Wet.	n, fine to c	oarse SAND	and Silt,			0	
	-													GL	ACIAL TILL
15 _	-	S-6	15- 16.75	21	18	5 7 19 100/3"	26	S-6 : Medium dense, br little Gravel. Wet.	own, fine t	o coarse SA	ND and Silt,			16.75	3:
	-							End of exploration at 16	6.75 feet.			1			
20 _	-														
25 _	-														
-	-														
30															
REMARKS	1 - Aug	er and	l split sp	ioon i	refusa	al on boulde	er or b	oedrock at 16.75 feet.							
See	Log K	ey for		ation	of	sample des	cripti	on and identification properties and identifications material transitions mated. Fluctuations of gro	ocedures.	Stratificatio	on lines repr	eser	nt E	Explor	ation No.:

								TEST BORING	LOG						
GZ			nviron ers and S			Inc.		Geis Construction C Lot 16, Jackson Devens, Massach	Road	y	EXPLORATION SHEET: PROJECT NO REVIEWED E	1 D: 04	of 1 4.0029	496.00	
Drilli	ng Co.:	New	ad Aliho Hampsl Misiasz	nire B	oring	, Inc.	Rig	illing Method: HSA Fi	round S inal Bor	urface Ele	ee Plan v v. (ft.): 343 (ft.): 14.5 1/12/2012 - 1/	12/2	012	H. Datı V. Datı	um: um: NGVD29
			utomatic		mer		Sa	mpler Type: SS	-	Date	Ground		r Dept /ater D	<u>, ,</u>	Stab. Time
Hamr	ner Fal	l (in.)	lb.): 14 : 30 O.D./I.D		in.): ;	3.25 I.D.	Sa	mpler O.D. (in.): 2.0 mpler Length (in.): 24 ock Core Size:		1/12/12				intered	5 min.
Depth (ft)	Casing Blows/ Core	No.	Depth		Rec.	Blows (per 6 in.)	SPT	Sample Descrip (Modified Bu				Remark	Field Test Data	Depth (ft.)	Stratum
_	Rate	S-1	(ft.) 0-2	(in) 24	(in) 15	(per 6 m.) 4 6 6 5	value	S-1 : Medium dense, dark some Silt, little Gravel.	brown,	fine to coa	, rse SAND,	<u></u>	Data	-	TOPSOIL 342.5
-		S-2	2-4	24	16	12 11 15 14	26	S-2 : Medium dense, dark some Silt, little Gravel.	brown,	fine to coa	rse SAND,			SAND	AND GRAVEL
5_		S-3	4-6	24	18	10 10 16 22	26	S-3 : Medium dense, dark some Silt, little Gravel.	brown,	fine to coa	rse SAND,			6	337.0
-		S-4	6-8	24	20	22 13 15 18	28	S-4 : Medium dense, brow Silt, little Gravel.	-						
10 _		S-5	8-10	24	14	11 69 28 15	97	S-5 : Very dense, brown, f little Gravel.	fine to m	edium SAI	ND and Silt,			GL	ACIAL TILL
-												1		13 WE 14 5 B	330.1 EATHERED EDROCK 328.1
15 _		S-6	14.4- 14.4	0	0	50/0"	<u></u>	S-6 : No recovery. End of exploration at 14.5	feet.			2			
20															
20 _															
- 25 _															
-															
30															
								action and drill cuttings. edrock at 14.5 feet.							
See	Log K	ey fo	r exploi	ation	of s	ample des	scriptio	on and identification proc pes. Actual transitions may ated. Fluctuations of ground	edures.	Stratificat	ion lines rep	eser	nt E	Explor	ation No.:

G			nviron ers and S			Inc.		Geis Constructio Lot 16, Jackso Devens, Massa	on Road		EXPLORATION SHEET: PROJECT NO REVIEWED I	1 0:04	of 1 4.0029	496.00	
Drill	ged By: ing Co.: eman:	New	Hampsh	nire B	oring	, Inc.	Ri	rpe of Rig: CME 45 Truck g Model: 550 illing Method: HSA	Ground S Final Bor	Surface Elev ing Depth (1	. (ft.): 343	/12/2	012	H. Dat V. Dat	tum: tum: NGVD29
	nmer Ty				mer			mpler Type: SS		Date	Ground Time	_	r Dept /ater D	· · /	Otah Time
Ham	nmer We nmer Fal er or Ca	l (in.):	30		in.):	3.25 I.D.	Sa	Impler O.D. (in.): 2.0 Impler Length (in.): 24 Inck Core Size:		1/12/12				intered	Stab. Time 5 min.
	Casing 1 Blows/		Depth	Samp Pen.		Blows	SPT	Sample Des			on	Remark	Field Test	epth (.)	Stratum . Description
(ft)	Core Rate	No. S-1	(ft.) 0-2	(in) 24	(in)	(per 6 in.) 3 6				Procedure)		Re	Data	0.5	
	-	0-1	0-2	24		88	14	some Silt, little Gravel.	ant brown,		SC OAND,			0.5	
	-	S-2	2-4	24	17	54		S-2 : Loose, dark brown	n, fine to m	nedium SAN	D and Silt,				
						43	8	trace Gravel.							
5 _	-	S-3	4-6	24	16	34 69	10	S-3 : Loose, brown to g Silt, trace Gravel.	ray, fine to	coarse SAN	ND, some			SANE	O AND GRAVE
	-	S-4	6-8	24	18	49 1216	21	S-4 : Medium dense, br SAND, some Silt, trace	-		edium			0	33
	-	S-5	8-9.1	13	13	16 30	R	S-5 : Top 6 inches: Ve	-		o medium				
10 _						50/1"		SAND and Silt, little Gra Bottom 7 inches: Very of			d rock	1			BEDROCK
_								fragments, some fine to	medium						
	_							End of exploration at 9.	1 feet.						
	-														
4-	-														
15 _	-														
	-														
	_														
20 _	-														
	-														
	-														
	-														
25 _															
_															
	-														
30	-														
30	1 - Aua	er and	l split sn	l loon i	refus	al in weath	ered h	edrock at 9.1 feet.					1	I	
REMARKS															
	1.05.11	ov *-		0 #1411	<i>c</i> ^f		oorlest'	on and identification		Ofm=11E 1'	n lines	no			
See	Log K coximate	ey tor boun	explor daries b	ation etwe	ot so	sample de	scripti	on and identification propers. Actual transitions mated. Fluctuations of gro	ocedures.	Stratificatio	on lines rep	resei s hav	nt E	zxploi	ration No.: B-3

G	()		nviron ers and S			Inc.		Geis Construction Lot 16, Jackso Devens, Massa	n Road	ıу		SI PI	KPLORATIC HEET: ROJECT NC EVIEWED B	1 of): 04.0	1 029496.00)
rilli		New	ad Alihoo Hampsh Misiasz	nire B	oring	, Inc.	Rig	be of Rig: CME 45 Truck J Model: 550 Iling Method: HSA	Ground S Final Bor	Surf ing	ace El Depth	ev. 1 (ft.	(ft.): 344	12/2012		um: um: NGVD29
lam	mer Ty	be: Au	Itomatic	Ham	mer		Sar	mpler Type: SS			Data				epth (ft.)	01 L T
lam	mer Fal	l (in.):			in.): 3	3.25 I.D.	Sar	mpler O.D. (in.): 2.0 mpler Length (in.): 24 ck Core Size:		1	Date /12/12 /13/12	2	Time 1530 0731 0725	Not er Not er	er Depth acountered acountered	Stab. Time 15 min. 16 hours
epth	Casing Blows/			Samp				Comple Descripti			/16/12 Field				countered	88 hours
ft)	Core Rate	No.	Depth (ft.)	Pen. (in)		Blows (per 6 in.)	SPT Value	Sample Descripti Modified Burmist		Remark	Test Data	Dep	Stratum Descriptior	Elect (#	Equipme	ent Installed
-	late	S-1	0-2	24	8	7 11 12 19	23	S-1: Medium dense, da brown, fine to coarse S/	AND,	1		0.5	TOPSOIL	a (a = 🖄		-Drill cuttings
-	-	S-2	2-4	24	13	14 13 9 7	22	some Silt, with root fiber S-2: Medium dense, da brown, fine to coarse SA	ırk							-2' >Bentonite Se
- 5 _	-	S-3	4-6	24	16	33 54	8	some Gravel, little Silt. S-3: Loose, brown to g	ay, fine			G	SAND AND GRAVEL (FII	1.		2" ID Solid S 40 PVC Wel Riser
-	-	S-4	6-8	24	9	6 1 1 1	2	to coarse SAND, some Gravel. S-4: Loose, brown to g		2						V3.5' Filter Sand 2" ID Slotted Sch 40 PVC
-	-	S-5	8-8.75	9	8	6 100/3"	R	to coarse SAND, some Gravel.	ſ	3		8.25	WEATHERE	/		Well Screen (0.01" Slot) 8.5'
0_								S-5: Top 3 inches: Ver dark brown to gray, fine coarse SAND, some Sil	to				BEDROCK			8.75
-								Gravel, trace rock fragn Bottom 5 inches: Very c								
5_								gray, weathered rock fragments. End of exploration at 8.	75 feet.							
-	-															
-																
0_																
-	-															
-	-															
5_	-															
-																
-																
2	2 - Piece	es of c	lay pipe	obse	erved	in split spoo	on in S	; standpipe 3.0 feet abov Sample S-4. drock at 8.75 feet.	e ground :	surf	ace.					
opr	Log K oximate i made	boun	daries b	etwe	en so	oil and bedro	ock typ	on and identification process. Actual transitions ma	ocedures. av be grad	St	ratifica Wate	ation	lines repr	esent have		ation No.: (OW)

GZA TEMPLATE TEST BORING W/ EQUIP.; 2/1/2012; 11:50:01 AM

GLY	GZA GeoE Engine	nviror ers and S	men Scient	n tal,	Inc.		Geis Constructio Lot 16, Jackso Devens, Massa	on Road		EXPLORATIC SHEET: PROJECT NC REVIEWED B	1): 04	of 1 4.0029	496.00	
Logged E Drilling C Foreman	o.: New	Hampsl	nire B	Boring	ı, Inc.	Ri	pe of Rig: CME 45 Truck g Model: 550 illing Method: HSA	Ground S Final Bor	Surface Elev ing Depth (f	. (ft.): 344	13/2	012	H. Dat V. Dat	tum: tum: NGVD2
Hammer	Г уре: Аі	utomatic	Ham	mer		Sa	mpler Type: SS		Data	Groundy			<u> </u>	Otale Time
Hammer Hammer Auger or	all (in.)	: 30		in.):	3.25 I.D.	Sa	mpler O.D. (in.): 2.0 mpler Length (in.): 24 ock Core Size:		Date 1/13/12	Time		later I enco	untered	Stab. Tim 5 min.
Casi Depth Blow	ng s/		Samp		Diaura	SPT	Sample Des	cription an	d Identificati	on	Remark	Field	G G	Stratum
(ft) Cor Rat	≥ No.	Depth (ft.)		(in)	Blows (per 6 in.)		المعانة معانة معا		Procedure)		Ren	Test Data	⊒ € I	Stratum Description
	S-1	0-2	24	14	6 11		S-1 : Medium dense, gr	ay, fine to	coarse SAN	ID, some			0.25	TOPSOIL 3
-	S-2	2-4	24	1	179 78 88	28 16	Silt, little Gravel. S-2 : No recovery.							
5_	S-3	4-6	24	15	8 8 15 19	23	S-3 : Medium dense, gr Gravel, little Silt.	ay, fine to	coarse SAN	ID, little			SANE) AND GRAV
-	S-4	6-8	24	21	20 32 32 28	64	S-4 : Very dense, gray, little Gravel.	fine to coa	arse SAND,	some Silt,				
-	S-5	8-10	24	20	10 9		S-5 : Medium dense, br	own, fine t	to coarse SA	ND and Silt.			8	3
_ 10 _					99	18	little Gravel.						GI	_ACIAL TILL
-													10.0	
		107			E0/0"	R					1			
]	S-6	12.7-	0	0	50/0"		S-6 : No recovery. End of exploration at 12	2.8 feet.			2			BEDROCK
15 _														
_														
-														
-														
-														
20														
-														
-														
1														
25 _														
4														
-														
-														
30	/00th			10.0	 faat baaa '						1			
							Il action and drill cuttings edrock at 12.8 feet.							
	Kev fo	r explo	ation		samnle de	scrinti	on and identification propers. Actual transitions mated. Fluctuations of gro	ocedures	Stratificatio	on lines repr	eser	nt I	Evolor	ation No.

								TEST BORING LOG						
GZ			nviron ers and S			Inc.		Geis Construction Compar Lot 16, Jackson Road Devens, Massachusetts	у	EXPLORATI SHEET: PROJECT N REVIEWED I	1 0:04	of 1 4.0029	496.00)
	ng Co.:	New	ad Alihoo Hampsh Misiasz	nire B	Boring	, Inc.	Rig	illing Method: HSA Final Bo	Surface Ele	See Plan ev. (ft.): 343.5 (ft.): 10.5 1/13/2012 - 1		012		atum: atum: NGVD29
Hamr	ner Ty	pe: Au	Itomatic	Ham	mer		Sa	mpler Type: SS		Ground		· ·	. ,	
Hamr Hamr	ner We ner Fal	ight (I (in.):	lb.): 14 30	0		3.25 I.D.	Sa Sa	mpler O.D. (in.): 2.0 mpler Length (in.): 24 ock Core Size:	Date 1/13/12	Time		later [encol	Depth untered	Stab. Time d 5 min.
epth	Casing Blows/			Samp		Discos		Sample Description ar	d Identifica	ation	lark	Field	÷ È	Stratum ; Description =
(ft)	Core Rate	No.	Depth (ft.)	Pen. (in)		Blows (per 6 in.)	SPT Value	(Modified Burmistor			Remark	Test Data	Dep [
_		S-1	0-2	24	16	5 10 10 10	20	S-1 : Medium dense, brown, fine Silt, trace Gravel.	to coarse S	SAND, little			0.25	TOPSOIL 343.3
-		S-2	2-4	24	15	9 12 15 14	27	S-2 : Medium dense, brown, fine Silt, trace Gravel.	to coarse S	SAND, little				
5 _		S-3	4-6	24	16	12 17 24 18	41	S-3 : Dense, brown, fine to coars Gravel.	e SAND, so	ome Silt, little			SAN	D AND GRAVEL
-		S-4	6-8	24	18	17 18 23 20	41	S-4 : Dense, brown, fine to coars Gravel.	e SAND, so	ome Silt, little				
- - 10 _		S-5	8-10	24	14	13 19 30 4	49	S-5 : Top 9 inches: Dense, brow some Gravel, little Silt. Bottom 5 inches: Dense, brown,					9.5 V	334.0 VEATHERED
		S-6	10.4-	0	0	50/0"	R	S-6 : No recovery.			1		10.5	BEDROCK 333.0
15 _ - - 20 _ - -														
_ 25 _ _ _														
30														
	1 - Aug	er and	l split sp	boon	refusa	al in weath	ered b	edrock at 10.5 feet.					,	
appro been	oximate made	boun at the	dariės b times a	etwe and u	en so nder	oil arid bedr	ock ty ons st	on and identification procedures pes. Actual transitions may be gra ated. Fluctuations of groundwater ere made.	dual. Water	r level reading	s hav	e	Explo	oration No.: B-6

GZA TEMPLATE TEST BORING; 2/1/2012; 11:39:49 AM

								TEST BORING	G LOG						
GZ			nviron ers and S			Inc.		Geis Constructior Lot 16, Jackso Devens, Massa	n Road	У	EXPLORATIO SHEET: PROJECT NO REVIEWED E	1 D: 0	of 1 4.0029	496.00	
Drilli	ng Co.:	New	ad Aliho Hampsl Misiasz	hire B	Boring	, Inc.	Rig	rpe of Rig: CME 45 Truck g Model: 550 illing Method: HSA	Ground S Final Bor	Surface Ele	See Plan ev. (ft.): 343 (ft.): 13.7 1/16/2012 - 1/	16/2	012	H. Dat V. Dat	um: um: NGVD29
			Itomatic		mer			mpler Type: SS		Date	Ground	_		<u> </u>	Otah Time
Ham	mer Fal	l (in.)			in.): ;	3.25 I.D.	Sa	Impler O.D. (in.): 2.0 Impler Length (in.): 24 Iock Core Size:		1/16/12	_	_	Vater [enco	untered	5 min.
Depth	Casing Blows/			Samp		Diawa		Sample Desc	cription and	d Identifica	ition	lark	Field	, , , , , , , , , , , , , , , , , , ,	Stratum
(ft)	Core Rate	No.	(ft.)	(in)	· /	Blows (per 6 in.)	SPT Value	(Modified	Burmister	Procedure	e)	Remark	Test Data		Stratum Stratum
_		S-1	0-2	24	10	68 1416	22	S-1 : Medium dense, gra Silt, trace Gravel.	ay, fine to	coarse SA	ND, some			0.5	TOPSOIL 342
-		S-2	2-4	24	15	16 18 17 17	35	S-2 : Dense, gray, fine t Silt.	o coarse S	SAND and	Gravel, little				
5_		S-3	4-6	24	17	20 25 20 25	45	S-3 : Dense, gray, fine t Silt.	o coarse S	SAND and	Gravel, little			SAND	AND GRAVE
-		S-4	6-8	24	18	22 24 19 14	43	S-4 : Dense, gray, fine t Silt.	o coarse S	SAND and	Gravel, little			8	335
-		S-5	8-10	24	14	10 6 12 10	18	S-5 : Medium dense, brottrace Gravel, Wet.	own, fine t	o coarse S	SAND and Silt,				
10 _						12 10	10							GL	ACIAL TILL
-		S-6	13.6-	0		50/0"	R	S-6 : No recovery.				1		13 13.7 WI	330 EATHERED BEDROCK
15 _			13.6					End of exploration at 13	.7 feet.						
-															
20 _															
-															
_ 25 _															
-															
30															
								action and drill cuttings. edrock at 13.7 feet.							
See	Log K oximate	ey fo	r exploi daries b	ration betwe	of s en so	sample des	scription	on and identification pr pes. Actual transitions ma ated. Fluctuations of grou	ocedures. ay be grad	Stratificat	tion lines repr	eser hav	nt I re		ation No.: B-7

GZA TEMPLATE TEST BORING; 2/1/2012; 11:39:49 AM

								TEST BORING LOG				<u> </u>	D 0	
57		GZA GeoE nginee	nviron ers and S	mer Scient	ists	Inc.		Geis Construction Compan Lot 16, Jackson Road Devens, Massachusetts	y	EXPLORATION SHEET: PROJECT NO REVIEWED E	1 D: 04	of 1 4.0029	496.00	
Drillir		New	id Alihoo Hampsł Misiasz	nire B	oring	, Inc.	Rig	illing Method: HSA Final Bor	Surface Ele	v. (ft.): 341.5	/16/2	012	H. Da V. Da	itum: itum: NGVD29
lamr	ner Ty	pe: Au	tomatic	Ham	mer		Sa	mpler Type: SS	Data	Ground	_		· /	o
lamr	ner Fal	I (in.):			n.): (3.25 I.D.	Sa	mpler O.D. (in.): 2.0 mpler Length (in.): 24 ck Core Size:	Date 1/16/12	Time	-	later [encol	untered	Stab. Time 5 min.
	Casing Blows/		Depth	Samp Pen		Blows	SPT	Sample Description an			Remark	Field Test	t.)	Stratum
(ft)	Core Rate	No.	(ft.)	(in)	(in)	(per 6 in.)	Value				Re	Data		TOPOOL
_		S-1	0-2	24	19	14 7 8 12	15	S-1 : Medium dense, gray, fine to Silt, little Gravel.	coarse SAI	ND, some			0.25	TOPSOIL 341
-		S-2	2-4	24	4	14 10 8 8	18	S-2 : Medium dense, brown, fine s Silt, trace Gravel.	to coarse S	AND, little				
5 _		S-3	4-6	24	11	4 4 22 22	26	S-3 : Medium dense, brown, fine silt, little Gravel.	to coarse S	AND, little				
-		S-4	6-8	24	18	7 18 16 11	34	S-4 : Medium dense, brown, fine s Silt, little Gravel.	to coarse S	AND, little			SAN	D AND GRAVEI
-		S-5	8-10	24	20	55		S-5 : Medium dense, brown, fine	to coarse S	AND, little				
0_						78	12	Silt, little Gravel.						
-		S-6	12.9-	0	0	50/0"	R	S-6 : No recovery.					13	328
-		3-0	12.9-	0		50/0		End of exploration at 13 feet.			1			
15 _														
-														
20														
-														
-														
25 _														
-														
- 30														
	1 - Aug	er and	l split sp	oon i	refusa	al on boulde	er or b	edrock at 13.0 feet.			-1			
KEWIARNO														
see	Log K	ey foi	explor	ation	ofs	sample des	scripti	on and identification procedures. pes. Actual transitions may be grad	Stratificati	on lines rep	reser	nt 🛛 🛔	Explo	ration No.:

GZA TEMPLATE TEST BORING; 2/1/2012; 11:39:50 AM

G	A)) (nviron ers and S			Inc.		Geis Constructior Lot 16, Jackso Devens, Massa	n Road	/		SH PR	PLORATIO	1 of : 04.	1 0029496.(
Drilli		New	id Aliho Hampsl Misiasz	hire B	oring	, Inc.	Rig	oe of Rig: CME 45 Truck 3 Model: 550 Iling Method: HSA	Ground S Final Bori	urfa ing l	ace El Depth	ev. (1 (ft.):	f t.): 338	2/20 ⁻	V. (Datum Datum	: I: NGVD29
lam	mer Tv	be: Au	tomatic	Ham	mer		Sar	mpler Type: SS					Groundw			·	
lam	mer Fal	I (in.):			in.): ദ	3.25 I.D.	Sar Sar	mpler O.D. (in.): 2.0 mpler Length (in.): 24 ck Core Size:	-	1/ 1/	Date /12/12 /13/12	2	Time 1604 1528 1046	Wa	ter Depth 12.01 12.17 12.32		Stab. Time 15 min. 23 hours
onth	Casing Blows/			Şamp							/16/12 Field						91 hours
epth (ft)	Core	No.	Depth (ft.)	Pen. (in)	Rec. (in)	Blows (per 6 in.)	SPT Value	Sample Description Modified Burmisto			Test Data	Dep(Stratum Description	Elev.	Equip	oment	Installed
	Rate	S-1	0-2	24	20	5 5	value	S-1: Top 8 inches: Top	soil.	<u>m</u> 1		0.75	TOPSOIL			D	rill cuttings
-						62	11	Bottom 12 inches: Med	ium		-	~				~ ^1	
-	-	S-2	2-4	24	8	12		dense, brown, fine to co									entonite Se
-	-					54	7	SAND, some Silt, trace S-2: Loose, brown, fine									" ID Solid S
-		S-3	4-6	24	3	13 17		coarse SAND, some Sil									0 PVC Well liser
5 _		0-0	4 -0	24		18 21	35	Gravel.								- /\3	.75' ilter Sand
_		~ 4				45 40		S-3: Dense, brown, fine									liter Sand
_		S-4	6-8	24	22	15 16 25 28	41	coarse SAND, some Sil Gravel.	t, some				SAND AND				
		_					+ 1	S-4: Dense, brown, fine	e to				GRAVEL				
		S-5	8-10	24	14	20 17		coarse SAND, some Sil								-2	" ID Slotted
10						14 13	31	Gravel, trace Rock fragr								s	ch 40 PVC
								S-5: Dense, brown, fine									Vell Screen 0.01" Slot)
-								coarse SAND, some Sil Gravel, trace Rock fragr	-								,
-								Glavel, liace Rock liagi	nents.								
-										2	-	13 V	VEATHERE	325.0			
-		S-6	13.9-	0	0	50/0"	R	S-6: No recovery.	F	3		14 V	BEDROCK			-1-	4'
15 _			13.9	<u> </u>				End of exploration at 14	feet.	5		<u> </u>	222110011				
-	-																
_																	
_																	
20																	
-																	
-																	
-																	
-																	
25 _																	
-																	
-																	
_																	
_																	
30																	
10								; standpipe 3.0 feet abov ction and drill cuttings.	e ground s	urfa	ace.						
2 3								drock at 14.0 feet.									
	-		•														
-																	
See	Log K	ey fo	exploi	ration	ofs	sample des	criptic	on and identification pr	ocedures.	Str	atifica	ition	lines repre	esent	Expl	orati	on No.:
nnr	ovimato	houn	dariaa h	-++	on co	il and hadre	oli tur	pes. Actual transitions ma									OW)

GZA TEMPLATE TEST BORING W/ EQUIP.; 2/1/2012; 11:50:02 AM

								TEST BORING L	.OG						
GZ			nviron ers and S			Inc.		Geis Construction Co Lot 16, Jackson Ro Devens, Massachus	oad		EXPLORATIO SHEET: PROJECT NO REVIEWED E	1 D: 04	of 1 4.0029	496.00	
Drilli		New	ad Aliho Hampsl Misiasz	hire B	oring	, Inc.	Rig	illing Method: HSA Fina	ound S al Bori	ourface Eleving Depth (/. (ft.) : 341	16/2	012	H. Da V. Da	tum: tum: NGVD29
			Itomatic		mer			mpler Type: SS		Date	Ground		r Dept /ater D	· · /	Stab. Time
Hamr	ner Fal	l (in.):			in.): ;	3.25 I.D.	Sa	mpler O.D. (in.): 2.0 mpler Length (in.): 24 ock Core Size:		1/16/12		Not		untered	
	Casing Blows/		Depth	Samp		Blows	SPT	Sample Description			on	Remark	Field Test	t.)	Stratum . Description a
(ft)	Core Rate	No.	(ft.)	(in)	(in)	(per 6 in.)				,		Rer	Data		TODOOU
-		S-1	0-2	24	14	13 10 9 9	19	S-1 : Medium dense, gray to some Silt, little Gravel.	o brow	n, fine to co	arse SAND,			0.25	TOPSOIL 340
-		S-2	2-4	24	20	13 12 17 15	29	S-2 : Medium dense, gray to some Gravel, little Silt.	o brow	n, fine to co	arse SAND,				
5 _		S-3	4-6	24	18	17 21 19 14	40	S-3 : Dense, gray, fine to co Gravel.	oarse S	SAND, little	Silt, little			SANI	O AND GRAVE
-		S-4	6-8	24	19	14 17 16 15	33	S-4 : Dense, gray, fine to co some Silt.	oarse S	SAND, som	e Gravel,				
_		S-5	8-10	24	17	13 13 15 17	28	S-5 : Medium dense, gray, f	fine to	coarse SAN	ID, some				
10 _							20							11	330
_		S-6	11.5-	0	0	50/0"	R	S-6 : No recovery.				1		11.6 W	/EATHERED329 BEDROCK
-			11.5					End of exploration at 11.6 fe	eet.						
_ 15															
··· _															
-															
-															
20 _															
-															
-															
25															
20 _															
_															
-															
30															
								action and drill cuttings. edrock at 11.6 feet.							
REMARKS															
 See	Log K	ey foi		ration	ofs	sample de	scripti	on and identification procee	dures.	Stratificati	on lines repr	eser	nt E		ration No.:
ppro	ximate made	boun at the	dariés b times a	petwe	en so nder	il and bedro	ock ty ons sta	pes. Actual transitions may be ated. Fluctuations of groundw	e grad	ual. Water	evel readings	; hav	e		B-10

GZA TEMPLATE TEST BORING; 2/1/2012; 11:39:44 AM

								TEST BORIN	G LOG						
GZ		GZA GeoE nginee	nviron ers and S	mei Scient	ntal,	Inc.		Geis Construction Lot 16, Jackso Devens, Massa	on Road	у	EXPLORATIO SHEET: PROJECT NO REVIEWED E	1): 0	of 1 4.0029	496.00	
Drilli	ng Co.:	New	ad Alihoo Hampsh Misiasz	nire B	Boring	, Inc.	Rig	pe of Rig: CME 45 Truck g Model: 550 illing Method: HSA	Ground S Final Bor	Surface Ele	See Plan ev. (ft.): 342 (ft.): 14.7 1/13/2012 - 1/	13/2	012	H. Da V. Da	tum: tum: NGVD29
Hami	mer Ty	be: Au	Itomatic	Ham	mer		Sa	mpler Type: SS		Data	Ground			· · /	Otale Time
Hami	mer Fal	l (in.):	lb.): 14 : 30 D.D./I.D		in.): ;	3.25 I.D.	Sa	mpler O.D. (in.): 2.0 mpler Length (in.): 24 ock Core Size:		Date 1/13/12	Time	-	Vater E t encou	untered	Stab. Time I 5 min.
Depth	Casing Blows/			Samp	le Rec.	Blows	SPT	Sample Deso	cription and	d Identifica	ition	Remark	Field), pt	Stratum . Description 👜
(ft)	Core Rate	No.	(ft.)	(in)	(in)	(per 6 in.)		, , , , , , , , , , , , , , , , , , ,	Burmister		,	Ren	Test Data		
_		S-1	0-2	24	20	56 66	12	S-1 : Medium dense, gr some Silt, little Gravel.	ay to brow	n, fine to c	coarse SAND,			0.25	TOPSOIL 341
-		S-2	2-4	24	14	12 10 18 18	28	S-2 : Medium dense, gr SAND, some Gravel, lit	-	n, medium	n to coarse				
5 _		S-3	4-6	24	15	15 16 16 18	32	S-3 : Dense, gray, med little Silt.	ium to coa	rse SAND	, some Gravel,				
-		S-4	6-8	24	18	21 23 25 17	48	S-4 : Dense, gray, med little Silt.	ium to coa	rse SAND	, some Gravel,			SANI	D AND GRAVE
-		S-5	8-10	24	16	11 12 11 11	23	S-5 : Medium dense, gr some Gravel, little Silt.	ay, mediur	n to coars	e SAND,				
- - - 15		S-6	14.6- 14.6	0	0	50/0"	R	S-6 : No recovery. End of exploration at 14	I.7 feet.			1		14 14.7 W	328 /EATHERED BEDROCK
- - 20 _ - -															
_ 25 _ -															
- - 30															
								action and drill cuttings. edrock at 14.7 feet.							
appro been	oximate made	boun at the	dariės b times a	etwe	en so nder i	sample des il and bedro the conditio neasuremen	ock ty ns sta	on and identification pr pes. Actual transitions m ated. Fluctuations of grou	ocedures. ay be grad undwater r	Stratificat lual. Water may occur	tion lines repr r level readings due to other fa	ese hav	nt re rs		ration No.: B-11

GZA TEMPLATE TEST BORING; 2/1/2012; 11:39:44 AM

GZN	GZ Geo Engi	oEn	viron rs and S	men Scient	ital,	Inc.		Geis Constructio Lot 16, Jackso Devens, Massa	on Road		EXPLORATIC SHEET: PROJECT NC REVIEWED B	1): 0	of 1 4.0029	9496.00		
Logged Drilling Foremar	Co.: Ne	ew H	lampsh	nire B	oring	I, Inc.	Ri	rpe of Rig: CME 45 Truck g Model: 550 illing Method: HSA	Ground S Final Bor	Surface Elev ing Depth (f	. (ft.): 342	13/2	012	H. Da V. Da	tum: tum: NG\	/D2
Hammer					mer			mpler Type: SS		Date	Groundv Time			th (ft.) Depth	Stab.	Time
Hammer Hammer Auger of	Fall (i	n.):	30		in.):	3.25 I.D.	Sa	Impler O.D. (in.): 2.0 Impler Length (in.): 24 Inck Core Size:		1/13/12	Time	-		unterec		
Depth Blo		_	S Depth	Samp Pen.		Blows	SPT	Sample Des	cription an	d Identificati	on	Remark	Field Test	epth ff.)	Stratum Descriptic	n à
	ate	o. -1	(ft.) 0-2		(in) 9	(per 6 in.) 3 14	Value	(Modified S-1 : Dense, black, fine		Procedure)	Silt with root	Re	Data		TOPSOI	
-	3	-	0-2	24	9	30 19	44	fibers.	to coarse	SAND and	Siit, with foot			0.75	10F301	- 3
_	S	-2	2-4	24	0	12 9 9 9	18	S-2 : No recovery.								
5_	S	-3	4-6	24	14	10 15 23 23	38	S-3 : Dense, gray, fine some Silt.	to coarse \$	SAND, some	e Gravel,			SAN	d and Gf	RAV
-	S	-4	6-8	24	17	29 25 22 28	47	S-4 : Dense, gray, fine some Silt.	to coarse \$	SAND, some	e Gravel,			0.05		~
-	S	-5	8-10	24	22	18 15		S-5 : Top 11 inches: D		, fine to coai	rse SAND,			8.25		3
10 _						15 15	30	some Gravel, some Sill Bottom 9 inches: Dens Silt, little Gravel. Wet.		fine to coars	e SAND and			G	LACIAL T	ΊLL
-														12.5		3
-	S	-6	12.9-	0	0	50/0"	R	S-6 : No recovery.				1	<u> </u>	13 V	/EATHER BEDROC	ED8 K
15			12.9					End of exploration at 13	3 feet.							
¹³																
_																
-																
20 _																
-																
-																
25 _																
-																
-																
-																
30																
1 - 1								ill action and drill cuttings edrock at 13.0 feet.								
REMARKS																
	Kay	for	ovelor	otion	of			on and identification p pes. Actual transitions m ated. Fluctuations of gro		Ctratificatio	n linco ronr	000	at		ration N	

G			nviron ers and S			Inc.		Geis Construction Lot 16, Jackso Devens, Massa	on Road	, 	EXPLORATIC SHEET: PROJECT NC REVIEWED B	1): 04	of 1 4.0029	496.00	
Dril	ged By: ling Co.: eman:	New		nire B	oring	, Inc.	Rig	rpe of Rig: CME 45 Truck g Model: 550 illing Method: HSA	Ground S Final Bor	Surface Eleving Depth (1	. (ft.): 341	16/2	012	H. Dat V. Dat	tum: tum: NGVD2
	nmer Ty				mer			ampler Type: SS		Dete	Groundy			· · ·	Stab. Time
Han	nmer We nmer Fa er or Ca	ll (in.):	30		in.): ;	3.25 I.D.	Sa	ampler O.D. (in.): 2.0 ampler Length (in.): 24 ock Core Size:		Date 1/16/12	Time	Not	later [encol	untered	
	Casing h Blows/		Depth	Samp Pen		Blows	SPT	Sample Des			on	Remark	Field Test	ft.)	Stratum
(ft)	Core Rate	No.	(ft.)	(in)	(in)	(per 6 in.)		e (Modified		Procedure)		Rei	Data		TODOOU
	_	S-1	0-2	24	18	11 19 23 18	42	S-1 : Dense, brown, fine Gravel.	e to coarse	e SAND, sor	ne Silt, trace			0.25	TOPSOIL 3
	-	S-2	2-4	24	13	17 15 19 19	34	S-2 : Dense, brown, fine Gravel.	e to coarse	e SAND, sor	ne Silt, little				
5_	-	S-3	4-6	24	13	9 12 14 11	26	S-3 : Medium dense, br Silt, little Gravel.	own, fine t	o coarse SA	AND, some			SANE	O AND GRAV
	-	S-4	6-8	24	15	15 15 16 15	31	S-4 : Dense, brown, fine Gravel.	e to coarse	e SAND, little	e Silt, little				2
	-	S-5	8-10	24	13	14 13		S-5 : Medium dense, br	own, fine t	o coarse SA	AND and Silt,			8	3
10 _	-					13 8	26	little Gravel. Wet.							
														GI	LACIAL TILL
15 _	-													15	3
	-	S-6	15- 15.1	2	2	50/2"		S-6 : Very dense, gray, End of exploration at 15		Bedrock.	Wet.] 1			EATHERED® BEDROCK
20	-														
20 _	-														
25 _	-														
	-														
30	-														
SKS	1 - Aug	er and	l split sp	oon	refusa	al in weathe	ered b	edrock at 15.1 feet.							
REMARKS															
	Loa K	ev fo	exploi	ation	of	sample de	scrinti	ion and identification propers. Actual transitions mated. Fluctuations of grouer made.	rocedures	Stratificatio	on lines renr	eser	nt I	Evolo	ration No.:

G			nviron ers and S			Inc.		Geis Constructio Lot 16, Jackso Devens, Massa	on Road	-	EXPLORATIC SHEET: PROJECT NC REVIEWED B	1): 04	of 1 4.0029	496.00	
Drill	ged By: ing Co.: eman:	New		nire B	oring	, Inc.	Ri	rpe of Rig: CME 45 Truck g Model: 550 illing Method: HSA	Ground S Final Bor	Surface Elev ing Depth (f	r. (ft.): 337	16/2	012	H. Dat V. Dat	tum: tum: NGVD29
	nmer Ty				mer			ampler Type: SS		Dete	Groundy			· · /	Otah Time
Ham	nmer We nmer Fa er or Ca	ll (in.):	30		in.): :	3.25 I.D.	Sa	ampler O.D. (in.): 2.0 ampler Length (in.): 24 ock Core Size:		Date 1/16/12	Time	-	later E encou	intered	Stab. Time 5 min.
	Casing Blows/		Depth	Samp		Blows	SPT	Sample Des			on	Remark	Field Test	t;)	Stratum - Description 👜
(ft)	Core Rate	No.	(ft.)	(in)	(in)	(per 6 in.)				Procedure)		Rer	Data		
	_	S-1	0-2	24	18	7 10 7 6	17	S-1 : Medium dense, gr Silt, trace Gravel.	ay, fine to	coarse SAN	ID, some			0.25	TOPSOIL 33
	-	S-2	2-4	24	10	4 4 10 15	14	S-2 : Medium dense, br Silt, trace Gravel.	own, fine t	o coarse SA	ND, some				
5 _	-	S-3	4-6	24	14	8 11 13 10	24	S-3 : Medium dense, br Silt, little Gravel.	own, fine t	o coarse SA	ND, some			SANE) AND GRAVE
	-	S-4	6-8	24	15	13 9 8 7	17	S-4 : Medium dense, br Silt, little Gravel.	own, fine t	o coarse SA	ND, some			8	32
10	-	S-5	8-10	24	17	10 12 15 30	27	S-5 : Top 14 inches: M SAND and Silt, little Gra Bottom 3 inches: Mediu	avel. Wet.					9.75	
		S-6	10.4-	0	0	50/0"	R	Bedrock. Wet.	un dense,	gray, weath	ereu	1		10.5 VV	
			10.4					S-6 : No recovery. End of exploration at 10).5 feet.						
15 _	-														
20	-														
20 _	-														
	-														
25 _	_														
	_														
	-														
30	 1 - Aua	er and	l split sc	l oon i	refusa	al in weathe	ered b	edrock at 10.5 feet.				1			
REMARKS	Ū		- •												
	Loa K	ev for	explor	ation	ofs	ample de	scripti	ion and identification pr rpes. Actual transitions m ated. Fluctuations of gro	ocedures	Stratificatio	on lines repr	eser	nt F	- - - -	ration No.:



Appendix B.3 – 2019 Boring Logs

GZ	N) (GZA GeoEi Enginee	n viron ers and S	men Scienti	i tal , l	Inc.		Due Diligence Geo Proposed	vens, LLC technical Evalua Development oad Devens, MA		BORING SHEET: PROJEC REVIEW	T NO:	1 of 1 01.017		0	
Drilling Foren Logge			Environme Hastings Larose	ental		Rig M		ATV CME 55LC od:HSA	Boring Locatio Ground Surfac Final Boring D Date Start - Fir	e Elev. (ft.): 3 epth (ft.): 12	38.5 029 - 11/5/201	9			: See Plan : See Plan	
I.D/O. Hamm	r/Casing .D.(in): ner Weig ner Fall ::	ght (lb.)	3.25/6		n Auge	I.D./C	ler Hm			Date 11/5/19	Groundw Time 08:00			t.)	ng Sta	b. Time) Mins.
)epth (ft)	Casing Blows/ Core	No.	Depth (ft.)	Samp Pen. (in)		Blows (per 6 in.)	SPT Value	(Mod	Description an ified Burmister		n	Remark	Field Test Data	Depth (ft.)	Stratum Descriptio	u Elev. (ft.)
-	Rate	S-1	0-2	24	12	6 5 5 6	10	S-1: Top 10" - Dry, dar Gravel, trace Roots/Gr Bottom 2" - Dry, brown	ass/Leaves.			1	0.8	0.8	TOPSOIL	007.
-		S-2	2-4	24	18	86 79	13	Gravel. S-2: Top 3" - Dry, brow				2 3	5.2 0.1	2.2		
5_		S-3	4-6	24	16	10 8 13 19	21	trace Gravel. Bottom 15" - Medium o Gravel, trace Silt.			,		0.1		SAND	
-		S-4	6-8	24	12	28 20 31 18	51	S-3: Medium dense, di trace Silt. S-4: Top 10" - Dry, bro	wn, fine to coarse	e SAND, little G	avel, little Silt.	4		6.8		331.3
- 10 _		S-5	10-12	24	14	11 11 19 40	30	Bottom 2" - Dry, brown some Silt, little Gravel. S-5: Dense, wet, brow	n/gray with occas				ND		GLACIAL TI	LL
-						19 40		SAND, some Silt, som	ottom of boring a	t 12 feet.		5		12		326.
15 - - 20 - - -																
25																
2. 3. 4. 5.	"Maste Advan Field to Tiger o nothin Driller Obser	erPlan_E ced bore esting re organic v g detecte noted po ved grav	Base.dwg, ehole usin esults repr vapor met ed (<0.1 p ossible gr vel in tip o	" no da ng hollo resent ter (O\ opmv). avel/co of split	ate inc ow ster total o /M) eq obbles spoon	licated. m auger (HS organic vapor juipped with	A) meth levels, a photoi g from 6	htours in an autoCAD ex nod from ground surface referenced to a benzene onization detector (PID) 6.5 to 7.5 feet. sting grade.	to approximately e standard, measu	10 feet below e ured in the head	xisting ground Ispace of seale	surfac ed soil	e. sample	jars usi	ing a Phoch	
	. Actual 1	ransitions	s may be g	gradual.	Water		s have b	rocedures. Stratification line een made at the times and							ing No. Z-201	:

								TEST BO	RING LOG							
GZ	N) (nviron ars and S			Inc.		Due Diligence Geo Proposed	evens, LLC otechnical Evalua Development coad Devens, MA		BORING SHEET: PROJEC REVIEWE	T NO:	1 of 1 01.01	74440.00		
Drilling (Forem Logge	nan:		Environme Hastings Larose			Rig		ATV CME 55LC Ind:HSA	Boring Locatic Ground Surfac Final Boring D Date Start - Fir	ce Elev. (ft.): 3 epth (ft.): 12	;22 029 - 11/5/201	9		. Datum: _{See}		
I.D/O.I Hamm	ner Fall	ght (lb.)	3.25/		n Auge	I.D.	npler Hn			Date Not Observed	Groundw	ater I		ft.)	Stab.	Time
	Casing Blows/ Core	No.	Depth		Rec.	Blows (per 6 in	SPT	() 1	Description an lified Burmister		on l	Remark	Field Test	ed je bt	tratum scription	Elev. (ft.)
-	Rate	S-1	(ft.) 0-2	(in) 24	(in) 12	4 5 10 18) Value 15	S-1: Top 6" - Dark bro Roots/Leaves.	wn, fine to coarse	SAND, some S	silt, trace	1	Data ND	0.5 T(OPSOIL JBSOIL	321. 321.(
-		S-2	2-4	24	18	20 19 16 12	35	Bottom 6" - Dry, brown S-2: Dense, dry, brown GRAVEL, little Silt.					ND	SANI	D/GRAVEL	
5_		S-3	4-6	24	16	15 15 16 12	31	S-3: Top 12" - Dry, bro Silt.	own, fine to coarse	e SAND, some (Gravel, little		ND	5		317.0
-		S-4	6-8	24	16	13 9 12 11	21	Bottom 4" - Dry, brown S-4: Medium dense, n coarse SAND and Cla	noist, brown with c	occasional orang			ND			
- - 10														GLA	CIAL TILL	
- 10		S-5	10-12	24	14	14 21 25 23	46	S-5: Dense, moist, bro Gravel.	own/gray, fine to c	oarse SAND, so	ome Silt, some	4	ND	12		310.0
-								E	Bottom of boring a	t 12 feet.						
15 _																
-																
20 _																
-																
_ 25 _																
-																
20																
REMA	"Maste Advan Field te Tiger o nothing	erPlan_E ced bore esting re organic v g detect	Base.dwg, ehole usir esults rep vapor met ed (<0.1	" no d ng holle resent ter (O opmv)	ate inc ow ste total c /M) ec	licated. m auger (H organic vap quipped wit	ISA) met or levels n a photo	hod from ground surface referenced to a benzen pionization detector (PID isting grade.	e to approximately e standard, measu	10 feet below e ured in the head	xisting ground Ispace of seale	surfac d soil	ce. sample	e jars using a	Phocheo	ж
types.	Actual 1	ransitions	s may be g	gradual	Water	r level readir	gs have	procedures. Stratification lin been made at the times an ments were made.						Boring GZ-2		

G	ZN	GZA GeoE Engine	ers and S	mer Scient	ital, ists	Inc.			Due Diligence Geo Proposed	evens, LLC otechnical Evalua Development oad Devens, MA	ition	BORING SHEET: PROJECT REVIEWE	г NO:	1 of 1 01.01	74440.00		
For	ng Co.: eman: Iged By	James	Environme Hastings Larose			F	Rig Mo		ATV CME 55LC od :HSA	Boring Locatio Ground Surfac Final Boring D Date Start - Fir	e Elev. (ft.): 3 epth (ft.): 12	17 029 - 11/5/2019	9			See Plan See Plan	
Aug	er/Casi	ng Type:	Hollov	<i>w</i> Ster	n Auge	er 🕴	Sampl	er Typ	e: Split Spoon	1		Groundw	ater 🛛	Depth (ft.)		
	O.D.(in)		3.25/	6.25	0			D. (in.			Date	Time	Wate	r Depti	n Casin	ng Stab	o. Tim
	nmer w	eight (lb. Il (in) [.]):						r Wt (Ib): 140 lbs r Fall (in): 30"		Not Observed						
Oth	er:	. ,					Other		Autohammer								
Dep (ft)	th Blow Cor Rate	s∕ ≥ No.	Depth (ft.)	Samp Pen. (in)	-	Blov (per 6		SPT Value	(Mod	Description an ified Burmister		n	Remark	Field Test Data		Stratum Descriptio	n <u>H</u> ev
	Tau	S-1	0-2	24	6	1		3	S-1: Top 5" - Dry, dark	k brown, fine to co	arse SAND, sor	ne Silt, trace		ND	0.4	TOPSOIL	- 31
	1					2 3	2	0	Leaves, Roots.				1		2	SUBSOIL	31
	-	S-2	2-4	24	18	7	7	11	Bottom 1" - Dry, brown S-2: Medium dense, d				2	ND	2		51
	1					7	8	14	little Silt.	,,,,		- () c.urol,	3				
	-	S-3	4-6	24	20	10	11	~ -	S-3: Dense, dry, browr	n, fine to coarse S	AND, some Gra	avel, little Silt.		ND	GF	RAVELLY SA	AND
5	-					21		32	, , ,	-			4				
	-	S-4	6-8	24	24	28	20		S-4: Top 6" - Dry, brov	vn. fine to coarse	SAND little Gra	vel, little Silt		ND	6.5		31
	-			27	27	24	-	44	Bottom 18" - Dense, m								-
	-								and fine to coarse SAN	ND, little Gravel.							
	4															GLACIAL TII	
10	_		40.15											ND		JLAGIAL I II	L
		S-5	10-12	24	16	12 : 21 :		42	S-5: Dense, moist, bro (+) Gravel.	wn/gray, SILT and	a tine to coarse	SAND, little					
						21	~ <u>~</u>		. ,						12		30
									E	Bottom of boring a	t 12 feet.		5				
15]																
	1																
	1																
	1																
20	1																
20	-																
	1																
	-																
	-																
	-																
25	-																
	-																
	4																
	_																
30																	
								phic co	ntours in an autoCAD e	xisting conditions	drawing file pre	pared by Highp	oint E	Inginee	ring, Inc.	entitled	
\$S	2. Adva	anced boi		ng holl	ow stei	m auge	r (HSA		od from ground surface								
REMARKS	Tige	r organic	vapor met	ter (O	VM) eq				referenced to a benzene ionization detector (PID)								eck
RE	noth	ing detec	ted (<0.1)	(vímqc					to apparent utility conflic		1			U P	, –		
	5. Upo	n complet	tion, boreh	iole ba	ckfilled	d with c	uttings	to exis	sting grade.								
									rocedures. Stratification line een made at the times and						Bori	ng No.:	
		. transition															

GZ		GZA GeoE Enginee	nviron ars and S	men Scient	ists	Inc.		King De Due Diligence Geo Proposed	RING LOG evens, LLC otechnical Evalua Development oad Devens, MA		BORING SHEET: PROJEC REVIEW	T NO:	1 of 1 01.01	74440.00		
Drilling C Forem Logge	nan:		Environme Hastings Larose			Rig		ATV CME 55LC Iod:HSA	Boring Locatio Ground Surfac Final Boring D Date Start - Fir	e Elev. (ft.): 3 epth (ft.): 12	15 029 - 11/5/201	9		Datum: s		
I.D/O.I Hamm	D.(in): Ier Wei Ier Fall	g Type: ght (lb.) (in.):	3.25/6		n Auge	I.D.	npler Hm			Date Not Observed	Groundw Time		Depth (r Deptl	T	g Stab.	Time
Depth (ft)	Casing		Depth (ft.)	Samp Pen. (in)		Blows (per 6 in	SPT	(Mod	Description an lified Burmister		n	Remark	Field Test Data	(#) [#	Stratum Description	Elev. (ft.)
_	Nate	S-1 S-2	0-2 2-4	24 24 24	16 18	2 2 4 8 8 12	6	S-1: Top 6" - Dark Bro Gravel, Roots, Leaves Bottom 18" - Dry, brov trace Roots.	, Wood.			1	ND ND	0.5 2	TOPSOIL	314.5 313.0
5_		S-3	4-6	24	18	16 13 20 17 17 20	34	S-2: Medium dense, d some Gravel. S-3: Top 12" - Dry, bro Silt.				3	ND	6	SAND	309.0
-		S-4	6-8	24	20	31 25 29 36	54	Bottom 6" - Dry, brown Gravel. S-4: Very dense, dry, I Gravel.					ND		LACIAL TILL	
10 _		S-5	10-12	24	18	23 41 29 39	70	S-5: Very dense, dry, o some gravel.	olive-brown, fine to	o coarse SAND,	, some Silt,		ND	12		303.0
- 15 _ - - 20 _ -																
25 _																
30																
1. 2. 3.	"Maste Advan Field t Tiger nothin	erPlan_E liced bord esting re organic v g detect	Base.dwg, ehole usir esults repr vapor met ed (<0.1 p	" no d ng holle resent ter (O opmv)	ate inc ow ste total c /M) ec	licated. m auger (H organic vap juipped wit	ISA) met or levels, h a photo	ntours in an autoCAD e nod from ground surface referenced to a benzen ionization detector (PID) isting grade.	to approximately e standard, measu	10 feet below e ured in the head	xisting ground Ispace of seale	surfac ed soil :	e. sample	e jars using	a Phoche	ck
types.	Actual	transitions		gradual	. Water	level readir	ngs have l	procedures. Stratification line							ng No.: -204	

GZ		GZA GeoE Engine	nviron ars and S	men Scienti	i tal, l	Inc.		Due Diligence Geo Proposed	vens, LLC otechnical Evalua Development oad Devens, MA	tion	BORING SHEET: PROJEC REVIEW	T NO:	1 of 1 01.01	74440.00	
Drilling C Forem Logge	nan:		Environme Hastings Larose			-	odel: C	ATV CME 55LC DDI:HSA	Boring Locatio Ground Surfac Final Boring De Date Start - Fin	e Elev. (ft.): 3 epth (ft.): 14	029 - 11/5/201		v	. Datum: _{See} . Datum: _{See}	
I.D/O.I Hamm Hamm Other:	D.(in): ler Wei ler Fall	. ,	3.25/6	6.25	n Auge	I.D./O	ler Hm			Date Not Observed	Groundw Time		Depth (r Deptl		Stab. Time
	Casing Blows/ Core		Depth (ft.)	Samp Pen. (in)		Blows (per 6 in.)	SPT		Description and ified Burmister		on	Remark	Field Test Data	td ⊕ (j. Des	ratum
	Rate	S-1 S-2	0-2	24	12	3 5 6 7 7 8	11	S-1: Medium dense, di trace Roots/Leaves/St S-2: Medium dense, di	icks.				0.4 0.1		IL/SUBSOIL 311
5_		S-3	4-6	24	12	10 14 16 18 23 20	18 41	S-3: Dense, dry, brown			,	3	ND		
-		S-4	6-8	24	20	23 20 24 22 26 27	48	S-4: Dense, dry, browr	n, fine to coarse S	AND, some Gra	avel, little Silt.		ND	SAND	/GRAVEL
- - 10 _ - -		S-5	10- 11.2	14	0	9 45 100/2"	R	S-5: No Recovery				4		9 POSSIBLE 11.2	304 GLACIAL TILI 301
15								E	Bottom of boring at	t 14 feet.		5		WEATHER	ED BEDROCK
- - 25 _ - -															
- - 30															
1. 2. 3. 4. 5.	"Maste Advan Field t Tiger nothin Driller Split s	erPlan_E loced bord esting re organic g detect noted in poon ref	Base.dwg, ehole usir esults repr vapor met red (<0.1 p ncreased f fusal at 11	" no da ng hollo resent ter (O\ opmv). HSA da I.2 fee	ate inc ow ster total o /M) eq rill effo t. Adv	licated. m auger (HS/ organic vapor juipped with a rt at approxin	A) meth levels, a photoi nately 9 from 11	.2 to 14 feet with approx	to approximately e standard, measu and 10.6eV lamp	14 feet below e ired in the head . Results in pa	xisting ground Ispace of seale rts per million l	surfac ed soil by volu	ce. sample ime (pp	e jars using a pmv). ND ind	Phocheck
								rocedures. Stratification line een made at the times and						Boring GZ-2	No.:

							TEST BO	RING LOG							
GZN	GZA GeoE Engine	nviron ers and S	men Scient	ital, ists	Inc.		Due Diligence Geo Proposed	vens, LLC stechnical Evalua Development oad Devens, MA		BORING SHEET: PROJEC REVIEW	T NO:	1 of 1 01.017			
Drilling Co.: Foreman: Logged B	James	Environme Hastings Larose			Rig N		atv CME 55LC od:HSA	Boring Locatio Ground Surfac Final Boring D Date Start - Fir	e Elev. (ft.): 2 epth (ft.): 7	98 029 - 11/5/201	19		Datum: See Datum: See		
I.D/O.D.(ir	Veight (lb.	3.25/		n Auge	I.D./0	pler Hm		I	Date Not observed	Groundv Time			t.)	Stab.	Time
Cas Depth Blo (ft) Co	ore No.		Samp Pen. (in)		Blows (per 6 in.)	SPT	(Mod	Description an ified Burmister		n	Remark	Field Test Data		atum cription	Elev. (ft.)
- - - 5_	s-1 S-2 S-3	0-2 2-4 4-6	24 24 24 24	12 18 20	1 2 1 3 11 24 29 40 18 21 24 23	3 53 45	S-1: Top 6" - Dry, dark Leaves, Roots, Wood. Bottom 18" - Loose, m little Gravel. S-2: Very dense, dry, t some Silt, some Grave S-3: Dense, dry, browr SILT, little (+) Gravel.	oist, brown, fine to prown with orange	o coarse SAND e/gray, fine to co	, some Silt, barse SAND,	1 2 3 4	ND ND ND	2	PSOIL BSOIL 	_297. _296.
								Bottom of boring a	at 7 foot		5		6.7 7 WEATHER	ED BEDF	291. R 291 .
- 10 _ - - 15 _ - - 20 _ -											7				
25															
STATES IN THE INFORMATION INFORMATIONI INFORMATION INFORMATICA INTICON INTO INTO INTO INTO INTO INTO INTO IN	asterPlan_l vanced bor eld testing r ger organic thing detec pserved app iller noted in ring offset a	Base.dwg rehole usir esults rep vapor me ted (<0.1 parent exp ncreased of approxima	," no d ng holl resent ter (O ppmv) osed b drill eff ately 5	ate inc ow ste total c /M) ec bedroc fort at 6 feet sc	licated. m auger (HS organic vapo quipped with k outcrop ap 6.7 feet and	SA) metł r levels, a photo pproxima HSA ref A advan	ontours in an autoCAD ex nod from ground surface referenced to a benzene ionization detector (PID) ately 10 feet east of bore usal at 7 feet. Driller not uced at 0 refusal at 6.7 feet sting grade.	to approximately e standard, measu and 10.6eV lamp hole. ted probable weat	10 feet below e ured in the head . Results in par	xisting ground Ispace of seal rts per million	ed soil : by volu	e. sample me (pp	jars using a mv). ND indi	Phochec cates	k
See Log K types. Acti	Key for expla ual transitior	nation of s	ample o gradual	descript . Water	tion and identi r level reading	fication p is have b	procedures. Stratification line peen made at the times and nents were made.						Boring GZ-2		

174440.00 KING STREET PROPERTIES, DEVENS, MA.GPJ; STRATUM ONLY; 12/7/2019

249 Vanderb Norwood, M			Pro	gence Geotecl posed Develo 45 Jackson Ro s, Massachuse	pment bad		Test Pit N Page No. File No. Checked E	1	TP-20: of 01.01744 MJO	1
GZA Rep. Weather		Glenn Larose Sunny 20-30s	Contractor Operator Make Capacity			tion 08E .5 FT	Date Ground El Time Stari Time Com	ted	<u>11/15</u> 343 08 09	3.5 30
Depth		5	Soil Description	n		Sample No.	PID (PPM)	Excav. Effort	Boulders: Count/ Class	Note No.
								E	0	1
1'								E	0	
2' 3'	Dry, browr	n, fine to coarse SAND and	Wood/ Concrete		lt, trace Brick/ Roots/	(ND	E	0	
			(FILL)					E	0	
	Apparent	12-inch-diameter ductile	iron pipe		3-ft	>		E	0	2 3
5' - 5		Bottom of e	excavation at 5 f	eet	/					5
6' —										
- 7'										
8' —										
9' —										
10'										
11'										
12'										
<u> </u>										
14'										
15'										
<u> </u>										
 Field testi meter (OVM Observed feet. Operat top lift of ba 	ng results represent to I) equipped with a pho top of existing 12-incl	nated from topography show otal organic vapor levels, refr otoionization detector (PID) a h-diameter ductile iron pipe l location in ~ 12-inch thick lifts ed. Boulder Class	renced to a benzei and 10.6eV lamp. located at the nor	ne standard, mea Results in parts p th side of the test tamped with the	sured in the headspace er million by volume (p pit approximately 4 to	of sealed so pmv). ND ind 5 feet. Test to existing g	il sample jars dicates nothin pit terminated	using a Phocl g detected (· d at approxin -like fill was u	– neck Tiger orga <0.1 ppmv). nately 5	anic vapor
	3'	Letter Size I Designation Classi	Range fication	Us	ed	F = Fine M = Mediu	ım	()	Observed Not Observed	
-	8' N		- 17" - 36" I Larger	TRACE (TR.) LITTLE (LI.)	0 - 10% 10 - 20%	C = Coarse V = Very F/M = Fine F/C = Fine GR = Gray	e to medium to coarse	Elaps Time Readi (Hour	ed to ng	Depth to Ground- water
		EEasy MModerate		SOME (SO.)	20 - 35%	BN = Brow YEL = Yello	'n		-,	'

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to factors other than those present at the time measurements were made.

Excavation Effort E-----Easy M-----Moderate D-----Difficult

35 - 50%

AND

	Environmental, Inc.	Pro	gence Geotechnical Study posed Development 45 Jackson Road 5, Massachusetts 01434		Test Pit No Page No. File No. Checked B	1	TP-201 of 01.017444 MJO	1
GZA Rep. Weather	Glenn Larose P. Sunny 20-30s	Contractor Operator Make Capacity	Anchor Excavating Corporat Mark Stodard CAT Model 30 0.75 CY Reach ~1	8E	Date Ground Ele Time Start Time Com	ed	11/15, 343 08	3.5 30
Depth	Approx. East Side	Soil Description	Approx. West Side	Sample No.	Field Test Data	Excav. Effort	Boulders: Count/ Class	Note No.
1' 1' Woo 2' Conc						E	0	1,2,3
3'	Dry, brown, fine to coarse, S/ Brick/	AND and fine to coarse G Roots/Wood/Concrete.	GRAVEL, little Silt, trace			E	0	
4'		(FILL)			ND	E	0	
						D	0	
6.5'						D	0	
8'	Damp, olive-brown with red s		AND, some Silt, some fine			D	0	
9' —		to coarse Gravel. (GLACIAL TILL)		S-1	ND	D	1A 1A	
10'10'	Bott	om of excavation at 10 f	eet	-		D	1A	5,6,7
11'								
— 12' —								
— 13' —								
— 14' —								
<u> </u>								
<u> </u>								
Notes:					11			
 Field testing residues meter (OVM) equid Offset test pit approximation 	ults represent total organic vapor le pped with a photoionization detecto pproximately 30 feet north of test pi	vels, refrenced to a benzen or (PID) and 10.6eV lamp. F t TP-201 staked location du	drawing .dwg file produced by Highpoin the standard, measured in the headspace Results in parts per million by volume (pp ue to asphalt pavement and buried pipe ately 1 to 2 feet within the East sidewall.	of sealed so omv). ND in	il sample jars u dicates nothing	ising a Phoch	– neck Tiger orga	nic vapor

5. Observed ground water at approximately 10 feet pooling at bottom of test pit.

6. Infiltration test performed adjacent to test pit location at a depth of approximately 8.5 feet. 7. Upon completion, test pit backfilled in 12-inch-thick lifts of excavated soil each tamped with the excavator bucket back to existing grade. Topsoil-like fill was used as the top lift of backfill and was reseeded.

Test Pit Plan	Boulder Class Letter Size Range	Proport Usec		Abbreviations F = Fine	GROUNDWATE (x) Observed	
8'	Designation Classification A 6" - 17" B 18" - 36"	TRACE (TR.)	0 - 10%	M = Medium C = Coarse V = Verv	() Not Observed	l Depth
→ N	C 36" and Larger	LITTLE (LI.)	10 - 20%	F/M = Fine to medium F/C = Fine to coarse	Elapsed Time to Reading	to Ground-
	Excavation Effort EEasy	SOME (SO.)	20 - 35%	GR = Gray BN = Brown	(Hours)	water
	MModerate DDifficult	AND	35 - 50%	YEL = Yellow	5 min	10'
	DDifficult				(see	Note 5)

249 Vande Norwood,	-	Prop	ence Geoter posed Devel 45 Jackson F , Massachus	Road			Test Pit No Page No. File No. Checked B	1	TP-202 of 01.01744 MJO	1
GZA Rep Weather		Contractor Operator Make Capacity	Anchor CAT 0.75 CY	Excavating Cc Mark Stodar Model Reach		E	Date Ground El Time Start Time Com	ed	<u>11/15/</u> <u>337</u> 073 083	7.5 30
Depth 0		Soil Description	l			Sample No.	Field Test Data	Effort	Boulders: Count/ Class 0	Note No. 1,2
1' 2'	Dry, brown, fine to o	coarse SAND and fine to cc Brick/Roots/Wood/Con (FILL)		, little Silt, trace	2		ND	E	0 0 0	
— 3'— — 4'—	51	Dry, tan, fine SAND, son (silty SAND)	ne Silt.			S-1	ND	E	0	
— 5' — — 6' —	5 Dry, 6'	brown, fine to medium SA (SAND)	ND, trace Silt				ND	E	0	3
— 7' — — 8' —		coarse SAND and fine to c (SAND/GRAVEL)	coarse GRAVE	L, trace (-) Silt.		S-2	ND	E	0	4
9' 10'	8.5' Damp, olive-brown with re	d staining, fine to coarse S Gravel.	AND, some Si	ilt, some fine to	coarse	S-3	ND	D	0 1A 1A	
— 11' — — 12' —	12'	(GLACIAL TILL)				5-5		D D	0 1A	5,6
— 13' — — 14' —	во	ttom of excavation at 12 f	eel							
— 15' —										
16' Notes:										

1. Ground surface elevation estimated from topography shown on an electronic drawing .dwg file produced by Highpoint Engineering, Inc. entitled "MasterPlan_Base."

2. Field testing results represent total organic vapor levels, refrenced to a benzene standard, measured in the headspace of sealed soil sample jars using a Phocheck Tiger organic vapor meter (OVM) equipped with a photoionization detector (PID) and 10.6eV lamp. Results in parts per million by volume (ppmv). ND indicates nothing detected (<0.1 ppmv).

3. Observed red/orange staining at approximately 4 feet and at 8.5 feet.

4. Infiltration test performed adjacent to test pit location at a depth of approximately 6.5 feet.

5. Test pit terminated in glacial till due to collapsing sand sidewall above.

6. Upon completion, test pit backfilled in 12-inch-thick lifts of excavated soil each tamped with the excavator bucket back to existing grade. Topsoil-like fill was used as the top lift of backfill and was reseeded.

Test Pit Plan	Boulder Class	Proport		Abbreviations	GROUNDWA	TER
3'	3' Letter Size Range Designation Classification A 6"-17" TRA		d 0 - 10%	F = Fine M = Medium C = Coarse	() Observed (x) Not Observed	
8' ► N	B 18" - 36" C 36" and Larger	LITTLE (LI.)	10 - 20%	V = Very F/M = Fine to medium F/C = Fine to coarse	Elapsed Time to Reading	Depth to Ground-
	Excavation Effort EEasy	SOME (SO.)	20 - 35%	GR = Gray BN = Brown	(Hours)	water
	MDifficult	AND	35 - 50%	YEL = Yellow		

249 Vande Norwood,		Prop 2	ence Geotec oosed Develo 45 Jackson R , Massachus	opment load	у		Test Pit No Page No. File No. Checked B	1	TP-203 of 01.01744 MJO	1
GZA Rep Weather		Contractor Operator Make Capacity	Anchor CAT 0.75 CY	Excavating Mark Stod Model Reach		E	Date Ground Ele Time Start Time Com	ed		4 15
Depth 0	- · · · · ·	Soil Description	Silt, trace fine	Gravel, trace	2	Sample No.	Field Test Data ND	Excav. Effort E	Boulders: Count/ Class 0	Note No. 1,2
1' 2'	Dry, brown, fine to coarse 2'	Roots/Leaves/Wood. (TC SAND, some Silt, little fin (SUBSOIL) coarse SAND, some fine t	ne to coarse (ND	E	0	
3' 4'	4'	(Gravelly SAND)					ND	E	0	
5' 6'	Dry, brown, fine to	coarse SAND and fine to	coarse GRAV	EL, trace Silt.				M	0	
— 7' — — 8' —		(SAND/GRAVEL)				S-1	ND	M	0	
9' 10'	9.8' 10' Bott	om of excavation at 10 fe	eet				ND	D D D	0	3,4 5,6
11' 12' 13' 14' 15' 16'	Wet, olive-brov	vn with red, fine to coars								
Notes:										

Ground surface elevation estimated from topography shown on an electronic drawing .dwg file produced by Highpoint Engineering, Inc. entitled "MasterPlan_Base."
 Field testing results represent total organic vapor levels, refrenced to a benzene standard, measured in the headspace of sealed soil sample jars using a Phocheck Tiger organic vapor meter (OVM) equipped with a photoionization detector (PID) and 10.6eV lamp. Results in parts per million by volume (ppmv). ND indicates nothing detected (<0.1 ppmv).

3. Observed groundwater or perched water infiltrating into excavation from sidewalls at 9 to 9.8 feet.

4. Observed orange/red staining of soil at approximately 9.8 feet.

5. Test pit terminated in glacial till due to sidewall collapse from water infiltration at 10 feet.

6. Upon completion, test pit backfilled in 12-inch-thick lifts of excavated soil each tamped with the excavator bucket back to existing grade. Topsoil was used as the top lift of backfill and was reseeded.

Test Pit Plan	Boulder Class Letter Size Range		Proportions Used		GROUNDWATE	R
8' 3'	Designation Classification A 6" - 17"	TRACE (TR.)	0 - 10%	M = Medium C = Coarse	() Not Observed	
→ N	B 18" - 36" C 36" and Larger	LITTLE (LI.)	10 - 20%	V = Very F/M = Fine to medium F/C = Fine to coarse	Elapsed Time to Reading	Depth to Ground-
	Excavation Effort EEasy	SOME (SO.)	20 - 35%	GR = Gray BN = Brown	(Hours)	water
	MModerate DDifficult	AND	35 - 50%	YEL = Yellow	10 mins	9'
	DDinicuit				see	Note 3

249 Vandel Norwood, I	•	Pro	gence Geotec posed Develo 45 Jackson R s, Massachus	opment load		Test Pit No Page No. File No. Checked E	1	TP-204 of 01.017444 MJO	1
GZA Rep. Weather		Contractor Operator Make Capacity	Anchor CAT 0.75 CY	Excavating C Mark Stoda Model Reach	E	Date Ground El Time Start Time Com	ed	<u>11/14</u> , <u>317</u> 094 100	7.5 45
Depth	Davidasi kasas	Soil Descriptior		Crewel torong	Sample No.	Field Test Data	Excav. Effort	Boulders: Count/ Class	Note No.
1'	1'	Roots/Leaves/Wood. (T	OPSOIL)			ND	Е	0	1,2
	Dry, brown, fine 2'	to coarse SAND, some Silt (SUBSOIL)	, little Gravel,	trace Roots.		ND	E	0	
2'	Dry, brown, fine	to coarse SAND, some fine (Gravelly SAND)	to coarse Grav	vel, trace Silt.		ND	E	0	
3' —	5	(Graveny SAND)					E	0	
— 4' —							E	0	
— 5' —					S-1	ND	М	0	
— 6' —	Damp, brown, fine	e to coarse SAND and fine t	to coarse GRA	VEL, trace Silt.	5-1		М	0	
— 7' —		(SAND/GRAVEL)					м	0	
<u> </u>									3
9' —	9'						D	0	4
— 10' —	10'					ND	D	1B	5,6
11'	В	ottom of excavation at 10 f	reet						
<u> </u>		ve-brown with red, fine to t, little fine to coarse Grav							
<u> </u>	(GLACIA	L TILL)							
<u> </u>									
15'									
— 16' —									
Notes:									

1. Ground surface elevation estimated from topography shown on an electronic drawing .dwg file produced by Highpoint Engineering, Inc. entitled "MasterPlan_Base."

2. Field testing results represent total organic vapor levels, refrenced to a benzene standard, measured in the headspace of sealed soil sample jars using a Phocheck Tiger organic vapor meter (OVM) equipped with a photoionization detector (PID) and 10.6eV lamp. Results in parts per million by volume (ppmv). ND indicates nothing detected (<0.1 ppmv).

3. Observed water or perched water seeping into excavation from sidewalls at about 8.7 feet.

4. Observed orange/red staining of soil at approximately 9 feet.

5. Test pit terminated in glacial till at 10 feet due to sidewall collapse from water infiltration.

6. Upon completion, test pit backfilled in 12-inch-thick lifts of excavated soil each tamped with the excavator bucket back to existing grade. Topsoil was used as the top lift of backfill.

Test Pit Plan	Boulder Class Letter Size Range		Proportions Used		GROUNDWATE (x) Observed	R
8'	Designation Classification A 6" - 17" B 18" - 36"	TRACE (TR.)	0 - 10%	M = Medium C = Coarse V = Verv	() Not Observed	Depth
► N	C 36" and Larger	LITTLE (LI.)	10 - 20%	F/M = Fine to medium F/C = Fine to coarse	Elapsed Time to Reading	to Ground-
	Excavation Effort EEasy	SOME (SO.)	20 - 35%	GR = Gray BN = Brown	(Hours)	water
	MModerate	AND	35 - 50%	YEL = Yellow ft = feet	20 mins see	8.7' Note 3

249 Vande Norwood,	GZA GeoEnvironmental, Inc. Engineers/Scientists	Proj	ence Geotec posed Develo 45 Jackson R 5, Massachus	opment oad	/		Test Pit N Page No. File No. Checked E	1	TP-205 of 01.017444 MJO	1
GZA Rep Weathe		Contractor Operator Make Capacity	Anchor CAT 0.75 CY	Excavating C Mark Stoda Model Reach		E	Date Ground El Time Stari Time Com	ted	11/14, 30 090	7 00
Depth	Dry dark brown fine	Soil Description		Gravel trace		Sample No.	Field Test Data	Excav. Effort	Boulders: Count/ Class	Note No.
1'	•	oots/Leaves/Wood. (To	OPSOIL)				ND ND	E	0	1,2
2' <u> </u>	-	(3003012)						E	0 1A	
4'	Dry, brown, fine to c	parse SAND and fine to (SAND/GRAVEL)	o coarse GRAV	EL, trace Silt.			ND	E	1A	
5' 6'	6.5'							D	0	
7'-	Damp, olive-brown with red s	Gravel.	SAND, some Si	ilt, little fine t	o coarse		ND	D D	0	
8' 9'	8.5' 9' Botto	(GLACIAL TILL)	et			S-1		D	1A	3 4
10'	N	sal on apparent Bedro								
11' 12'	•	to coarse plate-like GF d, trace Silt. (Weathere		ne to						
13'										
— 14' — — 15' —										
<u> </u>										
Notes:							1		1	

 Ground surface elevation estimated from topography shown on an electronic drawing .dwg file produced by Highpoint Engineering, Inc. entitled "MasterPlan_Base."
 Field testing results represent total organic vapor levels, refrenced to a benzene standard, measured in the headspace of sealed soil sample jars using a Phocheck Tiger organic vapor meter (OVM) equipped with a photoionization detector (PID) and 10.6eV lamp. Results in parts per million by volume (ppmv). ND indicates nothing detected (<0.1 ppmv).
 Observed orange/red staining of soil from approximately 8 to 8.5 feet.

4. Upon completion, test pit backfilled in 12-inch-thick lifts of excavated soil each tamped with the excavator bucket back to existing grade. Topsoil was used as the top lift of backfill.

Test Pit Plan	Boulder Class	Proport	Proportions Abbreviations		GROUNDWAT	ER
<u> </u>	Letter Size Range Designation Classification A 6" - 17" B 18" - 36"	Used TRACE (TR.)	d 0 - 10%	F = Fine M = Medium C = Coarse V = Very	() Observed (x) Not Observe Elapsed	ed Depth
N 4	C 36" and Larger	LITTLE (LI.)	10 - 20%	F/M = Fine to medium F/C = Fine to coarse	Time to Reading	to Ground-
	Excavation Effort EEasy	SOME (SO.)	20 - 35%	GR = Gray BN = Brown YEL = Yellow	(Hours)	water
	MDifficult	AND	35 - 50%	TEL - TENOW		

249 Vande Norwood,	GZA GeoEnvironmental, Inc. Engineers/Scientists erbilt Ave MA 02062	Pro	gence Geotec posed Devel 45 Jackson R s, Massachus	opment Road	/		Test Pit No Page No. File No. Checked E	1	TP-206 of 01.017444 MJO	1
GZA Rep Weathe		Contractor Operator Make Capacity	Anchor CAT 0.75 CY	Excavating C Mark Stoda Model Reach		E	Date Ground El Time Start Time Com	ted	11/14, 29 074 080	2 45
Depth		Soil Descriptior				Sample No.	Field Test Data	Excav. Effort	Boulders: Count/ Class	Note No.
	1'	fine to coarse SAND, some Roots/Leaves/Wood. (To	OPSOIL)				ND	E	0	1,2
	Dry, brown, fine 2'	to coarse SAND, some Silt (SUBSOIL)	, little Gravel,	trace Roots.			ND	E	0	
	Dry, brown, fine	to coarse SAND and fine to	o coarse GRAV	/EL, trace Silt.			ND	E	0	
<u> </u>	л'	(SAND/GRAVEL)				S-1		E/M	0	3
4'	Damp, olive-brown with r	ed staining, fine to coarse s		ilt, little fine t	o coarse		ND	D	1A	
<u> </u>	5.5'	Gravel. (GLACIAL TI						D	1A 1A	4
- 6' —	1 N	ottom of excavation at 5.5 t Refusal on apparent Bedro								
- 7'										
— 8' —		ne to coarse plate-like GRA and, trace Silt. (Weathered		e to						
9'										
10'										
11'										
12'										
— 13' —										
<u> </u>										
<u> </u>										
16'										
Notes:										

Ground surface elevation estimated from topography shown on an electronic drawing .dwg file produced by Highpoint Engineering, Inc. entitled "MasterPlan_Base."
 Field testing results represent total organic vapor levels, refrenced to a benzene standard, measured in the headspace of sealed soil sample jars using a Phocheck Tiger organic vapor meter (OVM) equipped with a photoionization detector (PID) and 10.6eV lamp. Results in parts per million by volume (ppmv). ND indicates nothing detected (<0.1 ppmv).
 Observed orange/red staining of soil at approximately 3.4 feet.

4. Upon completion, test pit backfilled in 12-inch-thick lifts of excavated soil each tamped with the excavator bucket back to existing grade. Topsoil was used as the top lift of backfill.

Test Pit Plan	Boulder Class	Proport		Abbreviations	GROUNDWATER	
3'	Letter Size Range Designation Classification A 6" - 17"	Used TRACE (TR.)	0 - 10%	F = Fine M = Medium C = Coarse	() Observed (x) Not Observe	d
8'	B 18" - 36" C 36" and Larger	LITTLE (LI.)	10 - 20%	V = Very F/M = Fine to medium F/C = Fine to coarse	Elapsed Time to Reading	Depth to Ground-
▼ N	Excavation Effort EEasy	SOME (SO.)	20 - 35%	GR = Gray BN = Brown	(Hours)	water
	MDifficult	AND	35 - 50%	YEL = Yellow		

GZA Due Diligence Geotechnical Study Test Pit No. TP-207 GZN GeoEnvironmental, Inc. Proposed Development Page No. of 1 Engineers/Scientists 45 Jackson Road File No. 01.0174440.0 Devens, Massachusetts 01434 249 Vanderbilt Ave Checked By: MJO Norwood, MA 02062 GZA Rep. Anchor Excavating Corporation 11/14/2019 **Glenn Larose** Contractor Date Operator Mark Stodard Ground Elev. 295 CAT Weather P. Sunny 20-30s Model 308E **Time Started** 0830 Make 0850 0.75 CY **Time Completed** Capacity Reach ~15 FT Field Boulders: Sample Depth Soil Description No. Test Data Excav. Count/ Note Effort Class No. 0 Dry, dark brown, fine to coarse SAND, some Silt, trace fine Gravel, trace 1,2 Е 0 ND Roots/Leaves/Wood. (TOPSOIL) Dry, brown, fine to coarse SAND, some Silt, little fine to coarse Gravel, trace Roots. 1C Е (SUBSOIL) ND 2 Е 0 Dry, brown, fine to coarse SAND and fine to coarse GRAVEL, trace Silt. 3 (SAND/GRAVEL) S-1 E/M 0 ND 3 Dry, olive-brown with red staining, fine to coarse SAND, some Silt, little fine to coarse D 0 ND Gravel. (GLACIAL TILL) 5 5.5 1A D ND 4 1A 6 6 Bottom of excavation at 6 feet (Refusal on apparent Bedrock) 8 Damp, fine to coarse plate-like GRAVEL, little fine to coarse Sand, trace Silt. (Weathered BEDROCK) 9 10' 11 12 13' 14 15 16' Notes:

Ground surface elevation estimated from topography shown on an electronic drawing .dwg file produced by Highpoint Engineering, Inc. entitled "MasterPlan_Base."
 Field testing results represent total organic vapor levels, refrenced to a benzene standard, measured in the headspace of sealed soil sample jars using a Phocheck Tiger organic vapor meter (OVM) equipped with a photoionization detector (PID) and 10.6eV lamp. Results in parts per million by volume (ppmv). ND indicates nothing detected (<0.1 ppmv).
 Observed orange/red staining of soil at approximately 4 feet.

4. Upon completion, test pit backfilled in 12-inch-thick lifts of excavated soil each tamped with the excavator bucket back to existing grade. Topsoil was used as the top lift of backfill and was reseeded.

Test Pit Plan	Boulder Class	Proportions Abbreviations			GROUNDWAT	ER
<u> </u>	Letter Size Range Designation Classification A 6" - 17"	Used TRACE (TR.)	i 0 - 10%	F = Fine M = Medium C = Coarse	() Observed (x) Not Observed	
8	B 18" - 36" C 36" and Larger	LITTLE (LI.)	10 - 20%	V = Very F/M = Fine to medium F/C = Fine to coarse	Elapsed Time to Reading	Depth to Ground
★ N	Excavation Effort EEasy	SOME (SO.)	20 - 35%	GR = Gray BN = Brown	(Hours)	water
	MModerate DDifficult	AND	35 - 50%	YEL = Yellow		

GZA Due Diligence Geotechnical Study Test Pit No. TP-208 GZN GeoEnvironmental, Inc. Proposed Development Page No. of 1 Engineers/Scientists 45 Jackson Road File No. 01.0174440.0 Devens, Massachusetts 01434 249 Vanderbilt Ave Checked By: MJO Norwood, MA 02062 GZA Rep. Anchor Excavating Corporation 11/14/2019 **Glenn Larose** Contractor Date Operator Mark Stodard Ground Elev. 319 CAT Weather P. Sunny 20-30s Model 308E **Time Started** 1300 Make 0.75 CY Reach **Time Completed** 1345 Capacity ~15 FT Boulders: Sample Field Depth Soil Description No. Test Data Excav. Count/ Note Effort Class No. 0 Dry, dark brown, fine to coarse SAND, some Silt, trace fine Gravel, trace 1,2 Е 0 Roots/Leaves/Wood. (TOPSOIL) ND Dry, brown, fine to coarse SAND, some Silt, little fine to coarse Gravel, trace Roots. 0 Е (SUBSOIL) ND Dry, brown, fine to coarse SAND, some fine to coarse Gravel, trace Silt. 0 Е ND (Gravelly SAND) 3 Е 0 Dry, brown, fine to coarse SAND and fine to coarse GRAVEL, trace Silt. 0 М (SAND/GRAVEL) ND 5 M 1A 6 3 D 1C 4 Damp, olive-brown with red staining, fine to coarse SAND, some Silt, little fine to coarse D 0 8 Gravel. (GLACIAL TILL) S-1 ND D 1C 9 9.5 D 2C 10 5 10' Bottom of excavation at 10 feet (Refusal on apparent Bedrock) 11' 12 Damp, fine to coarse plate-like GRAVEL, little fine to coarse Sand, trace Silt. (Weathered BEDROCK) 13 14 15 16' Notes:

Ground surface elevation estimated from topography shown on an electronic drawing .dwg file produced by Highpoint Engineering, Inc. entitled "MasterPlan_Base."
 Field testing results represent total organic vapor levels, refrenced to a benzene standard, measured in the headspace of sealed soil sample jars using a Phocheck Tiger organic vapor meter (OVM) equipped with a photoionization detector (PID) and 10.6eV lamp. Results in parts per million by volume (ppmv). ND indicates nothing detected (<0.1 ppmv).

3. Observed orange/red staining of soil at approximately 6 feet.

4. Observed red/gray staining throughout glacial till layer.

5. Upon completion, test pit backfilled in 12-inch-thick lifts of excavated soil each tamped with the excavator bucket back to existing grade. Topsoil was used as the top lift of backfill.

Test Pit Plan	Boulder Class	Boulder Class Proportions Letter Size Range Used		Abbreviations F = Fine	GROUNDWATER	
3'	Designation Classification A 6" - 17"	TRACE (TR.)	0 - 10%	M = Medium C = Coarse	() Observed (x) Not Observ	red
^{8'}	B 18" - 36" C 36" and Larger	LITTLE (LI.)	10 - 20%	V = Very F/M = Fine to medium F/C = Fine to coarse	Elapsed Time to Reading	Depth to Ground-
* N	Excavation Effort EEasy	SOME (SO.)	20 - 35%	GR = Gray BN = Brown	(Hours)	water
	MModerate DDifficult	AND	35 - 50%	YEL = Yellow		

	Environmental, Inc.	Prop 4	oosed Deve 15 Jackson I			Test Pit No Page No. File No. Checked B	1	TP-20 of 01.01744 MJC	1 40.0
GZA Rep. Weather	Glenn Larose P. Sunny 20-30s	Contractor Operator Make Capacity	Anchor CAT 0.75 CY		tion D8E 15 FT	Date Ground El Time Start Time Com	ed	3	9/2019 28 145 215
Depth	Approx. South Side	Soil Description		Approx. North Side	Sample No.	Field Test Data	Excav. Effort	Boulders: Count/ Class	Note No.
0	Dry, dark brown, fine to					ND	E	0	1,2
1'	Dry, brown, fine to coarse	ts/Leaves/Wood. (TO SAND, some Silt, little		rse Gravel, trace	_	ND	E	0	
2'2'	A	sphalt/Brick/Roots. ((FILL)		_	ND			
3'							E	0	
	Dry, brown, fine to coa	rse SAND and fine to (SAND/GRAVEL)	coarse GRAV	/EL, trace Silt.		ND	М	1C	
							М	0	2.4
5'5							M/D	1A	3,4
							D	0	
7'	Damp, olive-brown with red stair						D	2B	
8'	SAND, some Silt, little fine to (GLACIAL TILL)		/	BEDROCK					
9'				•			D	1C	
— 10' —					S-1	ND	D	0	
10.5'		7	/				D	1A	5,6
11'	Bottom	; of excavation at 11 fe	eet		-				3,0
— 12' —									
— 13' —	Damp fine to	coarse plate-like GRA	VEL little fir	a to					
— 14' —	• *	race Silt. (Weathered	•						
— 15' —									
— 16' —									
Notes:									
 Ground surface Field testing reimeter (OVM) equits Observed orange Observed top of Test pit terminal 	e elevation estimated from topography s sults represent total organic vapor levels, ipped with a photoionization detector (P ge/red staining of soil at approximately 5 f bedrock ranged from approximately 4 ited in apparent bedrock at 11 feet due t on, test pit backfilled in 12-inch-thick lifts	refrenced to a benzene ID) and 10.6eV lamp. Refeet. so 5 feet below ground so excavator bucket refu	e standard, mo esults in parts surface on nor isal.	easured in the headspace per million by volume (p th side of excavation.	e of sealed soi pmv). ND inc	il sample jars u dicates nothin	using a Phocl g detected (<		anic vapor
Test Pit	Plan Boulder C	255	Dre	oportions	۸hh	reviations	GI	ROUNDWATER	
8'	3' Letter Designation A B	Size Range Classification 6" - 17" 18" - 36" 3" and Larger Fort te		oportions Used 0 - 10% 10 - 20% 20 - 35% 35 - 50%	F = Fine M = Mediu C = Coarse V = Very	to medium to coarse n	()	Observed Not Observed ed to	Depth to Ground- water

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to factors other than those present at the time measurements were made.



Appendix C – 2020 Test Boring and Test Pit Logs

BORING LOG LEGEND

GS Elev. = Ground Surface Elevation NAVD = North American Vertical Datum NR = No Recovery S.S. = Split Spoon Stab. = Stabilization Time for groundwater reading WOH = Weight of Hammer WOR = Weight of Rods

SOIL DESCRIPTIONS

Soil samples are described on the exploration logs by the "Modified Burmister Soil Identification System". The following provides a brief description of the Modified Burmister System.

1. Major and minor components of the soil matrix are identified as gravel, sand or fines. The relative amounts of these constituents are proportioned as:

Component	Proportional Term	Percent by Weight of Total
Major		Greater than percentage of other components
Minor	And	35-50
	Some	20-35
	Little	10-20
	Trace	1-10

2. The nature of "fines" is defined by using the following guidelines:

Degree of Plasticity	Identity	Plasticity Index
Non-plastic	SILT	0
Slight	Clayey SILT	1-5
Low	SILT & CLAY	5-10
Medium	CLAY & SILT	10-20
High	Silty CLAY	20-40
Very High	CLAY	40 and Greater

3. For boring logs, relative density or consistency is identified based on standard penetration resistance, using the following table.

Non-Pla	stic Soils	Plasti	c Soils
Blows/ft "N"	Relative Density	Blows/ft "N"	Consistency
0-4	Very Loose	<2	Very Soft
4-10	Loose	2-4	Soft
10-30	Medium Dense	4-8	Medium Stiff
30-50	Dense	8-15	Stiff
>50	Very Dense	15-30	Very Stiff
		>30	Hard

BEDROCK DESCRIPTIONS

Rock samples described on the exploration logs are generally based on the International Society of Rock Mechanics (ISRM) System, as generally described on the following page. Each rock sample was generally described using the following guideline, in the order presented:

- 1. Field hardness: very hard, hard, moderately hard, medium, soft, very soft
- 2. Weathering: fresh, very slight, slight, moderate, moderately severe, severe, very severe, complete
- 3. Rock continuity (fracturing): extremely, moderately, slightly, sound
- 4. Texture: amorphous, fine, medium, coarse, very coarse
- 5. Color
- 6. Rock type
- 7. Fractures, Bedding, and Foliation, Spacing and Attitude
- 8. Rock Quality Designation (RQD)

	G		ironmen s and Sci			Su	ppleme	King Devens ntal Explorations - Deve 45 Jackson F Devens, Massac	ens Biotech Dev Road	veloj	pment	BORING NO.: SHEET: PROJECT NO: REVIEWED BY	1 of 1 01.017			
Drillin Forem Logge		Joe G	Environn ruga Prohaske		Inc.	Rig M		iruck lobile B-57 od: HSA	Boring Locati Ground Surfa Final Boring I Date Start - Fi	ice E Dept	h (ft.):): 341.5			Datum: Se Datum: Se	
Auger	/Casing	Type:	HSA			-		e: Split Spoon				Ground	water	Depth (ft.)	
I.D./O			4.25"/8"				.D (in.): Ier Hmr			-	ate	Time	Wate	r Depth	Casing	Stab. Tim
	Veight (Fall (in.)		-					Fall: 30			1/20 2/20	<u>1555</u> 0800		7 9.5	WELL WELL	1 day 12 days
Other		•				Other		Auto Hammer		-	23/20	1320		9.3 9.2	WELL	1.5 month
	Casing Blows/		Ş	Samp	le						Field			0.2	Equipment In:	
epth (ft)	Core Rate Min/ft	No.	Depth (ft.)	Pen. (in)	Rec. (in)	Blows (per 6 in.)	SPT Value	Sample Desc Modified Burr		Remark	Test Data		Elev. (ft)			
		S-1	0-2	24	5	4 14		S-1: Medium dense, dry,	dark brown to	1	ND	Q.4' <u>ASPHALT/FILL</u>	341.1		XX	
-						13 16	27	brown, fine to coarse SA		2					∭ – Cu	ttings (0-3')
-		S-2	2-4	24	4	20 15		little Asphalt, trace Grave		3	ND	FILL		▓◀		C Riser (0-5
-		02		<u> </u>		17 13	32	S-2: Dense, dry, brown, f							***	
							02	SAND and GRAVEL, littl	e Silt.			4'	337.5		≪ −Be	ntonite (3-4'
5		S-3	4-6	24	14	44		S-3: Medium dense, mois		4	ND				∵ ≺ –Sa	nd (4-15')
ĭ-						86	12	gray with occasional oran	-							
-								coarse SAND, some Silt,	some Gravel.			SILTY SAND/GRAV	VEL			
_												7 51	224.0			
												7.5'	334.0			
1															· · · ·	
		S-4	9-10	12	10	23 60/6"	R	S-4: Very dense, moist, g	gray with	5	0.2				.: ·:	
0_							R	orange/red staining, GRA	VEL and fine	6					Sci	een (5-15')
_								to coarse SAND, trace S	ilt. (Weathered							
								BEDROCK)				WEATHERED BEDF	ROCK			
1																
-																
-		S-5	14-	3	1	25/3"	R	S-5: (Tip of spoon) Very	dense damn		ND				· · · ·	
15 _		0-0	14.3		'	25/5		brown, fine to coarse SA				15'	326.5'		· · ·	
			14.0	J				GRAVEL, some Silt. (Ap		7						
								Weathered BEDROCK)		8						
-								Bottom of boring a	t 15 feet.	1						
-								Dottoin of Doning d								
_																
20																
-																
-																
_																
25																
~ -																
-																
1																
+																
80	C	f- :			al 6	ton o	·	an AutoCAD	na describer O		al 16-17 12			al 116.4	Diam D:	
	indicated	l						an AutoCAD existing condition	•						-	•
č ^{2.}	vapor m	eter equi	pped with	a photo	oinizati	on detector (P	ID) and 1	ed to a benzene standard, me 0.6eV lamp. Results in parts	per million by volu	ıme (p						iyer organic
4 3.	Driller no	ted that	split spoor	n begar	n to vee		wĥile sar	npling from 1.5 to 2 feet (pose			. ,	5				
2 5.	Moisture	observe	ed on outsi	de of sp	olit spoo	on at sample S	-4.									
7.	Driller no	ted auge	er refusal a	at appro	ximate	ly 15 feet on pr	obable b									
8.	Upon co	mpletion	, observati	on well	with st	eel standpipe i	nstalled a	as shown.								
														_		
e loa	kev for a	explanati	on of sam	ple des	cription	ns and identific	ation nro	cedures. Stratification lines i	epresent annroxin	nate I	boundari	es between soil and	bedrock		Boring	No ·

174440.01 45 JACKSON RD DEVENS MA.GPJ; STANDARD BORING W/E W/O SMP 2PG2; 10/23/2020

	6		ironmen rs and Sci			Su	ppleme	King Devens ntal Explorations - Deve 45 Jackson F Devens, Massac	ens Biotech Dev load	velop	oment	BORING NO.: SHEET: PROJECT NO: REVIEWED BY	1 of 1 01.01744	40.01		
Fore	ng Co.: man: Jed By:	Joe G	Environn ruga Prohaske		, Inc.	Rig M		ruck lobile B-57 Dd: HSA	Boring Locati Ground Surfa Final Boring I Date Start - Fi	ce E Depti	h (ft.):	: 341			atum: Se atum: _{Se}	
I.D./ Hmr	er/Casing O.D.: Weight Fall (in.)	(lb.):	HSA 4.25"/8" - -			I.D./O Samp	.D (in.): Ier Hmr Ier Hmr			-	ate 0/20	Ground Time 1310 hrs	Water De Water D DRY (1	epth) Casing 17.5	Stab. Tir 10 min
	Casing			Samp	ole					ark	Field	ے Stratum		Eq	uipment Ins	stalled
Depth (ft)	Core Rate	No.	Depth	Pen. (in)	Rec. (in)	Blows (per 6 in.)	SPT	Sample Desc Modified Burr		Remark	Test	ਜੂ Stratum ਰੇਦੇ Description ੁ	≣ev. €			
. ,	Min/ft	S-1	(ft.) 0-2	24	13	(per 6 iii.) 5 7	value	S-1: Medium dense, dry,		<u>~</u>	Data ND					
•	-	S-2	2-4	24	9	53 44 44	12 8	brown, fine to coarse SA Gravel, little Silt, trace R S-2: (Top 4") Loose, dry, coarse SAND, some Gra	bots. brown, fine to	2 3	ND	TOPSOIL 2' 2.3' <u>SUBSOIL</u>	<u>339.0'</u>	No Equ	lipment	Installed
5 _	-	S-3	4-6	24	14	7 10 17 15	27	trace Roots. S-2: (Bottom 5") Loose, o to coarse SAND, little Gr Silt.			ND	SAND/GRAVEL	-			
10 _	-	S-4	9-11	24	21	5 11 16 16	27	S-3: Medium dense, dry, coarse SAND, some Gra Silt. S-4: Medium dense, dan to coarse SAND and GR Clayey Silt.	vel, little (-) np, brown, fine		ND	7.5'	<u>333.5'</u>			
	_											GLACIAL TILL				
15 _	-	S-5	14- 15.1	13	11	21 27 25/1"	R	S-5: Very dense, damp, l coarse SAND, some Gra Silt.		4	ND					
-	1							Pottom of boring at	17 E faat	-		17.5'	323.5'			
20 _	-							Bottom of boring at	17.5 1661.	5 6						
25 _	-															
30	-															
	indicated 2. Field tes vapor m 3. Offset b 4. Probable 5. Driller no	d. eter equi orehole a e boulde oted aug	ults represe ipped with approximat r noted and er refusal a	ent tota a photo ely 12 f l passe at 17.5	l organi pionizati feet nor ed arour feet on	c vapor levels, ion detector (P thwest of mark nd 15.1 feet ba possible bedro	reference ID) and 1 and locations sed on sations ock or bou	an AutoCAD existing conditioned to a benzene standard, mm 0.6eV lamp. Results in parts on due to apparent conflict with amping and drill effort change ulder. mately ground surface level.	easured in the hea per million by volu th marked undergr	dspac ime (p	ce of sea	led soil sample jars u	using a lon S	cience Pl	– hocheck T	
		nsitions						ocedures. Stratification lines i en made at the times and u						В	oring GZ-3	No.:

	(ironmen rs and Sci	<i>,</i>		S	uppleme	King Devens ntal Explorations - Deve 45 Jackson F Devens, Massac	ens Biotech Dev Road	velop	oment	BORING NO.: SHEET: PROJECT NO: REVIEWED BY:	1 of 1 01.0174440	01	
Fore	ng Co.: man: ed By:	Joe G	Environn ruga Prohaske		Inc.	Rig I	e of Rig:⊤ Model: M ng Metho	obile B-57	Boring Locati Ground Surfa Final Boring I Date Start - Fi	ice E Deptl	h (ft.):	: 338		H. Datum: Se V. Datum: Se	
Auge	er/Casing	g Type:	HSA 4.25"/8"				pler Type O.D (in.):	e: Split Spoon 1.375"/2"			ate	Ground Time	water Dept Water Dep	<u> </u>	Stab. Tir
Hmr	Weight	• •	-			Sam	pler Hmr	Wt: 140		-	1/20	1600	11.4	WELL	1 day
Hmr Othe	Fall (in.):	-			Sam Othe	•	Fall: 30 Auto Hammer		-	2/20 23/20	0755 1310	DRY (15')	-	12 days
	Casing		Ś	Samp	le						Field		DRY(15')	Equipment In:	1.5 mont stalled
Depth (ft)	Core Rate Min/ft	No.	Depth (ft.)	(in)	(in)	Blows (per 6 in	SPT .) Value		nister	Remark	Test Data	de ⊕ □ □		~~~~	
_		S-1	0-2	24	16	88 67	14	S-1: (Top 4") Medium de brown, fine to coarse SA		1	ND .	P.4' TOPSOIL			
_						07	14	trace Roots.	ND, Some Sill,	2					ttings (0-3' C Riser (0-
		S-2	2-4	24	11	97		S-1: (Bottom 12") Mediur	m dense, dry,		ND				C Risei (0-
-						88	15	brown, fine to coarse SA	ND, little					≪ −Be	ntonite (3-4
5	1	S-3	4-6	24	12	99		Gravel, little Silt.	h		ND			Sa	nd (4-15')
5_	1					9 13	18	S-2: Medium dense, dry, fine to coarse SAND and	0,						. ,
-	-							Silt.	GIVAVEL, IIIIe			SAND/GRAVEL			
-	-							S-3: Medium dense, dry,	brown,						
-	-							GRAVEL and fine to coa	rse SAND,				E		
_	-		~			15 00		trace (+) Silt.							
10 _	-	S-4	9-11	24	0	15 22 22 20	44	S-4: No recovery.		3					reen (5-15'
_												11.0			
-		S-5	11-	9	7	22 50/3	" R	S-5: (Top 3") Dry, brown			ND ·	<u>11.3'</u>	<u>_326.7'</u>		
-	1		11.8					SAND and GRAVEL, trac S-5: (Bottom 4") Very de							
-	1							with gray and occasional				GLACIAL TILL			
-	1							coarse SAND, some Silt		4		451			
15 _	-	S-6	15-15	0	0	50/0"	R	S-6: No penetration.		5		15'	323.0' · ` .'-	<u> </u>	
-	-							Bottom of boring a	t 15 feet.	6					
- 20 -	-														
- - 25 _ -	-														
- 30	-														
2. 3. 4. 5.	indicate Field tes vapor m Gravel o Driller n Driller n	d. sting resunctor oter equipobserved oted bou oted aug	ults represe ipped with in tip of sp Ider/cobble er refusal a	ent total a photo oon on from a at appro	l organi bionizati sample bout 14 oximate	c vapor level ion detector (e S-4. I to 14.5 feet	s, reference PID) and 1 based on o possible bo	an AutoCAD existing conditi ed to a benzene standard, m 0.6eV lamp. Results in parts drill effort changes. bulder or bedrock. is shown.	easured in the hea	Idspac	ce of sea	led soil sample jars u	sing a Ion Scie	nce Phocheck T	
								cedures. Stratification lines i						Boring	No.: 03

	6		ironmen t rs and Sci	<i>,</i>		Sup	pleme	King Devens ntal Explorations - Deve 45 Jackson R Devens, Massac	ens Biotech Dev load	veloj	oment	BORING NO.: SHEET: PROJECT NO: REVIEWED BY:	1 of 1 01.017			
Forer	ng Co.: man: ed By:	Jamie	Environm Hastings Prohaske	,	Inc.	Rig Mo		ruck obile B-57 vd: HSA	Boring Locati Ground Surfa Final Boring I Date Start - Fi	ce E Dept	h (ft.):): 324			. Datum: Se . Datum: Se	
-	r/Casing	g Type:	HSA			-		Split Spoon				Groundy			i	1
I.D./C	D.D.: Weight	(lb.)•	4.25"/8" -				D (in.): er Hmr	1.375"/2" Wt: 140		<u> </u>	ate	Time		r Depth		Stab. Tim
	Fall (in.)	• •	-					Fall: 30			7/20 2/20	1525 0805		Y(16') Y(16')	WELL WELL	6 days 11 days
Othe	r: -					Other:	1	Auto Hammer						()		
epth	Casing Blows/			Samp		Diaura	ODT	Sample Desc	rintion	Remark	Field	Stratum			Equipment Ins	stalled
(ft)	Rate	No.	Depth (ft.)	Pen. (in)	Rec. (in)	Blows (per 6 in.)	SPT Value	Modified Burr		Sem	Test Data	fade Description	(ft)			
	Min/ft	S-1	0-2	24	16	8 16		S-1: (Top 5") Dry, brown,	fine to coarse	1	12.8	0.5' FOREST MAT	323.5'		XX	
-						15 12	31	SAND, some Gravel, sor	ne Silt, trace	2		ASPHALT/FILL			×	
-		S-2	2-4	24	8	10 8		Roots.			ND	2'	322.0'			tings (0-4')
_		3-2	2-4	24	°	65	14	S-1: (Bottom 11") Dry, br		3					₩ `PV	C Riser (0-6
						0.0	14	some fine to coarse Sand	l, some						×	
5		S-3	4-6	24	7	78		Asphalt, little Silt.	brown fino to		ND				≺ −Ber	ntonite (4-5'
~ _						9 12	17	S-2: Medium dense, dry, coarse SAND and GRAV				SAND/GRAVEL	l			
-		S-4	6-8	24	15	15 16		Silt.	EE, 11000 (*)	4	ND					
-						18 22	34	S-3: Medium dense, dry,	brown, fine to						Scr	een (6-16')
_								coarse SAND and GRAV	EL, trace Silt.			0.51	045 5			
_								S-4: Dense, dry, brown, f	ine to coarse			8.5'	<u>315.5'</u>			
0		S-5	9-	21	12	13 22		SAND and GRAVEL, tr (,		ND	GLACIAL TILL				
° _			10.8			33 50/3"	55	S-5: Dense, moist, brown				10.8'	313.2'		-Sar	nd (5-16')
-		C-1	11-16	60	56			occasional orange, fine to	coarse SAND	5						()
-	4:00							and GRAVEL, some Silt. C-1: Medium hard to hard	t eliabtly	6						
_	2:00							weathered, gray, fine gra		0						
_								amorphous, SCHIST, sul				BEDROCK				
15	2:30							moderately dipping bedd	ing, with close							
	2:00							to very close subhorizont	al to vertical			16'	308.0'			
-	2:30							joints/fractures.		7		10	500.0	••	· .	
-								RQD=0%								
-								Bottom of boring a	t 16 feet.							
_																
20 _																
-																
-																
-																
-																
25 _																
-																
-																
-																
-																
30																
2. 3. 4. 5. 6.	indicated Field test vapor m Groundv Slight or Driller no Driller w	1. eter equivater lev vater lev ange sta oted aug orked the	ults represe ipped with el measure ined soil ol er refusal a e core barre	ent total a photo d after oserveo at 11 fee el up ar	l organic pionizatio introduo d in sam et. nd dowr	c vapor levels, on detector (Pl cing water for r ople S-5.	reference D) and 10 ock core. advancing	g core barrel from 11 to 12 fe	easured in the hea per million by volu	dspao ime (j	ce of sea opmv). I	aled soil sample jars us ND indicates nothing d	sing a Ic	on Science	– e Phocheck T	•
								cedures. Stratification lines r en made at the times and ur							Boring	No.:

	G		ironment	<i>,</i>		Sup	plemei	King Devens ntal Explorations - Deve 45 Jackson R Devens, Massac	ens Biotech Dev load	veloj	pment	BORING NO.: SHEET: PROJECT NO: REVIEWED BY:	1 of 1 01.0174	140.01		
Foren	g Co.: nan: d By:	Jamie	Environm Hastings Prohaske		Inc.	Rig Mo		ruck obile B-57 pd: HSA	Boring Locati Ground Surfa Final Boring I Date Start - Fi	ice E Dept	h (ft.):): 311			. Datum: Se . Datum: _{Se}	
I.D./O Hmr \	Veight (lb.):	HSA 4.25"/8" -			I.D./O. Sampl	D (in.): er Hmr	e: Split Spoon 1.375"/2" Wt: 140 Fall: 30		D	ate	Ground Time	water Do Water I Not Mea	Depth	Casing	Stab. Tim
Hmr r Other	fall (in.) : -		-			Other:		Auto Hammer		-						
epth	Casing Blows/			Samp				Sampla Doog	rintion	ark	Field	⊊Stratum			Equipment In	stalled
(ft)	Core Rate	No.	Depth (ft.)	Pen. (in)	Rec. (in)	Blows (per 6 in.)	SPT Value	Sample Desc Modified Burr		Remark	Test Data	ਜੂ Stratum ਰੇ⊕ Ω Description	Elev.			
	Min/ft	S-1	0-2	24	14	3 2		S-1: (Top 5") Dry, dark b	rown, fine to	1	4.0	0.5' FOREST MAT			·	Installed
-						77	9	medium SAND, some Sil	t, little Roots,	2				NO E	quipment	Installed
-		S-2	2-4	24	11	10 12		trace Leaves.		3	ND					
-		0 -				12 15	24	S-1: (Bottom 9") Loose, of to coarse SAND, little Sil				SAND/GRAVEL				
-		<u> </u>	4.0	24	47	7 04		S-2: Medium dense, dry,				4.3'	306.7'			
5_		S-3	4-6	24	17	7 24 33 38	57	coarse SAND and GRAV			ND					
							57	Silt.								
		S-4	6-6.8	9	6	44 50/3"	R	S-3: (Top 8") Dry, brown,			ND	GLACIAL TILL				
1								SAND and GRAVEL, trac				8'	303.0'			
-								S-3: (Bottom 9") Very der with occasional orange s	-							
-		S-5	9-11	24	14	25 34		coarse SAND and GRAV			ND					
0						37 35	71	Clayey Silt.								
-								S-4: Very dense, brown,								
								SAND, some Gravel, sor								
								S-5: Very dense, dry, gra				WEATHERED BEDR	ROCK			
								staining, GRAVEL and fir SAND, little Silt. (Weathe								
15		S-6	14-	6	6	75/6"	R	BEDROCK)			ND					
-			14.5					S-6: Very dense, moist, g	ray with brown							
-								and red staining, GRAVE	L and fine to			16.5'	294.5'			
-								coarse SAND, some Silt.	(Weathered	4						
-								BEDROCK)		5						
								Bottom of boring at	16.5 feet.							
20 _																
-																
-																
-																
-																
25 _																
1																
1																
, 1																
30 1.	Ground	surface e	elevation e	l stimate	d from	topographic cor	ntours in	an AutoCAD existing condition	ons drawing file pre	l epare	l d by Hia	l npoint Engineering, In	c. entitled	'Maste	rPlan Base.d	wg," no date
	indicated	l.						ed to a benzene standard, me	•						-	
3.	vapor me	eter equi	pped with a	a photo	ionizati	on detector (PI	D) and 1	0.6eV lamp. Results in parts restriction from nearby trees	per million by volu							
4.	Driller no	ted auge	er refusal a	t appro	ximate	ly 16.5 feet on p	orobable									
ב ר	500100		, 20/01/010			_ 5.1 Suttiligo (U	- 99,0411	Sector our lovel.								
								cedures. Stratification lines r							Boring	

	G		ironmen s and Sci			Suj	opleme	King Devens ntal Explorations - Deve 45 Jackson R Devens, Massac	ens Biotech Dev load	velop	oment	BORING NO.: SHEET: PROJECT NO: REVIEWED BY	1 of 1 01.017444	0.01	
Foren	g Co.: nan: ed By:	Jamie	Environn Hastings Prohaske		Inc.	Rig Mo		ruck lobile B-57 od: HSA	Boring Locati Ground Surfa Final Boring I Date Start - Fi	ce E Depti	h (ft.):): 312.5		H. Datum: S V. Datum: S	
I.D./C			4.25"/8"			I.D./O.	D (in.):			D	ate	Ground Time	water Dep Water De	pth Casing	Stab. Time
	Weight Fall (in.) :: -		-					r Wt: 140 • Fall: 30 Auto Hammer		9/2	7/20 2/20 23/20	<u>1530</u> 0810 1330	DRY(14. DRY(14. DRY(14.	5') WELL	5 days 10 days 1.5 month
epth (ft)	Casing Blows/ Core Rate	No.	Depth (ft.)	Samp Pen. (in)		Blows (per 6 in.)	SPT	Sample Desc Modified Burr		Remark	Field Test	Stratum	·	Equipment Ir	
-	Min/ft	S-1	0-2	24	9	(per 6 m.) 3 4 4 8	8	S-1: (Top 5") Loose, dry, fine to medium SAND an	dark brown,	1 2	Data ND	Q.4' FOREST MAT	040 41		
-		S-2	2-4	24	13	9 11 14 16	25	Roots, trace Leaves. S-1: (Bottom 4") Dry, bro coarse SAND, some Silt,		2	ND	SUBSOIL 2'	_ <u>310.5'</u>	(0	/C Riser -6.5) uttings (0-4')
5		S-3	4-5.7	20	8	8 17 47 60/2"	64	S-2: Medium dense, dry, fine to coarse SAND and Silt. S-3: Very dense, dry, bro coarse SAND and GRAV	GRAVEL, little		ND	SAND/GRAVEL		· · · :	entonite (4-6) and (5.5-14.5
- - 10 _ -		S-4	9-11	24	18	12 17 18 17	35	S-4: Dense, moist, browr SAND and GRAVEL, sor	, fine to coarse		ND	7.5' GLACIAL TILL 12.5'	305.0'		creen .5-14.5')
- - 15 _		S-5	14- 14.3	4	_4_	60/4"	R	S-5: Very dense, moist, g red/orange staining, fine		3	ND	WEATHERED BEDF			
-			14.0	J				SAND and GRAVEL, little (Weathered BEDROCK) Bottom of boring at	e (-) Silt.	4 5					
- 20 _ -															
- - 25 _ -															
30	0	6			1.6						d basel for				
2. 3. 4.	indicated Field tes vapor m Driller no Offset 4	l. ting resu eter equi oted augo 5 feet so	Its represe pped with er refusal a puth of orig	ent total a photo at appro inal bor	organio pionizati pximatel rehole lo	c vapor levels, on detector (Pl y 14.5 feet on	referenc D) and 1 probable vanced a	auger to refusal at approximat	easured in the hea per million by volu	dspao ime (p	ce of sea opmv). I	aled soil sample jars u ND indicates nothing o	ising a lon Sc	ience Phocheck	•
								ocedures. Stratification lines r en made at the times and ur						Boring	No.:

174440.01 45 JACKSON RD DEVENS MA.GPJ; STANDARD BORING W/E W/O SMP 2PG2; 10/23/2020

	G		ironment s and Sci	<i>.</i>			Supp	lemei	King Devens ntal Explorations - Deve 45 Jackson R Devens, Massacl	ns Biotech Dev load	veloj	oment	SHI	RING NO.: EET: DJECT NO: /IEWED BY:	1 of 1 01.01		I	
Forem	g Co.: nan: d By:	Jamie	Environm Hastings Prohaske		Inc.	R	-	el: M	ruck obile B-57 vd: HSA	Boring Locati Ground Surfa Final Boring I Date Start - Fi	ice E Dept	h (ft.):): 29 19				. Datum: Se . Datum: _{Se}	
	/Casing	Type	ЦСЛ			s	Sampler	· Type	Split Spoon		T			Ground	vater	Depth	(ft.)	
I.D./O	-	Type.	4.25"/8"				D./O.D	•••	1.375"/2"		D	ate		Time		r Depth	<u> </u>	Stab. Tin
Hmr V	Neight	lb.):	-				Sampler				9/1	1/20	1	550		18	WELL	1 day
Hmr F Other	-all (in.)	:	-			-	Sampler Other:		Fall: 30 Auto Hammer		-	2/20		815 335		8.7	WELL	12 days
	Casing		S	Samp	le							23/20 Field	1			Y(19')	Equipment Ins	1.5 mont stalled
epth ft)	Blows/ Core Rate Min/ft	No.	Depth (ft.)	Pen. (in)	Rec. (in)		3 in.) V	SPT ′alue	Sample Desci Modified Burr	nister	Remark	Test Data		Stratum Description		~~~~	~~~	
		S-1	0-2	24	12	3		10	S-1: (Top 5") Dry, dark br		1	ND	0.5'	FOREST MAT	298.5		**	
						7 1	11	10	some fine to medium Sar trace Wood.	id, little Roots,	2						**	
		S-2	2-4	24	23	27			S-1: (Bottom 7") Medium	dense, dry,		ND		SAND/GRAVEL				
-						62	32	R	brown, fine to coarse SA	ND and					005.01			ttings (0-7')
-		S-3	4-6	24	21	19	33		GRAVEL, little Silt.			ND	<u> ⁴</u> ' — ·		295.0			C Riser (0-
5_						37		70	S-2: Very dense, dry, bro	wn to light	3						XX	
_									brown, GRAVEL and fine	to coarse	3						XX -	
									SAND, trace Silt.	rown with grov								
									S-3: Very dense, moist, b and orange staining, fine								≺ −Bei	ntonite (7-8
1									SAND and GRAVEL, son									
		S-4	9-11	24	16	21	22		S-4: Dense, moist, brown			ND						
0						26	23	48	SAND, some Gravel, son	ne Silt.							Scr	een (9-19'
_																		
														GLACIAL TILL				
-		S-5	13-	13	13	41	62	R	S-5: Very dense, moist, b	rown, fine to		ND					-Sai	nd (8-19')
_ 1			14.1			60/	1"	``	coarse SAND, some Grav	vel, some Silt.	4							. ,
5_											.							
-																		
_																		
											5		19'		280.0'			
0		S-6	19-19	0	0	40/	0"	R	S-6: No penetration.		6							
"-									Bottom of boring a	t 19 feet.								
-																		
_																		
5																		
~ 																		
-																		
-																		
4																		
0																		
			elevation e	stimate	d from	topograp	hic conto	ours in	an AutoCAD existing condition	ons drawing file pre	epare	d by Hig	hpoint E	Engineering, In	c. entitle	ed "Maste	rPlan_Base.d	wg," no date
2.		ting resu							ed to a benzene standard, me									iger organic
3.	Slight or	ange-sta	ined soil ol	bserve	d in bot	tom 12 in	nches of	sample			ume (p	opmv). I	vD India	cates nothing o	etected	(<0.1 pp	πν).	
5.	Split spc	on sam	oler and au	ger refu	usal not	ted at abo	out 19 fe	et indic	amping and drill effort change cating probable bedrock.	S.								
6.			, observati															
Ļ	len: 1	sumle: "	an of		aut-1		lant's	an	cedures. Stratification lines r				1 /		had		Boring	
		wolonot	on of sam	nua das	CONTINUE	w and id		n nro										

			eental Geotech King Devens, 45 Jackson Ro vens, Massach	LLC		Test Pit No Page No. File No. Checked B	1	TP-30 of 01.01744 MJO	1 40.01
GZA Rep. Weather	L. Prohaske Cloudy, 50-70s	Contractor Operator Make Capacity	Takeuchi ~0.25 CY	Drilex Joe Gruda Model TB2 Reach ~12		Date Ground Ele Time Start Time Com	ed	33 14	/2020 38 40 15
Depth		Soil Description	n		Sample No.	Field Test Data	Excav. Effort	Boulders: Count/ Class	Note No.
0.8'	Dry, dark brown, fine to coars	e SAND, some Silt,	little Gravel, tra	ace Roots (TOPSOIL)	S-1	ND	Е	0	1, 2
1'2'	Dry, brown , fine to coars	e SAND and GRAVE	L, little Silt, trad	e Cobbles (FILL)	S-2	ND	E/M	0	
	Moist, light brown with oran	ge, fine to coarse S Cobbles	AND and GRAV	EL, some Silt, trace	S-3	ND	E/M E/M	0	
4'4.3'		(FILL)					E	0	
<u> </u>							E	0	
							E	0	
	Moist, brown, fine to co	arse SAND, some G (SAND/GRAVEI		obles, trace Silt	S-4	ND	E	0	
							E	0	
							E	0	3
11'	Botto	m of Test Pit 10 fee	et						
— 12' —									
— 13' —									
— 14' —									
— 15' —									
— 16' —									
 Field testing resu organic vapor mete Test pit terminate 	elevation estimated from plan entitled Its represent total organic vapor levels r equipped with a photoionization dete ed at approximately 10 feet below grou he heel of the excavator bucket. Topsoi	, referenced to a benzector (PID) and 10.6eV und surface due to mu	zene standard, m / lamp. Results ir ultiple test pit side	easured in the headspace parts per million by volu ewall collapses. Upon col	e of sealed ume (ppmv mpletion, te).	-		-
Test Pit P 12' NORTH	3.5' Designation C B B C 36 Excevation Eff EEasy MModerat	Size Range Ilassification 6" - 17" 18" - 36" " and Larger ort	Propo Us TRACE (TR.) LITTLE (LI.) SOME (SO.) AND	ed 0 - 10% 10 - 20% 20 - 35%	F = Fine M = Mediu C = Coarse V = Very	e to medium to coarse vn	()	to ing	Depth to Ground- water (feet)
Stratification In-	DDifficult			35 - 50%	ado et t'		itions stated		

		Supplem	Test Pit No. Page No. File No. Checked By:		TP-302 1 of 1 01.0174440.01 MJO			
GZA Rep.	L. Prohaske Cloudy, 50-60s	Contractor Operator Make Capacity	Drilex Joe Gruda Takeuchi Model TB2 ~0.25 CY Reach ~12		Date Ground Elev. Time Started Time Completed		9/18/2020 332 0920 1045	
Depth		Soil Description	n	Sample No.	e Field Test Data	Excav. Effort	Boulders: Count/ Class	Note No.
- 0	Dry, brown, fine to coarse S	SAND and GRAVEL, lit (FILL)	ttle Silt, trace Aslphalt, trace Roots	S-1	ND	М	0	1, 2
- 1'				1		М	0	
— 2' — — 3' —	Dry, light brown with orar	Cobbles	ND, some Gravel, some Silt, trace	S-2	ND	E/M	0	
4'		(FILL)				E/M	0	
_ 4				1		E/M	0	
- 5'						E/M	0	
- 6'	Dry, brown, fine to c		VEL, little Cobbles, trace Silt	S-3	ND	E/M	0	
		(SAND/GRAVEI	_)			E/M	2A	
— 8' —						E/M	4A	
9' 9.5'				-		М	2A	
- 10'	Moist, brown, fine to coar	se SAND, some Grave (GLACIAL TILL)	el, some Clayey Silt, trace Cobbles)	S-4	ND	M/D	1A, 2B	
- 11'	Botti	om of Test Pit 11.5 fe	et	-		M/D	11,20	3
- 12'	DUIL	JII OI TEST FIL 11.5 IE	et					
- 13'								
- 14'								
- 15'								
— 16' —								
lotes:								<u> </u>
Field testing resul ganic vapor meter Test pit terminate	ts represent total organic vapor leve equipped with a photoionization de	els, referenced to a benz etector (PID) and 10.6eV	vg", prepared by Highpoint Engineering, Ir eene standard, measured in the headspace / lamp. Results in parts per million by volu nultiple test pit sidewall collapses. Upon c	e of sealed Ime (ppmv).	-		-
Test Pit Pla	an	Class	Proportions	A1-1	reviations	G	ROUNDWATER	
10'	Letter Designation	Class Size Range Classification	Used	Abb F = Fine M = Medi	reviations um	()	Encountered) Not Encountered	

Test Pit Plan	Boulder Class		tions	Abbreviations	GROUNDWATER	
10' 3.5'	Letter Size Range Designation Classification A 6" - 17" B 18" - 36"		0 - 10%	F = Fine M = Medium C = Coarse	() Encountered (X) Not Encour	ntered
	C 36" and Larger	LITTLE (LI.)	10 - 20%	V = Very F/M = Fine to medium F/C = Fine to coarse	Elapsed Time to Reading	Depth to Ground- water
NORTH	Excavation Effort EEasy	SOME (SO.)	20 - 35%	GR = Gray BN = Brown YEL = Yellow	(Hours)	(feet)
	MDifficult	AND	35 - 50%			
Stratification lines represent approx	imate boundaries between soil types, transitions ma	who gradual Water	lovel readings have been m	ado at timos and undor conditions	stated	

Er	eoEnvironmental, In agineers/Scientists	nc.	•	nental Geotec King Devens, 45 Jackson Ro vens, Massach	LLC pad		Test Pit No. Page No. File No. Checked By:		TP-303 <u>1 of 1</u> 01.0174440.01 MJO	
249 Vanderbilt A Norwood, MA C			Dev	vens, ividssdCl	IUSELLS		спескей Е		IVI	10
GZA Rep.		rohaske	Contractor		Drilex		Date			18/2020
Weather	Cloud	dy, 50-60s	Operator Make Capacity	Takeuchi ~0.25 CY	Joe Gruda Model Reach	TB290 ~12 FT	Ground El Time Start Time Com	ed	315.5 0830 0910	
Depth			oil Descriptio			Sample No.	e Field Test Data	Excav. Effort	Boulder Count Class	/ Note
1'	Dry, dark b	rown, fine to medium	SAND and SILT MAT)	, little Gravel, t	race Roots (FORE	ST S-1	ND	E/M	0	1, 2
2'	Dry, light	t brown, fine to coarse	SAND and GRA (SAND/GRAVE)		Silt, trace Cobbles	5 S-2	ND	E	0	
3'3'			(- , -	,		_		E	0	
4'	Dry,	brown, fine to coarse	SAND and GRA (SAND/GRAVE		oles, trace Silt	S-3	ND	E	0	
5' 6'5.8'			(_,				E/M	0	
	Moist, brown	with gray and occasic			ID, some Gravel, s	some S-4	ND	М	0	
8'			Silt, trace Cobbl (GLACIAL TILL			54		M/D D	2A	
9' 8.8'		Bottom o	f Test Pit 8.8 fe	et				U	3A	3
— 10' —			apparent BEDR							
— 11' —										
— 12' —										
— 13' —										
— 14' — — 15' —										
16'										
 Field testing r organic vapor m Test pit termination 	esults represent total neter equipped with a	d from plan entitled "Ma organic vapor levels, refi photoionization detector ly 8.8 feet due to excava	erenced to a benz r (PID) and 10.6eV	zene standard, m V lamp. Results ir	easured in the head n parts per million b	lspace of sealed y volume (ppmv	').			
Test F	Pit Plan	Boulder Class		Propo	ortions	۵bł	reviations	G	ROUNDWATER	
)'3'	Letter Size R Designation Classif A 6"- B 18" C 36" and Excavation Effort EEasy MModerate	ication 17" - 36"		0 - 10% 0 - 20% 20 - 35% 35 - 50%	F = Fine M = Medi C = Coarse V = Very	um e to medium to coarse vn		to ling	red Depth to Ground- water (feet)
		DDifficult			33 - 30%					

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to factors other than those present at the time measurements were made.

	Environmental, Inc.	Supplem		Test Pit No Page No. File No. Checked E	1	TP-304 of 1 01.0174440.01 MJO		
GZA Rep. Weather	L. Prohaske Cloudy, 50-60s	Contractor Operator Make Capacity	Drilex Joe Gruda Takeuchi Model ~0.25 CY Reach	TB290 ~12 FT	Date Ground El Time Start Time Com	ted	9/18/2020 322 1125 1215	
Depth		Soil Descriptio	n	Samp No.		Excav. Effort	Boulders: Count/ Class	Note No.
1'						M M	3A 2A	1, 2
3'	Dry, brown, fine to coarse SAN	Vletal, S-1	ND	М	ЗA			
4'		(FILL)				M M	1A 2A	
5' <u>5.5'</u> 6' <u>6'</u>	Dry, brown, fine to medium	SAND, some Silt, tra JRIED TOPSOIL)	ce Gravel, trace Roots	S-2	ND	E/M	0	
			Gravel, trace Cobbles (Silty SA	.ND) S-3	ND	E/M E/M M	0 1A	
9' 9' 10' 10.5'	Dry, brown, fine to coarse SAN	ID, some Clayey Silt, TILL)	little Gravel, trace Cobbles (GL	ACIAL S-4	ND	D	0 1A	
11'11' 12' 13'		om of Test Pit 11 fee I on apparent BEDR(S-5	ND		0	3
14' 15' 16'		e/brown, plate-like obbles, little fine to o ROCK)	coarse					
2. Field testing rest organic vapor mete	elevation estimated from plan entitled ults represent total organic vapor level er equipped with a photoionization det ted at approximately 11 feet due to ex avator bucket.	s, referenced to a benz tector (PID) and 10.6e\	zene standard, measured in the hea / lamp. Results in parts per million	adspace of seale by volume (ppn	ıv).			

Test Pit Plan 10'	Boulder Class Letter Size Range Designation Classification	Proport Use	ł	Abbreviations F = Fine M = Medium	GROUNDWATER () Encountered (X) Not Encountered	
	A 6" - 17" B 18" - 36"	TRACE (TR.)	0 - 10%	C = Coarse V = Very	Elapsed	Depth to
₩	C 36" and Larger	LITTLE (LI.)	10 - 20%	F/M = Fine to medium F/C = Fine to coarse	Time to Reading	Ground- water
NORTH	Excavation Effort EEasy	SOME (SO.)	20 - 35%	GR = Gray BN = Brown YEL = Yellow	(Hours)	(feet)
	MDifficult	AND	35 - 50%	TEL = TENOW		
Stratification lines represent approxi	imate boundaries between soil types, transitions ma	av be gradual. Water l	evel readings have been m	ade at times and under conditions	stated.	

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readi Fluctuations of groundwater may occur due to factors other than those present at the time measurements were made.

		•	Supplemental Geotechnical Study King Devens, LLC 45 Jackson Road Devens, Massachusetts				Test Pit No. Page No. File No. Checked By:		TP-305 1 of 1 01.0174440.01 MJO		
GZA Rep. Weather		L. Prohaske Clear, 30-60s	Contractor Operator Make Capacity	J Takeuchi ~0.25 CY	Drilex amie Hastings Model TB29 Reach ~12		Date Ground Ele Time Start Time Com	ed	9/21/ 297 112 112	7.5 20	
Depth			Soil Descriptio	n		Sample No.	Field Test Data	Excav. Effort	Boulders: Count/ Class	Note No.	
1'0. 2'2.	.0	ry, dark brown, fine to ight brown, fine to co		ravel, little (-) S		S-1 S-2	1.8 ND	E	0	1, 2	
3' 4' 5'		Pry, brown, fine to coa	arse SAND, some Gr (SAND/GRAVE		trace Cobbles	S-3	ND	E	0 0 0		
6' <u>5.</u> - 6'		vn/gray with orange/r	ed, fine to coarse S trace Cobbles (GLACIAL TILL	5	vel, some Clayey Silt,	S-4	ND	M/D D D	1A 2A 0		
9' <u>8.</u> 9' <u>8.</u>			n of Test Pit 8.1 fe on apparent BEDR(S-5	ND	D	1A	3	
- 11'											
Notes:	Inface elevation estin	nated from plan entitled	"MasterPlan Base dy	wg" prepared by	Highpoint Engineering, Ir						
 Field testin organic vapor Test pit ter 	ng results represent t r meter equipped wi rminated at approxin	otal organic vapor levels th a photoionization det	, referenced to a benz ector (PID) and 10.6e	zene standard, m / lamp. Results ir	ngippont Engineering, in easured in the headspace parts per million by volu n apparent bedrock. Upo	e of sealed me (ppmv).			Ū	
	st Pit Plan 12' 3'		ass Size Range Classification 6" - 17" 18" - 36"	Propo Us TRACE (TR.)		Abb F = Fine M = Mediu C = Coarse V = Very		()	ROUNDWATER Encountered) Not Encountered	Depth to	

Test Pit Plan 12'	Boulder Class Letter Size Range		Proportions Used		GROUNDWAT () Encountered	
3'	Designation Classification A 6" - 17" B 18" - 36"	TRACE (TR.)	0 - 10%	M = Medium C = Coarse V = Very	(X) Not Encoun	ntered Depth to
\backslash	C 36" and Larger	LITTLE (LI.)	10 - 20%	F/M = Fine to medium F/C = Fine to coarse	Time to Reading	Ground- water
NORTH	Excavation Effort EEasy	SOME (SO.)	20 - 35%	GR = Gray BN = Brown YEL = Yellow	(Hours)	(feet)
	MModerate DDifficult	AND	35 - 50%	TEL - TENOW		
Stratification lines represent approx	imate boundaries between soil types, transition	s may be gradual. Water le	evel readings have beer	n made at times and under condit	ions stated.	

Fluctuations of groundwater may occur due to factors other than those present at the time measurements were made.

	ironmental, Inc.	Supplemental Geotechnical Study King Devens, LLC 45 Jackson Road Devens, Massachusetts					Test Pit No. Page No. File No. Checked By:		TP-306 1 of 1 01.0174440.01 MJO	
GZA Rep Weather	L. Prohaske Clear, 30-60s	Capacity <u>~0.25 CY</u> Reach <u>~12</u>			ngs TB29 ~12		Date Ground Elev. Time Started Time Completed		9/21/ 305 083	5.5 16
Depth		Soil Description	n			Sample No.	Field Test Data	Excav. Effort	Boulders: Count/ Class	Note No.
1'0.8'	Dry, dark brown, fine to Dry, brown/orange, fine t			S-1 S-2	ND ND	E	0	1, 2		
	Dry, brown, fine to co	barse SAND and GRA (SAND/GRAVEI		bles, trace Silt	t	S-3	ND	E E E/M	0 0 0	
	Moist, brown with gray, Cla			, some Gravel	, trace	S-4	ND	E/M M	0 1A	
- 7' - 7.7' - 8' - 8' - 9' 10'	(Refusa	Cobbles (GLACIAL m of Test Pit at 8 fo al on apparent BEDR(nge, plate-like GRAV	eet ОСК) EL,			S-5	ND	M/D	2A	3
— 11' — — 12' — — 13' —	tr	se Sand, trace Cobble ace Silt red BEDROCK)	es,							
— 14' — — 15' — — 16' —										
Notes: 1. Ground surface elev	vation estimated from plan entitle represent total organic vapor leve	—			-		soil sample iar	s using a lo	Science Phoe	heck Tiger

3. Test pit terminated at approximately 8 feet below ground surface due to excavator refusal on apparent bedrock. Upon completion, test pit was backfilled with excavated material in lifts and tamped with the heel of the excavator bucket.

Test Pit Plan 13'	Boulder Class Letter Size Range	Proport Used	Proportions		GROUNDWATER
3'	Designation Classification	Designation Classification A 6" - 17" TRACE (TR.) 0 - 10%		F = Fine M = Medium C = Coarse	() Encountered (X) Not Encountered
Î	B 18" - 36" C 36" and Larger	LITTLE (LI.)	10 - 20%	V = Very F/M = Fine to medium F/C = Fine to coarse	Elapsed Depth to Time to Ground- Reading water
NORTH	Excavation Effort EEasy	SOME (SO.)	20 - 35%	GR = Gray BN = Brown	(Hours) (feet)
	MDifficult	AND	35 - 50%	YEL = Yellow	
Stratification lines represent approv	imate boundaries between soil types transitions	may be gradual. Water l	evel readings have been	a made at times and under condit	ions stated

Fluctuations of groundwater may occur due to factors other than those present at the time measurements were made.

G			Supplemental Geotechnical Study King Devens, LLC 45 Jackson Road Devens, Massachusetts				р1 му:	TP-307 of 1 01.0174440.01 MJO		
GZA Rep. Weather	L. Prohaske Cloudy, 50-70s	Contractor Operator Make Capacity	Takeuchi ~0.25 CY	Drilex Iamie Hastings Model TB29 Reach ~12		Date Ground Ele Time Start Time Com	ed	9/17/2020 324.5 1305 eed 1400		
Depth		Soil Description	n		Sample No.	Field Test Data	Excav. Effort	Boulders: Count/ Class	Note No.	
01'	Dry, dark brown, fine to	coarse SAND, some (FOREST MAT		Silt, trace Roots	S-1	ND	E	0	1, 2	
	Dry, light brown, fine to	· · · · · · · · · · · · · · · · · · ·		vel, trace Roots	S-2	ND	E	0		
- 3' - 4.2'	Dry, brown, GRAVEL and fine	to coarse SAND, trac	e Silt, trace Co	bbles (SAND/GRAVEL)	S-3	ND	E/M M	0 1A		
4'							М	0	<u> </u>	
— 5' — — 6' —							M/D	1A		
7'	Dry, brown with gray and occ	casional orange, fine	to coarse SANI), some Gravel, some			D	1A		
, 8'	, ,	Clayey Silt, trace Co (GLACIAL TILL)	bbles	,	S-4	ND	D	1A	ļ	
9'							D	1A, 1B	<u> </u>	
10'							D	3A	<u> </u>	
11'11'	Bott	om of Test Pit 11 fee	•				D	3A	3, 4	
— 12' —		al on apparent BEDR(<u> </u>	
— 13' —										
— 14' —										
<u> </u>										
<u> </u>									1	
 Field testing in organic vapor in Fragments of Test pit term 	ace elevation estimated from plan entitle results represent total organic vapor leve neter equipped with a photoionization de decomposed rock observed at about 10. inated at approximately 11 feet below gru d with the heel of the excavator bucket.	ls, referenced to a benz tector (PID) and 10.6e 5 to 11 feet below grou	ene standard, m / lamp. Results i ind surface (bgs)	easured in the headspace n parts per million by volu within the Till strata.	e of sealed me (ppmv)).			-	
Test F	3' Designation A B	Class Size Range Classification 6" - 17" 18" - 36" 36" and Larger		ortions sed 0 - 10% 10 - 20%	F = Fine M = Mediu C = Coarse V = Very F/M = Fine	to medium	()			
NC	DRTH Excavation E MBasy DDifficult	:ffort rate	SOME (SO.)	20 - 35% 35 - 50%	F/C = Fine GR = Gray BN = Brow YEL = Yello	to coarse n	Read (Hou	ing	water (feet)	

	GeoEnvironmental, Inc. Engineers/Scientists 49 Vanderbilt Avenue			nnical Study LLC pad nusetts		Test Pit No Page No. File No. Checked B	1	of 01.01744	TP-308 <u>1 of 1</u> 01.0174440.01 MJO		
GZA Rep WeatherC	L. Prohaske loudy, 50-70s	Contractor Operator Make Capacity	Takeuchi ~0.25 CY		-B290 ~12 FT	Date Ground Ele Time Start Time Com	ed	33	/2020 30 40 30		
Depth		Soil Description	1		Sample No.	Field Test Data	Excav. Effort	Boulders: Count/ Class	Note No.		
0 1'1'	Dry, brown, fine to coars	(FOREST MAT)			S-1 S-2	ND ND	Е	0	1, 2		
2'2.2'		(SUBSOIL)			_		E/M E/M	0			
3' 4'	Dry, brown, fine to coarse SAND and GRAVEL, trace Silt, trace Cobbles (SAND/GRAVEL)					ND	M	0			
— 5' — — 6' — 5.7'					_		M	0			
— 7' — Moist, b	rown with gray/orange, f	ine to coarse SAN trace Cobbles	ND, some Grav	el, some Silt and C	ay, S-4	ND	M M/D	1A 2A			
9' 10'		(GLACIAL TILL)					M/D M/D	1A 2A	3		
— 10' — — 11' — — 12' — — 13' —	Bottom of Test Pit	10 feet below gro	ound surface								
— 14' — — 15' —											
16' Notes: Ground surface elevation esti Field testing results represent organic vapor meter equipped w	total organic vapor levels, re	eferenced to a benz	ene standard, m	easured in the heads	pace of sealed		s using a lor	Science Phoc	heck Tiger		
 Test pit terminated at approxi excavator bucket. 	mately 10 feet below ground	l surface. Upon con	npletion, test pit	was backfilled with e	excavated mate	rial in lifts and	tamped wit	h the heel of t	he		
Test Pit Plan 11' 3' NORTH	Designation Class A 6' B 18	Range sification '- 17" "- 36" id Larger		rrtions ed 0 - 10% 10 - 20% 20 - 35% 35 - 50%	F = Fine M = Mediu C = Coarse V = Very	e to medium to coarse m	()	to ng	Depth to Ground- water (feet)		

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to factors other than those present at the time measurements were made.

G			ental Geotecl King Devens, 45 Jackson Ro rens, Massach	LLC pad		Test Pit No Page No. File No. Checked B	1	TP-309 of 01.017444 MJO	1
GZA Rep. Weather	L. Prohaske Cloudy, 50-60s	Contractor Operator Make Capacity	J Takeuchi ~0.25 CY		290 .2 FT	Date Ground Ele Time Start Time Com	ed	9/18/ 34(12 13	0.5 40
Depth		Soil Descriptior	1		Sample No.	Field Test Data	Excav. Effort	Boulders: Count/ Class	Note No.
01'	Dry, dark brown, fine to coarse	SAND and SILT, son (TOPSOIL)	ne Gravel, trac	e Cobbles, trace Roo	ts S-1	ND	E/M	14	1, 2
1'		(1010012)					E/M	0	
3'							Е	0	
4'							E	0	
5'	Dry, brown, fine to coar			oles, trace Silt	S-2	ND	E	1A	
- 6'	(SAND/GRAVEL)						E	0	
7'							E	0	3
8'							E	2A	
9'9.6'	Damp, brown with gray, fine	to coarse SAND, so	me Clavev Silt.	some Gravel, trace		ND	E/M	5A	
	Damp, brown with gray, fine to coarse SAND, some Clayey Silt, some Gravel, trace Cobbles						Μ	3A	
11'11'	Bottom of Test Pi	(GLACIAL TILL) t 11 feet below gro on apparent BEDRC	ound surface		S-4	ND	M/D	0	4
— 13' — — 14' — — 15' —									
— 16' —									
 Field testing organic vapor r Slight increased Test pit term 	ace elevation estimated from plan entitled ' results represent total organic vapor levels, neter equipped with a photoionization dete se in Cobbles observed with depth between inated at approximately 11 feet due to exca excavator bucket. Topsoil and grass seed w	referenced to a benz ctor (PID) and 10.6eV approximately 1 and vator refusal on appa	ene standard, m ' lamp. Results ir 9.6 feet below g arent bedrock. U	easured in the headspa parts per million by vo round surface (bgs).	ce of sealed olume (ppmv)).			
	Destauation (C	ize Range	Propo Us		F = Fine	reviations	()	ROUNDWATER Encountered	
	A B C 36" Excavation Effo	assification 6" - 17" 18" - 36" and Larger rt	TRACE (TR.) LITTLE (LI.) SOME (SO.)	0 - 10% 10 - 20% 20 - 35%	F/C = Fine GR = Gray	to medium to coarse	(X Elaps Time Read (Hou	to ing	Depth to Ground- water (feet)
NC	DRTH EEasy MDifficult	2	AND	35 - 50%	BN = Brow YEL = Yello				
	les represent approximate boundaries between so groundwater may occur due to factors other than	oil types, transitions may	be gradual. Water	level readings have been	made at times	and under cond	itions stated.	I	



Appendix D – Falling Head Borehole and Single-Ring Infiltrometer Permeability Test Results



Updated: 10/29/2020

Geotechnical Exploration - Wick Test and Single-Ring Infiltrometer Summary

		Approximate	Approximate	Estin	nated	
		Ground	Falling	Hydi	raulic	
		Surface	Head Test	Condu	uctivity	
Exploration	Year	Elevation	Elevation		k	
Туре	Performed	(ft)	(ft)	(cm/sec)	(ft/day)	Comments
boring	2008	335	329	2E-03	6E+00	test #1
boring	2008	335	329	3E-03	7E+00	test #2
boring	2008	328	322	2E-03	7E+00	
boring	2008	343	338	1E-04	4E-01	
boring	2008	341	331	1E-04	3E-01	
boring	2008	306	303	8E-05	2E-01	
boring	2008	306	303.5	9E-05	3E-01	
boring	2008	302	299	3E-03	8E+00	
boring	2008	313	310	5E-04	1E+00	
boring	2008	309	304	1E-04	4E-01	
boring	2008	309	306.5	6E-05	2E-01	
test pit	2019	343.5	335	5.8E-03	1.6E+01	
test pit	2019	337.5	331	1.4E-01	4.0E+02	
test pit	2020	305.5	298.2	2.6E-03	7.4E+00	
test pit	2020	324.5	317.4	3.5E-03	9.8E+00	
	Type boring boring boring boring boring boring boring boring boring boring boring boring test pit test pit	Type Performed boring 2008 boring 2019 test pit 2020	Ground Exploration Year Elevation Type Performed (ft) boring 2008 335 boring 2008 335 boring 2008 335 boring 2008 328 boring 2008 343 boring 2008 341 boring 2008 306 boring 2008 306 boring 2008 302 boring 2008 309 boring 2008 309 boring 2008 309 boring 2019 343.5 test pit 2019 337.5 test pit 2020 305.5	Ground Falling Exploration Year Elevation Type Performed (ft) Elevation boring 2008 335 329 boring 2008 335 329 boring 2008 335 329 boring 2008 343 338 boring 2008 343 338 boring 2008 341 331 boring 2008 306 303 boring 2008 306 303 boring 2008 306 303 boring 2008 306 303.5 boring 2008 306 303.5 boring 2008 302 299 boring 2008 302 299 boring 2008 309 304 boring 2008 309 306.5 test pit 2019 337.5 331 test pit	Ground Falling Hydr Surface Head Test Condu Type Performed (ft) (ft) (cm/sec) boring 2008 335 329 2E-03 boring 2008 335 329 2E-03 boring 2008 335 329 2E-03 boring 2008 343 338 1E-04 boring 2008 341 331 1E-04 boring 2008 306 303.5 9E-05 boring 2008 306 303.5 9E-05 boring 2008 306 303.5 9E-05 boring 2008 302 299 3E-03 boring 2008 309 304 1E-04 boring 2008 309 306.5 6E-05 boring 2008 309 304 1E-04 boring 2008 309 306.5 6E-05 t	$ \begin{array}{c c c c c c c c c c c c c c c c c c c $

Notes:

 Ground surface elevations for the 2008 borings interpreted from existing site contour plan prepared by S.J. Mullaney Companies, Inc. dated 1/8/08 and ground surface elevations for the 2019 and 2020 test pits were estimated from an existing conditions electronic drawing file entitled "MasterPlan Base.dwg" transmitted by Highpoint Engineering, Inc. on October 31, 2019. Actual ground surface elevations may vary.

2. Approximate falling head wick test and single ring infiltrometer test elevation referenced to center of test zone.

3. For all 2008 borings (except boring GZ-110), for the two 2019 test pits (TP-201A and TP-202), and for the two 2020 test pits (TP-306 and TP-307) permeability test results were approximated using the formula Q=kiA where, Q is the flow rate, k is the permeability, i=1.0 (gravity drainage above the water table), and A is the area estimated to be similar to the exposed surface area of the wick.

J:\170,000-179,999\174440\174440-01.MJO\WORK\Calcs\[2020 to 2008 k_test-summary.xls]Summary Table



Appendix D.1 – 2008 Falling Head Borehole Permeability Test Results

			TEST DATA	
<u> </u>		# 1 from 5 to	/ feet	
	iameter, D (cm) =	11.43		
Casing Inside Dia	· · · ·	10.16		
1	of Casing (feet) =	5.0	(measured from groun	
	of Borehole (feet) =	7.0	(measured from groun	d surface)
Casing Stickup (f		5.17		
Zone tested, L (cr	n) =	60.96		
L/D =	21	5.33		
Ground Surface E		335	41	NTA
	om Top of Casing (Befor mate Ground Water Leve		5 the casing in reet) =	NA 11
Depui to Approxi	male Ground water Leve	er (reet beg) =		11
			Depth of Water	
			from	
Date	Time Ela	sped	Top of Casing	
Date	(minute)	(second)	(ft)	
	(initiate)	(second)	(11)	-
1/18/2008				_
	0.0	0	5.50	
	0.3	15	5.60	
	0.4	25	5.70	
	0.8	45	5.80	
	1.0	60	5.90	
	1.5	90	6.00	
	2.0	120	6.50	
	2.8	165	7.00	_
	3.5	210	7.50	
	5.0	300	8.00	_
	6.3	380	8.50	_
	9.5	570	9.00	
	20.0	1200	9.50	_
	40.0	2400	10.00	_
				<u> </u>
				<u> </u>

						Estimated Hydraulic	Estimated Hydraulic
Length of Test	Exposed Surface Area, A	Drop in Water		Volume of	Flow Rate, Q	conductivity,	conductivity,
Interval (cm)	(cm^2)	Level (ft)	Time Interval (sec)	Water (cm ³)	(cm^3/sec)	k (cm/sec)	k (ft/day)
60.96	2292	4.50	2400	11120	4.6	2E-03	6E+00

Notes:

(1) Data presented represents falling head testing conducted by New Hampshire Boring and GZA.

(2) Permeability results were approximated using the formula Q=kiA where, Q is the flow rate, k is the permeability, i=1.0 (gravity drainage above the water table), and A is the area estimated to be similar to the exposed surface area of the wick.

(3) Depth to groundwater from ground surface estimated based on nearby test pits TP-120 and TP-122.

(4) Could not fill casing to top with water - water level dropping too quickly.

J:\19,000-20,999\19707\19707-00.PJM\Calcs\[k_test-GZ101(1).XLS]GZ101-T1 WICK

	GZ-101 INFI	LTRATION	TEST DATA	
		# 2 from 5 to		
Casing Outside D	Diameter, D (cm) =	11.43		
Casing Inside Dia		10.16		
	of Casing (feet) =	5.0	(measured from ground	1 surface)
	of Borehole (feet) =	7.0	(measured from ground	
Casing Stickup (f		5.17	ζ ų	/
Zone tested, L (ci	n) =	60.96		
_/D =		5.33		
Ground Surface H	Elevation (feet) =	335		
Depth to Water fi	om Top of Casing (Befo	ore filling water int	o the casing in feet) =	NA
Depth to Approxi	mate Ground Water Lev	el (feet beg) =		11.0
		-		
			Depth of Water	
			from	
Date	Time Elasped		Top of Casing	
	(minute)	(second)	(ft)	
1/21/2008				
	0.0	0	5.60	
	0.3	15	5.80	
	0.6	35	6.00	
	0.8	50	6.20	
	1.0	60	6.30	1
	1.4	85	6.40	
	1.6	96	6.50	
	1.8	109	6.70	
	2.0	120	6.80	
	2.1	128	6.90	
	2.3	140	7.00	
	2.6	155	7.10	
	3.0	180	7.40	
	4.0	240	7.80	
	4.5	270	8.00	
	4.8	289	8.10	
	5.1	306	8.20	
	5.4	325	8.30	
	5.7	344	8.40	
	6.1	365	8.50	
	8.0	480	9.00	
	9.7	580	9.20	
	11.6	696	9.40	
		1000	9.60	
	16.7		0.00	
	16.7 23.0	1380	9.80	

						Estimated Hydraulic	Estimated Hydraulic
Length of Test	Exposed Surface Area, A	Drop in Water		Volume of	Flow Rate, Q	conductivity,	conductivity,
Interval (cm)	(cm^2)	Level (ft)	Time Interval (sec)	Water (cm ³)	(cm^3/sec)	k (cm/sec)	k (ft/day)
60.96	2292	4.40	1830	10873	5.9	3E-03	7E+00

Notes:

(1) Data presented represents falling head testing conducted by New Hampshire Boring and GZA.

(2) Permeability results were approximated using the formula Q=kiA where, Q is the flow rate, k is the permeability, i=1.0 (gravity drainage above the water table), and A is the area estimated to be similar to the exposed surface area of the wick.

(3) Depth to groundwater from ground surface estimated based on nearby test pits TP-120 and TP-122.

(4) Could not fill casing to top with water - water level dropping too quickly.

 $J:\label{eq:linear} J:\label{eq:linear} J:\l$

IF

	GZ-104 INFII	TRATION	ΤΕՏΤ ΟΛΤΛ	
		# 1 from 5 to		
Casing Outside D	rest n	11.43	11001	
Casing Outside D		10.16		
	of Casing (feet) =	5.0	(measured from ground	d surface)
	of Borehole (feet) =	7.0	(measured from ground	,
Casing Stickup (f		3.0	(measured from ground	i suitace)
Zone tested, L (cr		60.96		
L/D =	II) —	5.33		
Ground Surface E	Elevation (feet) $=$	328		
	rom Top of Casing (Before		the casing in feet) = $\frac{1}{2}$	NA
	mate Ground Water Level		, the easing in reet)	8
Deptil to reppion	inate offeand water here	(leet deg)		0
			Depth of Water	
			from	
Date	Time Elas	ped	Top of Casing	
	(minute)	(second)	(ft)	
1/21/2009				
1/21/2008	0.0	0	0.00	
	0.0	0	0.00	
			0.08	
	0.5	<u> </u>	0.17	
	1.2	70	0.23	
	1.5	90	0.33	
	1.8	110	0.42	
	2.3	135	0.60	
	2.8	165	0.70	
	3.0	180	0.80	
	3.3	200	0.90	
	3.7	220	1.00	
	4.1	245	1.10	
	4.5	270	1.20	
	4.8	290	1.30	
	5.3	320	1.40	
	5.8	350	1.50	
	6.2	370	1.60	
	6.6	395	1.70	
	7.0	420	1.80	
	7.5	450	1.90	
	8.0	480	2.00	
	10.0	600	2.40	
	12.3	735	2.80	
	13.5	810	3.00	
	17.2	1030	3.50	
	21.0	1260	4.00	
	25.5	1530	4.50	
	30.8	1845	5.00	
	49.5	2970	6.70	

						Estimated Hydraulic	Estimated Hydraulic
Length of Test	Exposed Surface Area, A	Drop in Water		Volume of	Flow Rate, Q	conductivity,	conductivity,
Interval (cm)	(cm^2)	Level (ft)	Time Interval (sec)	Water (cm ³)	(cm^3/sec)	k (cm/sec)	k (ft/day)
60.96	2292	6.7	2970	16556	5.6	2E-03	7E+00

Notes:

(1) Data presented represents falling head testing conducted by New Hampshire Boring and GZA.

(2) Permeability results were approximated using the formula Q=kiA where, Q is the flow rate, k is the permeability, i=1.0 (gravity

drainage above the water table), and A is the area estimated to be similar to the exposed surface area of the wick.

(3) Depth to groundwater from ground surface estimated based on closest adjacent test pits TP-118 and TP-136.

 $J:\label{eq:linear} J:\label{eq:linear} J:\l$

Γ

	GZ-107 INFI	LTRATION	TEST DATA	
	Test	# 1 from 4 to	6 feet	
Casing Outside D	Diameter, D (cm) =	11.43		
Casing Inside Dia		10.16		
	of Casing (feet) =	4.0	(measured from ground	l surface)
	of Borehole (feet) =	6.0	(measured from ground	l surface)
Casing Stickup (f		3.0		
Zone tested, L (cr	n) =	60.96		
L/D =		5.33		
Ground Surface E		343		
	om Top of Casing (Befor		the casing in feet) =	NA
Depth to Approxi	mate Ground Water Leve	l (feet beg) =		8
			Depth of Water	
			from	
Date	Time Elas	ped	Top of Casing	
	(minute)	(second)	(ft)	
1/18/2008				
1,10,2000	0.0	0	0.00	
	0.0	1	0.17	
	0.1	3	0.42	
	0.1	5	0.67	
	0.1	7	0.75	
	0.2	12	0.83	
	0.2	14	1.00	
	0.3	17	1.08	
	0.3	19	1.17	
	0.4	21	1.25	
	0.8	50	1.33	
	1.0	60	1.42	
	1.8	105	1.50	
	6.0	360	1.58	
	10.0	600	1.67	
	20.0	1200	1.75	
	30.0	1800	1.83	
				1
				1

71

						Estimated Hydraulic	Estimated Hydraulic
Length of Test	Exposed Surface Area, A	Drop in Water		Volume of	Flow Rate, Q	conductivity,	conductivity,
Interval (cm)	(cm^2)	Level (ft)	Time Interval (sec)	Water (cm ³)	(cm^3/sec)	k (cm/sec)	k (ft/day)
60.96	2292	0.08	600	206	0.3	1E-04	4E-01

Notes:

(2) Permeability results were approximated using the formula Q=kiA where, Q is the flow rate, k is the permeability, i=1.0 (gravity drainage above the water table), and A is the area estimated to be similar to the exposed surface area of the wick.

(3) Depth to groundwater from ground surface estimated based on nearby test pit TP-106.

J:\19,000-20,999\19707\19707-00.PJM\Calcs\[k_test-GZ107.XLS]GZ107-T1 WICK

⁽¹⁾ Data presented represents falling head testing conducted by New Hampshire Boring and GZA.

Г

٦

GZ-110	FALLING HE	AD PERMEA	BILITY TEST	DATA
	Test	t # 1 from 9 to	11 ft	
Casing Outside Diar	neter, $D(cm) =$	11.43		
Casing Inside Diame	eter (cm) =	10.16		
Depth to Bottom of	Casing (feet) =	9.0		
Depth to Bottom of	Borehole (feet) =	11.0		
Casing Stickup (feet	() =	1.0		
Zone tested, L (cm)	=	60.96		
L/D =		5.33		
Ground Surface Elev		341.0		
			the casing in feet) =	NA
Depth to Approximation	te Ground Water Lev	vel (feet beg) =		8
			D (L CITL)	D
			Depth of Water	Piezometric
Dete	T_{int} - Γ_{i}	- Marine Marine	from	Head
Date	Time Elasped		Top of Casing	"H"
	(minute)	(second)	(ft)	(ft)
1/17/2008				
	0.0	0	0.00	9.00
	0.5	30	0.08	8.92
	1.0	60	0.17	8.83
	1.3	75	0.25	8.75
	1.8	110	0.33	8.67
	2.7	160	0.42	8.58
	3.5	210	0.50	8.50
	5.0	300	0.67	8.33
	5.7	340	0.75	8.25
	6.5	390	0.83	8.17
	7.5	450	0.92	8.08
	8.2	490	1.00	8.00
	<u>9.0</u> 9.7	540 580	<u>1.08</u> 1.17	7.92
	9.7	630	1.17	7.83 7.75
	10.5	690	1.25	7.75
	11.5	740	1.33	7.58
	12.3	740	1.42	7.50
l –	14.0	840	1.50	7.42
	14.8	890	1.67	7.33
	15.5	930	1.75	7.25
	16.8	1010	1.83	7.17
	17.6	1010	1.92	7.08
	18.7	1120	2.00	7.00
	19.5	1170	2.08	6.92
	20.8	1245	2.00	6.83
	22.0	1320	2.25	6.75

Based on the data, the average permeability estimated to be:									
H1 (ft) =	8.75	T1 (second) =	75						
H2 (ft) =	7.08	T2 (second) =	1055						
Ave. Permeability, k =	1E-04	cm/s							
k =	3E-01	ft/day							

Notes:

(1) Data presented represents falling head testing conducted by New Hampshire Boring and GZA.

(2) Permeability tests were conducted in general accordance with procedures outlined by Hvorslev (1951).

(3) Assume that transformation ratio, m = 1, since vertical permeability = horizontal permeability.

(4) Depth to groundwater from ground surface estimated based on nearby test pits TP-103 through TP-105.

 $J:\label{eq:linear} J:\label{eq:linear} J:\l$

IF

71

	GZ-113 INFI	LTRATION	TEST DATA	
	Test	# 1 from 2 to	4 feet	
Casing Outside D	Diameter, D (cm) =	11.43		
Casing Inside Dia	ameter (cm) =	10.16		
Depth to Bottom	of Casing (feet) =	2.0	(measured from ground	d surface)
	of Borehole (feet) =	4.0	(measured from ground	d surface)
Casing Stickup (f	eet) =	3.0		
Zone tested, L (cr	n) =	60.96		
L/D =		5.3		
Ground Surface E		306		
	om Top of Casing (Befo		the casing in feet) =	NA
Depth to Approxi	mate Ground Water Lev	el (feet beg) =		7
			Depth of Water	
			from	
Date	Time Elasped		Top of Casing	
	(minute)	(second)	(ft)	
1/22/2008				
	0.0	0	0.00	
	1.0	60	0.05	
	10.0	600	0.10	
	35.0	2100	0.15	

						Estimated Hydraulic	Estimated Hydraulic
Length of Test	Exposed Surface Area, A	Drop in Water		Volume of	Flow Rate, Q	conductivity,	conductivity,
Interval (cm)	(cm^2)	Level (ft)	Time Interval (sec)	Water (cm^3)	(cm^3/sec)	k (cm/sec)	k (ft/day)
60.96	2292	0.15	2100	371	0.18	8E-05	2E-01

Notes:

(1) Data presented represents falling head testing conducted by New Hampshire Boring and GZA.

(2) Permeability results were approximated using the formula Q=kiA where, Q is the flow rate, k is the permeability, i=1.0 (gravity drainage above the water table), and A is the area estimated to be similar to the exposed surface area of the wick.

(3) Depth to groundwater from ground surface estimated based on nearby test pit TP-128.

J:\19,000-20,999\19707\19707-00.PJM\Calcs\[k_test-GZ113.XLS]GZ113-T1 WICK

IF

71

	GZ-113A INF	ILTRATIO	N TEST DATA	
	Test	# 1 from 3 to	4 feet	
Casing Outside D	Diameter, D (cm) =	11.43		
Casing Inside Dia	ameter (cm) =	10.16		
Depth to Bottom	of Casing (feet) =	3.0	(measured from ground	d surface)
Depth to Bottom	of Borehole (feet) =	4.0	(measured from ground	d surface)
Casing Stickup (f	eet) =	2.3		
Zone tested, L (cr	n) =	30.48		
L/D =		2.7		
Ground Surface E		306		
	om Top of Casing (Befo		o the casing in feet) =	NA
Depth to Approxi	mate Ground Water Leve	el (feet beg) =		7
			Depth of Water	
			from	
Date	Time Elasped		Top of Casing	
	(minute)	(second)	(ft)	
1/23/2008				
	0.0	0	0.00	
	4.0	240	0.04	
	15.0	900	0.08	
	30.0	1800	0.08	

						Estimated Hydraulic	Estimated Hydraulic
Length of Test	Exposed Surface Area, A	Drop in Water		Volume of	Flow Rate, Q	conductivity,	conductivity,
Interval (cm)	(cm^2)	Level (ft)	Time Interval (sec)	Water (cm^3)	(cm^3/sec)	k (cm/sec)	k (ft/day)
30.48	1197	0.08	1800	198	0.11	9E-05	3E-01

Notes:

(1) Data presented represents falling head testing conducted by New Hampshire Boring and GZA.

(2) Permeability results were approximated using the formula Q=kiA where, Q is the flow rate, k is the permeability, i=1.0 (gravity drainage above the water table), and A is the area estimated to be similar to the exposed surface area of the wick.

(3) Depth to groundwater from ground surface estimated based on nearby test pit TP-128.

J:\19,000-20,999\19707\19707-00.PJM\Calcs\[k_test-GZ113A.XLS]GZ113A-T1 WICK

	GZ-115 INFI	LTRATION	TEST DATA	
	Test	# 1 from 2 to	4 feet	
Ų	iameter, D (cm) =	11.43		
Casing Inside Dia		10.16		
Depth to Bottom of Casing (feet) = Depth to Bottom of Borehole (feet) =		2.0	(measured from groun	
		4.0	(measured from groun	d surface)
Casing Stickup (f		3.0		
Zone tested, L (cr	n) =	60.96		
L/D =	11	5.3		
Ground Surface E		302		27.4
	om Top of Casing (Befo mate Ground Water Lev		o the casing in feet) =	NA
Depth to Approxi	mate Ground water Lev	el(leet beg) =		4
			Depth of Water	
			from	
Date	Time Ela	isped	Top of Casing	
Dute	(minute)	(second)	(ft)	
1/00/2000	(minute)	(second)	(11)	1
1/22/2008	0.0		0.00	_
	0.0	0 60	0.00 3.00	
	1.3	75	3.10	
	1.3	100	3.10	
	2.1	100	3.30	-
	2.1	125	3.40	-
	2.4	143	3.50	
	3.3	195	3.60	
	3.8	225	3.70	
	4.3	255	3.80	
	4.8	290	3.90	
	5.3	320	4.00	
	6.0	360	4.10	
	6.8	410	4.20	
	7.3	440	4.30	
	7.9	475	4.40	
	8.5	510	4.50	
	9.7	580	4.60	
	10.7	640	4.70	
	11.8	710	4.80	_
	12.5	750	4.90	_
	14.3	860	5.00	
	17.0	1020	5.20	
	21.0	1260	5.40	-
	35.0	2100	5.60	_

						Estimated Hydraulic	Estimated Hydraulic
Length of Test	Exposed Surface Area, A	Drop in Water		Volume of	Flow Rate, Q	conductivity,	conductivity,
Interval (cm)	(cm^2)	Level (ft)	Time Interval (sec)	Water (cm ³)	(cm^3/sec)	k (cm/sec)	k (ft/day)
60.96	2292	5.6	2100	13838	6.6	3E-03	8E+00

Notes:

(1) Data presented represents falling head testing conducted by New Hampshire Boring and GZA.

(2) Permeability results were approximated using the formula Q=kiA where, Q is the flow rate, k is the permeability, i=1.0 (gravity

drainage above the water table), and A is the area estimated to be similar to the exposed surface area of the wick.

(3) Depth to groundwater from ground surface estimated based on nearby test pit TP-123.

(4) Water level dropping too quickly top 3 feet of casing to obtain accurate reading.

 $J:\label{eq:linear} J:\label{eq:linear} J:\l$

IF

71

	GZ-117 INFI	LTRATION	TEST DATA	
	Test	# 1 from 2 to	4 feet	
Casing Outside D	iameter, D (cm) =	11.43		
Casing Inside Dia	meter (cm) =	10.16		
Depth to Bottom	of Casing (feet) =	2.0	(measured from groun	d surface)
	of Borehole (feet) =	4.0	(measured from groun	d surface)
Casing Stickup (f	eet) =	3.0		
Zone tested, L (cr	n) =	60.96		
L/D =		5.3		
Ground Surface E		313		
	om Top of Casing (Befo		the casing in feet) =	NA
Depth to Approxi	mate Ground Water Lev	el (feet beg) =		5
			Depth of Water from	
Date	Time Elasped		Top of Casing	
	(minute)	(second)	(ft)	
1/23/2008				
	0.0	0	0.00	
	0.8	45	0.10	
	2.0	120	0.20	
	2.5	150	0.30	
	7.0	420	0.40	
	8.3	495	0.50	
	14.3	858	0.60	
	19.0	1140	0.65	
	22.0	1320	0.70	
	24.5	1470	0.75	
	30.0	1800	0.80	
l l				_

						Estimated Hydraulic	Estimated Hydraulic
Length of Test	Exposed Surface Area, A	Drop in Water		Volume of	Flow Rate, Q	conductivity,	conductivity,
Interval (cm)	(cm^2)	Level (ft)	Time Interval (sec)	Water (cm ³)	(cm^3/sec)	k (cm/sec)	k (ft/day)
60.96	2292	0.8	1800	1977	1.1	5E-04	1E+00

Notes:

(1) Data presented represents falling head testing conducted by New Hampshire Boring and GZA.

(2) Permeability results were approximated using the formula Q=kiA where, Q is the flow rate, k is the permeability, i=1.0 (gravity

drainage above the water table), and A is the area estimated to be similar to the exposed surface area of the wick.

(3) Depth to groundwater from ground surface estimated based on nearby test pis TP-129 and TP-130.

J:\19,000-20,999\19707\19707-00.PJM\Calcs\[k_test-GZ117.XLS]GZ117-T1 WICK

	GZ-119 INFI	LTRATION	TEST DATA	
	Test	# 1 from 4 to	6 feet	
Casing Outside D	iameter, D (cm) =	11.43		
Casing Inside Dia		10.16		
Depth to Bottom	of Casing (feet) =	4.0	(measured from ground	1 surface)
Depth to Bottom	of Borehole (feet) =	6.0	(measured from ground	1 surface)
Casing Stickup (f	eet) =	3.0		
Cone tested, L (cr	n) =	60.96		
/D =		5.33		
Ground Surface E	Elevation (feet) =	309		
	om Top of Casing (Befo		the casing in feet) =	NA
Depth to Approxi	mate Ground Water Lev	el (feet beg) =		7
			Depth of Water	
			from	
Date	Time Elasped		Top of Casing	
	(minute)	(second)	(ft)	
1/21/2008				
	1.0	60	0.10	
	5.0	300	0.20	
	10.5	630	0.30	
	11.4	683	0.31	
	16.5	990	0.37	
	18.5	1110	0.40	
	25.0	1500	0.45	
			+	1

						Estimated Hydraulic	Estimated Hydraulic
Length of Test	Exposed Surface Area, A	Drop in Water		Volume of	Flow Rate, Q	conductivity,	conductivity,
Interval (cm)	(cm^2)	Level (ft)	Time Interval (sec)	Water (cm^3)	(cm^3/sec)	k (cm/sec)	k (ft/day)
60.96	2292	0.05	390	124	0.3	1E-04	4E-01

Notes:

(1) Data presented represents falling head testing conducted by New Hampshire Boring and GZA.

(2) Permeability results were approximated using the formula Q=kiA where, Q is the flow rate, k is the permeability, i=1.0 (gravity drainage above the water table), and A is the area estimated to be similar to the exposed surface area of the wick.

(3) Depth to groundwater from ground surface estimated based on nearby test pits TP-120 and TP-122.

 $J:\label{eq:linear} J:\label{eq:linear} J:\l$

	Test	# 2 from 2 to	3 feet	
Casing Outside F	biameter, $D(cm) =$	11.43	5 1661	
Casing Inside Dia		10.16		
	of Casing (feet) =	2.0	(measured from groun	daurfaaa
	of Borehole (feet) =	3.0	(measured from groun	
Casing Stickup (f		3.0	(measured from groun	u surrace,
Cone tested, L (ci		30.48		
D = D	ii) –	2.67		
	Elevation (feet) =	309		
	rom Top of Casing (Before		r_{1} the casing in feet) =	NA
	mate Ground Water Leve		s the cusing in feet) =	7
cpui to Appion		r (leet beg) =		/
			Depth of Water	
			from	
Date	Time Elasped		Top of Casing	
	(minute)	(second)	(ft)	
1/22/2000	()	((/	
1/22/2008	0.5		0.04	_
	0.5	30 75	0.04	_
	-	-	0.13	_
	2.5 3.5	<u>150</u> 210	0.15	
	<u> </u>	300	0.17	
	6.5		0.19	
	15.0	<u>390</u> 900	0.21	
	30.0	1800	0.25	
	30.0	1800	0.25	
	1	1	1	1

						Estimated Hydraulic	Estimated Hydraulic
Length of Test	Exposed Surface Area, A	Drop in Water		Volume of	Flow Rate, Q	conductivity,	conductivity,
Interval (cm)	(cm^2)	Level (ft)	Time Interval (sec)	Water (cm^3)	(cm^3/sec)	k (cm/sec)	k (ft/day)
30.48	1197	0.04	1410	103	0.07	6E-05	2E-01

Notes:

(1) Data presented represents falling head testing conducted by New Hampshire Boring and GZA.

(2) Permeability results were approximated using the formula Q=kiA where, Q is the flow rate, k is the permeability, i=1.0 (gravity drainage above the water table), and A is the area estimated to be similar to the exposed surface area of the wick.

(3) Depth to groundwater from ground surface estimated based on nearby test pits TP-120 and TP-122.

 $J:\19,000-20,999\19707\19707-00.PJM\Calcs\[k_test-GZ119A.XLS]GZ119A-T2\ WICK$



Appendix D.2 – 2019 Single-Ring Infiltrometer Permeability Test Results



PERMEABILITY TEST NO. 1 Location: TP-201A

Test Data

Date of Test 11/15/2019

Casing Inside Diameter (in) 11.8

Depth to Bottom of Casing (feet) 8.5

Casing Stickup (feet) 2.2

Ground Surface Elevation (feet) 343.5 Approx. Test surface Elevation (feet) 335.0

Approx. Groundwater Level Depth (feet) 10

(measured from ground surface) (measured from bottom of test pit)

(measured from ground surface)

Time	Time Elasped		Depth of Water from Top of Casing	
(minute)	(second)	(ft)	(in)	
0.0	0	0.17	2.0	
2.0	120	0.22	2.6	
4.0	240	0.26	3.1	
6.0	360	0.28	3.4	
8.0	480	0.31	3.7	
10.0	600	0.33	4.0	
15.0	900	0.40	4.8	
20.0	1200	0.47	5.6	
30.0	1800	0.59	7.1	
60.0	3600	0.91	10.9	
90.0	5400	1.24	14.9	
120.0	7200	1.54	18.5	

Calculations	Exposed Surface Area, A (in^2)	109.59
	Drop in Water Level (in)	16.4
	Time Interval (sec)	7200
	Volume of Water (in^3)	1801.7
	Flow Rate, Q (in^3/sec)	0.25
	Estimated Hydraulic conductivity, k (in/sec)	2.3E-03
	k (cm/sec)	5.8E-03

Notes

 Data presented represents falling head permeameter testing conducted by GZA. Test hole presoaked for approx. 15 min. prior to recording water level drop.

2. Permeability results were approximated using the formula Q=kiA where, Q is the flow rate, k is the permeability, i=1.0 (gravity drainage above the water table), and A is the area at the exposed surface area at the bottom of the casing.

3. Ground surface elevation estimated based on topography shown on an electronic drawing file produced by Highpoint Engineering, Inc. entitled "MasterPlan_Base.dwg" received on 10/31/2019.

4. PVC pipe used for testing is approximately 3.4-feet-long.



PERMEABILITY TEST NO. 1

Location: TP-202

Test Data

Date of Test 11/15/2019

Casing Inside Diameter (in) 11.8

Depth to Bottom of Casing (feet) 6.5

Casing Stickup (feet) 2.1

Ground Surface Elevation (feet) 337.5

Approx. Test surface Elevation (feet) 331.0

(measured from ground surface) (measured from bottom of test pit)

(measured from ground surface)

Approx. Groundwater Level Depth (feet) Not observed

Time Elasped Depth of Water from Top of Casing (minute) (second) (ft) (in) 0 2.70 32.4 0.0 0.3 15 2.83 34.0 0.5 30 2.95 35.4 1.0 60 3.13 37.6 1.5 90 3.22 38.6 2.0 120 3.28 39.4 2.2 129 3.30 39.6

Calculations	Exposed Surface Area, A (in^2)	109.59
	Drop in Water Level (in)	7.2
	Time Interval (sec)	129
	Volume of Water (in^3)	789.1
	Flow Rate, Q (in^3/sec)	6.12
	Estimated Hydraulic conductivity, k (in/sec)	5.6E-02
	k (cm/sec)	1.4E-01

Notes

 Data presented represents falling head permeameter testing conducted by GZA. Test hole presoaked for approx. 15 min. prior to recording water level drop.

2. Permeability results were approximated using the formula Q=kiA where, Q is the flow rate, k is the permeability, i=1.0 (gravity drainage above the water table), and A is the area at the exposed surface area at the bottom of the casing.

3. Ground surface elevation estimated based on topography shown on an electronic drawing file produced by Highpoint Engineering, Inc. entitled "MasterPlan_Base.dwg" received on 10/31/2019.

4. PVC pipe used for testing is approximately 3.4-feet-long.



Appendix D.3 – 2020 Single-Ring Infiltrometer Permeability Test Results



PERMEABILITY TEST NO. 1 Location: TP-306

Test Data

Date of Test	9/21/2020	
Casing Inside Diameter (in)	11.8	
Depth to Bottom of Casing (feet)	7.3	(measured from ground surface)
Casing Stickup (feet)	2.2	(measured from bottom of test pit)
Ground Surface Elevation (feet)	305.5	
Approx. Test surface Elevation (feet)	298.2	
Approx. Groundwater Level Depth (feet)	N/A	(measured from ground surface)

Time Elasped		Depth of Water fr	om Top of Casing
(minute)	(second)	(ft)	(in)
0.0	0	0.46	5.5
2.0	120	0.48	5.8
5.0	300	0.49	5.9
10.0	600	0.52	6.3
15.0	900	0.55	6.6
20.0	1200	0.58	6.9
25.0	1500	0.60	7.3
30.0	1800	0.63	7.6
35.0	2100	0.65	7.8
40.0	2400	0.69	8.3
71.0	4260	0.83	9.9

Calculations	Exposed Surface Area, A (in^2)	109.59
	Drop in Water Level (in)	4.4
	Time Interval (sec)	4260
	Volume of Water (in^3)	482.2
	Flow Rate, Q (in^3/sec)	0.11
	Estimated Hydraulic conductivity, k (in/sec)	1.0E-03
	k (cm/sec)	2.6E-03

<u>Notes</u>

 Data presented represents falling head permeameter testing conducted by GZA. Test hole presoaked for approx. 15 min. prior to recording water level drop.

- 2. Permeability results were approximated using the formula Q=kiA where, Q is the flow rate, k is the permeability, i=1.0 (gravity drainage above the water table), and A is the area at the exposed surface area at the bottom of the casing.
- 3. Ground surface elevation estimated based on topography shown on an electronic drawing file produced
- by Highpoint Engineering, Inc. entitled "MasterPlan_Base.dwg" no date indicated.

4. PVC pipe used for testing was approximately 3.3-feet-long.



PERMEABILITY TEST NO. 1 Location: TP-307

Test Data

9/18/2020	
11.8	
7.1	(measured from ground surface)
2.5	(measured from bottom of test pit)
324.5	
317.4	
N/A	(measured from ground surface)
	11.8 7.1 2.5 324.5 317.4

Time Elasped		Depth of Water fr	om Top of Casing
(minute)	(second)	(ft)	(in)
0.0	0	0.50	6.0
3.8	225	0.52	6.3
6.5	390	0.54	6.5
12.0	720	0.58	7.0
15.0	900	0.60	7.3
20.0	1200	0.64	7.7
25.0	1500	0.67	8.0
30.0	1800	0.71	8.5
35.0	2100	0.73	8.8
40.0	2400	0.77	9.3
45.0	2700	0.80	9.7
50.0	3000	0.83	10.0
55.0	3300	0.88	10.5

Calculations	Exposed Surface Area, A (in^2)
	Drop in Water Level (in)
	Time Interval (sec)
	Volume of Water (in^3)
	Flow Rate, Q (in^3/sec)

Estimated Hydraulic conductivity, k (in/sec)	1.4E-03
k (cm/sec)	3.5E-03

Notes

1. Data presented represents falling head permeameter testing conducted by GZA. Test hole presoaked for approx. 15 min. prior to recording water level drop.

109.59 4.5

3300

493.2 0.15

- 2. Permeability results were approximated using the formula Q=kiA where, Q is the flow rate, k is the permeability, i=1.0 (gravity drainage above the water table), and A is the area at the exposed surface area at the bottom of the casing.
- 3. Ground surface elevation estimated based on topography shown on an electronic drawing file produced
- by Highpoint Engineering, Inc. entitled "MasterPlan_Base.dwg" no date indicated.

4. PVC pipe used for testing was approximately 3.3-feet-long.



PERMEABILITY TEST NO. 1 Location: TP-307

Test Data

Date of Test	9/18/2020	
Casing Inside Diameter (in)	11.8	
Depth to Bottom of Casing (feet)	7.1	(measured from ground surface)
Casing Stickup (feet)	2.5	(measured from bottom of test pit)
Ground Surface Elevation (feet)	324.5	
Approx. Test surface Elevation (feet)	317.4	
Approx. Groundwater Level Depth (feet)	N/A	(measured from ground surface)

Time E	Elasped	Depth of Water fr	Depth of Water from Top of Casing						
(minute)	(second)	(ft)	(in)						
0.0	0	0.50	6.0						
3.8	225	0.52	6.3						
6.5	390	0.54	6.5						
12.0	720	0.58	7.0						
15.0	900	0.60	7.3						
20.0	1200	0.64	7.7						
25.0	1500	0.67	8.0						
30.0	1800	0.71	8.5						
35.0	2100	0.73	8.8						
40.0	2400	0.77	9.3						
45.0	2700	0.80	9.7						
50.0	3000	0.83	10.0						
55.0	3300	0.88	10.5						

CalculationsExposed Surface Area, A (in^2)109.59Drop in Water Level (in)4.5Time Interval (sec)3300Volume of Water (in^3)493.2Flow Rate, Q (in^3/sec)0.15Estimated Hydraulic conductivity, k (in/sec)k (cm/sec)3.5E-03

<u>Notes</u>

 Data presented represents falling head permeameter testing conducted by GZA. Test hole presoaked for approx. 15 min. prior to recording water level drop.

- 2. Permeability results were approximated using the formula Q=kiA where, Q is the flow rate, k is the permeability, i=1.0 (gravity drainage above the water table), and A is the area at the exposed surface area at the bottom of the casing.
- 3. Ground surface elevation estimated based on topography shown on an electronic drawing file produced
- by Highpoint Engineering, Inc. entitled "MasterPlan_Base.dwg" no date indicated.
- 4. PVC pipe used for testing was approximately 3.3-feet-long.



Appendix E – Geotechnical Laboratory Results

TABLE E-1 SUMMARY OF GEOTECHNICAL LABORATORY TESTING Proposed Development

45 Jackson Road

Devens, MA

Exploration ID	Exploration Type	Year Performed	Sample No.	Sample Depth (ft)	Laboratory Test	Classification ¹	Notes
TP-101 & TP-104	test pit	2008	composite	3-4	Gradation and Proctor	Brown, f-c SAND and f-c GRAVEL, little Silt	2,5,6
TP-113 & TP-118	test pit	2008	composite	4-6	Gradation and Proctor	Brown, f-c SAND, some f-c Gravel, trace Silt	2,5,6
TP-103	test pit	2008	S-1	4	Gradation	Brown, f-c SAND and f-c GRAVEL, little Silt, trace Concrete	2,5
TP-103	test pit	2008	S-2	10	Gradation	Brown f-c SAND, some Silt, little f-c Gravel	2,5
GZ-103	boring	2008	S-2	4-6	Gradation	Brown, f-c SAND, some f-c Gravel, trace Silt	2,5
GZ-114	boring	2008	S-2	4-5.8	Gradation	Brown, f-c SAND, some Silt, some fine Gravel	2,5
GZ-116	boring	2008	S-1	0.5-2	Gradation	Brown f-c SAND and f-c GRAVEL, little Silt	2,5
GZ-117	boring	2008	S-2	4-6	Gradation	Brown f-c SAND, little f-c Gravel, trace Silt	2,5
B-1	boring	2012	S-2	2-4	Gradation	Brown, fine to coarse SAND and Gravel, little Silt	3,5
B-3	boring	2012	S-2	2-4	Gradation	Dark brown, fine to medium SAND and Silt, trace Gravel	3,5
B-7	boring	2012	S-2	2-4	Gradation	Gray, fine to coarse SAND and Gravel, little Silt	3,5
B-11	boring	2012	S-2	2-4	Gradation	Gray to brown, medium to coarse SAND, some Gravel, little Silt	3,5
TP-202	test pit	2019	S-2	6.5	Gradation	Brown f-c SAND and f-c Gravel, trace Silt	4,5
GZ-202	boring	2019	S-4	6-8	Gradation	Brown f-c SAND and Clayey SILT, little fine Gravel	4,5
GZ-301	boring	2020	S-3	4-6	Gradation	Brown f-c SAND, some Silt, some fine Gravel	4,5
GZ-302	boring	2020	S-3	4-6	Gradation	Brown f-c SAND, some f-c Gravel, little Silt	4,5
GZ-304	boring	2020	S-4	6-8	Gradation	Brown f-c SAND and f-c GRAVEL, trace Silt	4,5
GZ-307	boring	2020	S-2	2-4	Gradation	Brown fine GRAVEL and f-c SAND, trace Silt	4,5

Notes:

1. Classification is based on the Modified Burmister System.

2. Testing performed by GZA's Geotechnical Laboratory, Hopkinton, MA.

3. Testing performed by GZA's Geotechnical Laboratory, Manchester, NH.

4. Testing performed by Thielsch Engineering of Cranston, Rhode Island.

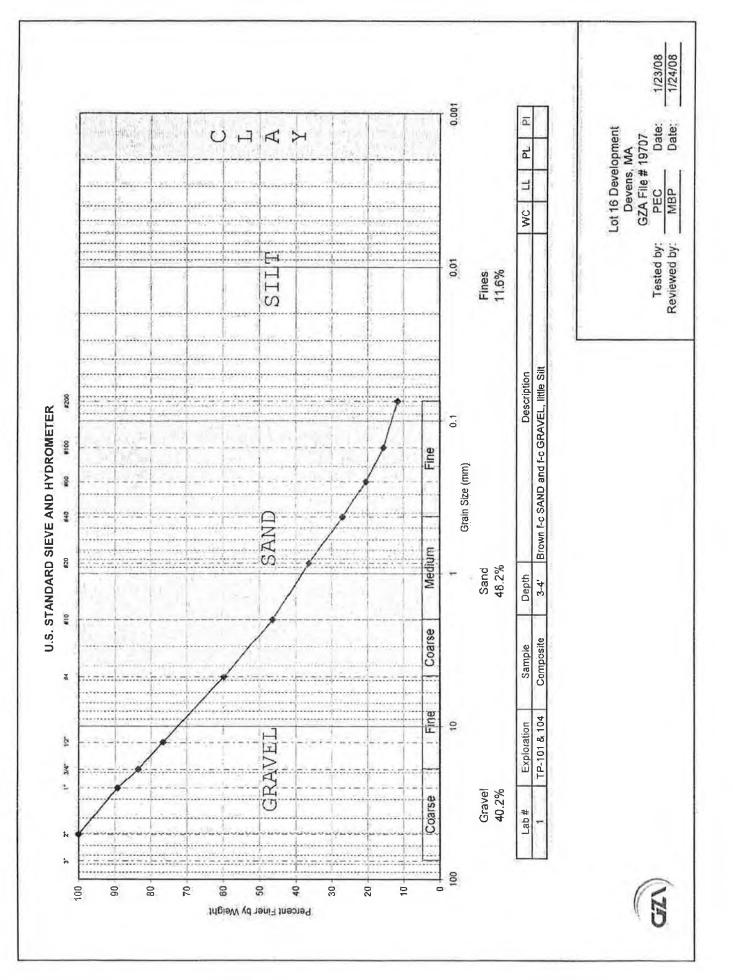
5. Laboratory gradation testing performed in accordance with ASTM D422.

6. Laboratory Proctor testing performed in accordance with ASTM D1557.

J:\170,000-179,999\174440\174440-01.MJO\WORK\LAB\Geotech\[174440.01_Table E-1.xls]Sheet1



Appendix E.1 – 2008 Geotechnical Laboratory Results



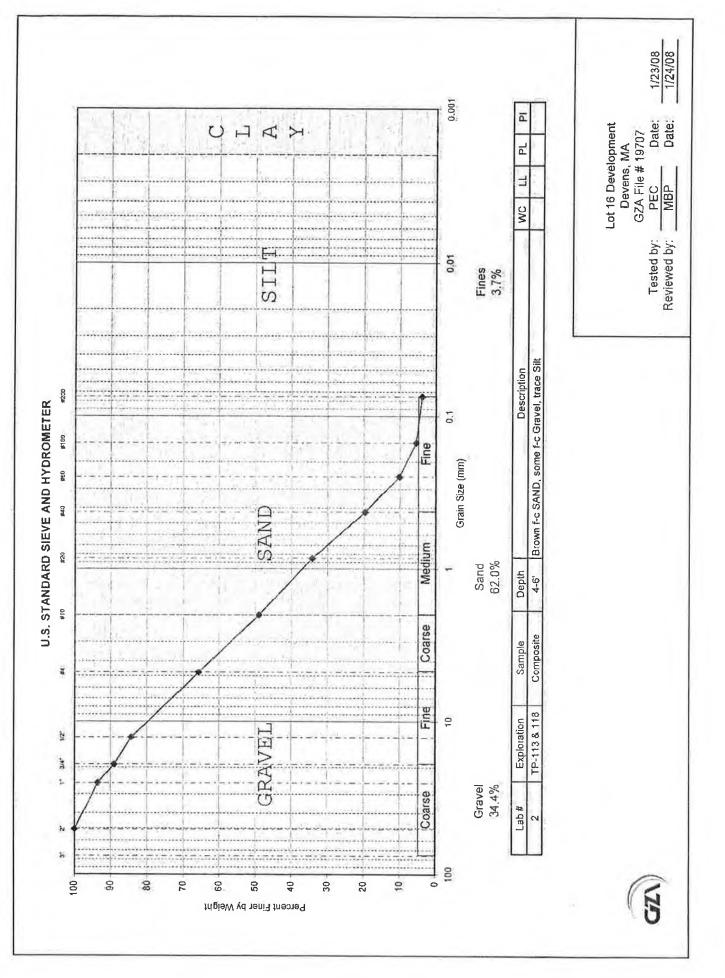
ASTM D-1557 MODIFIED COMPACTION TEST

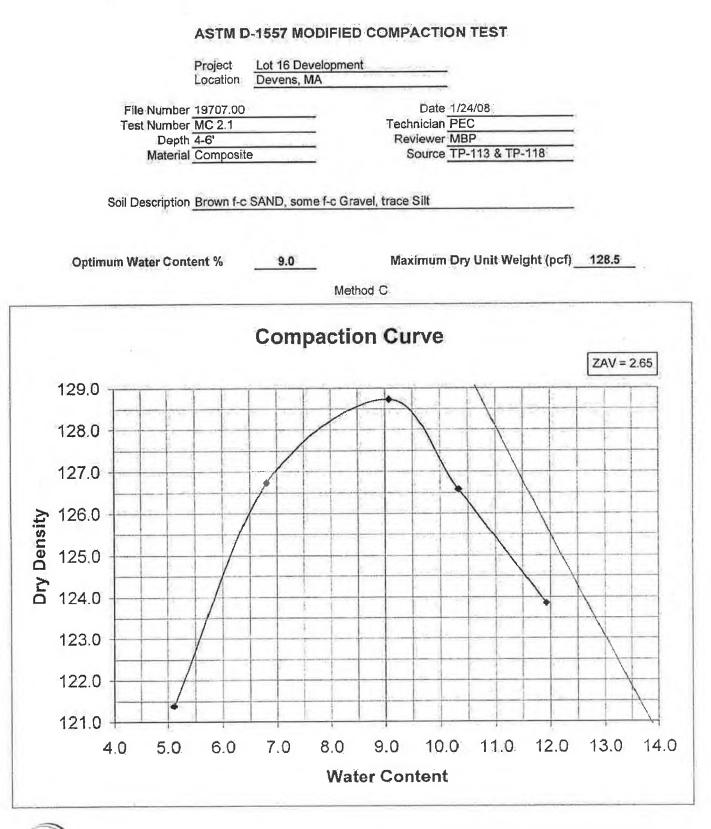
Location Devens, MA File Number 19707.00 Test Number MC 1.1 Depth 3-4' Material Composite Soil Description Brown f-c SAND and f-c						d f-c (Date 1/24/08 Technician PEC Reviewer MBP Source TP-101 & TP-104 GRAVEL, little Silt														
Optimum Water Content %					Maximum Dry Unit Weight (pcf) Method C										12	7.5	-				
						-	Co	om	pa	ctic	on	Cui	ve	1-							
																			ZA	AV = 2	2.65
1	29.0								1					1			1				
1	28.0						-	1 - 33 K 1-3 1 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1							-		1	1-			
1	27.0 -								5	1	•	/				-		/			
1	26.0 -							-	1					~					1		
1	25.0 -							/	/							/	1			/	
1	24.0 -	-				/	*			-		_		-	_			1			
1	23.0 -		•																		/
1	22.0 -	-							_	-		_									
	21.0 -	0	-	.0	5.	0	6	.0	7	.0	8.	0	9.0		10	0	1.	1.0	12	2.0	13
	5	U.	4	.0,	U.	0	0	.0			er C				10	.0	1.		12		10



GZA GeoEnvironmental, Inc.

2

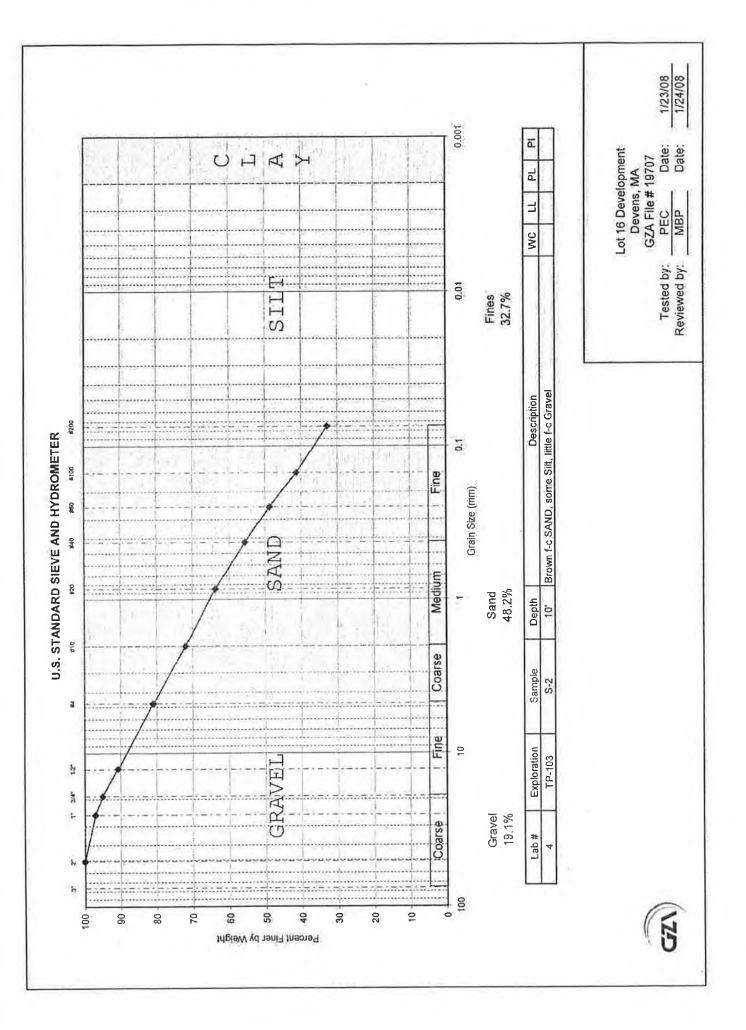


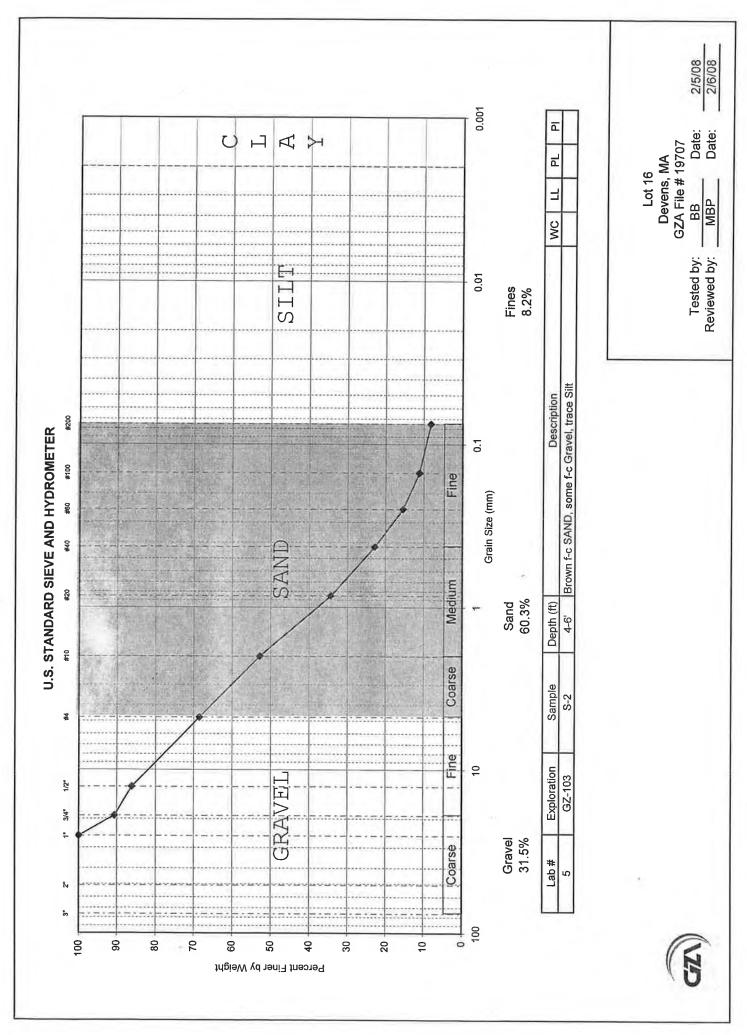


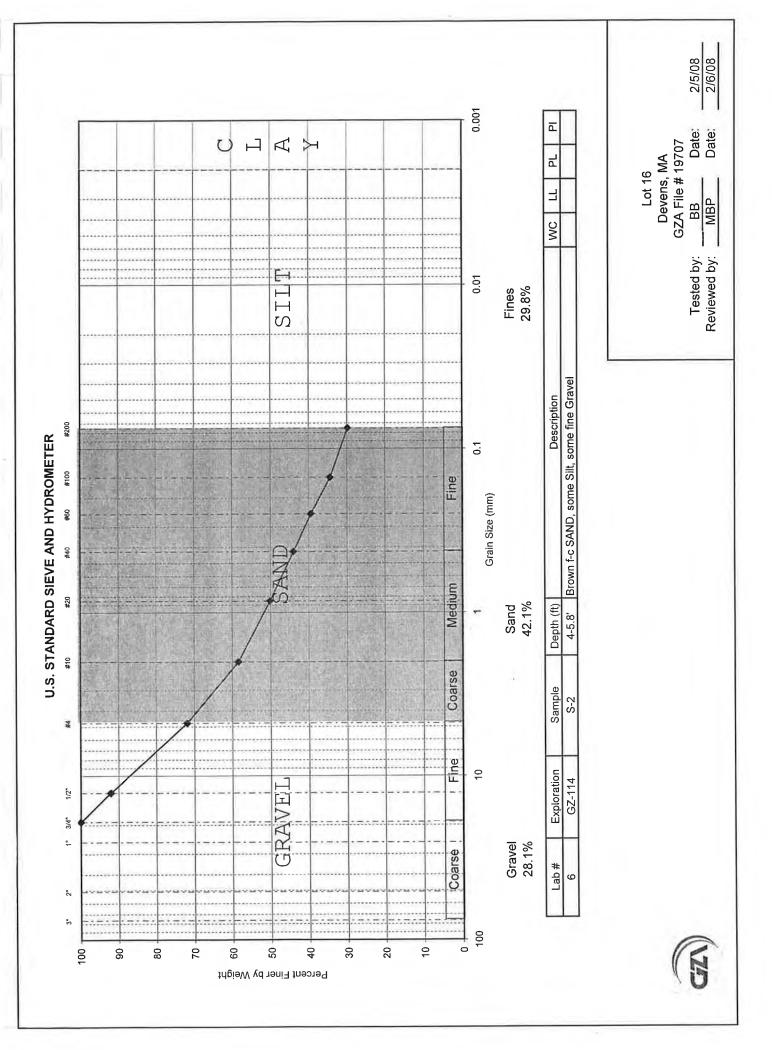


1/23/08 1/24/08 0.001 Lot 16 Development Devens, MA GZA File # 19707 PEC Date: MBP Date: ā. C H A Y ď H WC Tested by: Reviewed by: Ent 0.01 SIL Fines 12.1% Brown f-c SAND and f-c GRAVEL, little Silt (trace Concrete) Description 1200 **U.S. STANDARD SIEVE AND HYDROMETER** 0.1 8100 Fine Grain Size (mm) 09# 9**1**40 SANI Medium #20 Sand 46.7% T Depth * #10 Coarse Sample S-1 2 Fine 20 Exploration TP-103 H 2 F GRAV .tre 4 Gravel 41.2% Coarse Lab # 3 ł 'n 100 0 10 -100 06 80 2 60 50 40 30 20 CEN Percent Finer by Weight

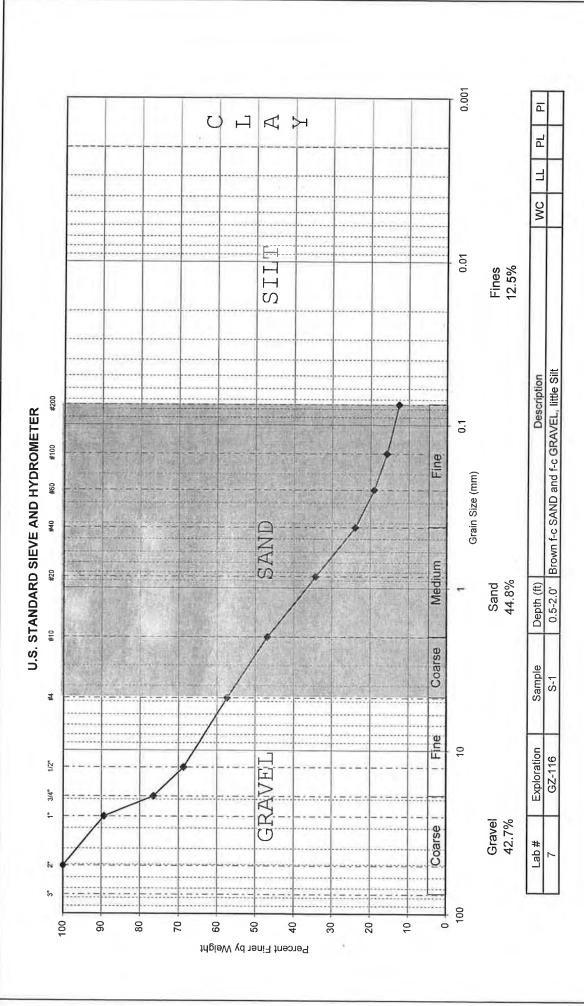
.



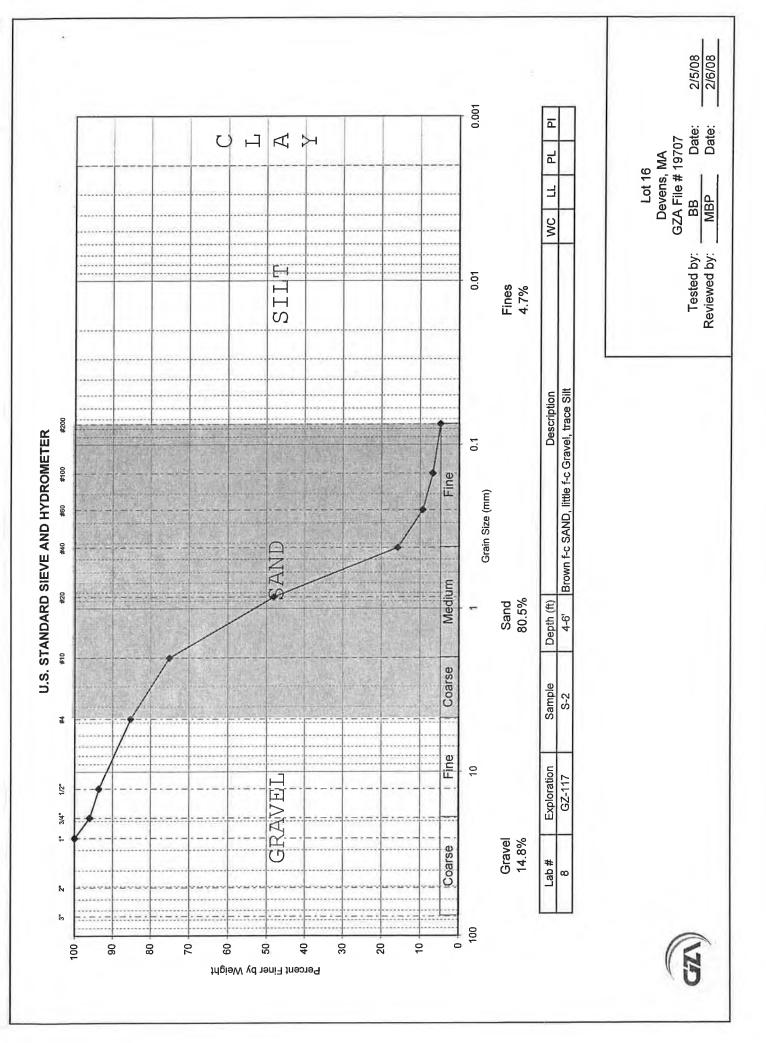




Lot 16 Devens, MA GZA File # 19707 Tested by: BB Date: 2/5/08 Reviewed by: MBP Date: 2/6/08

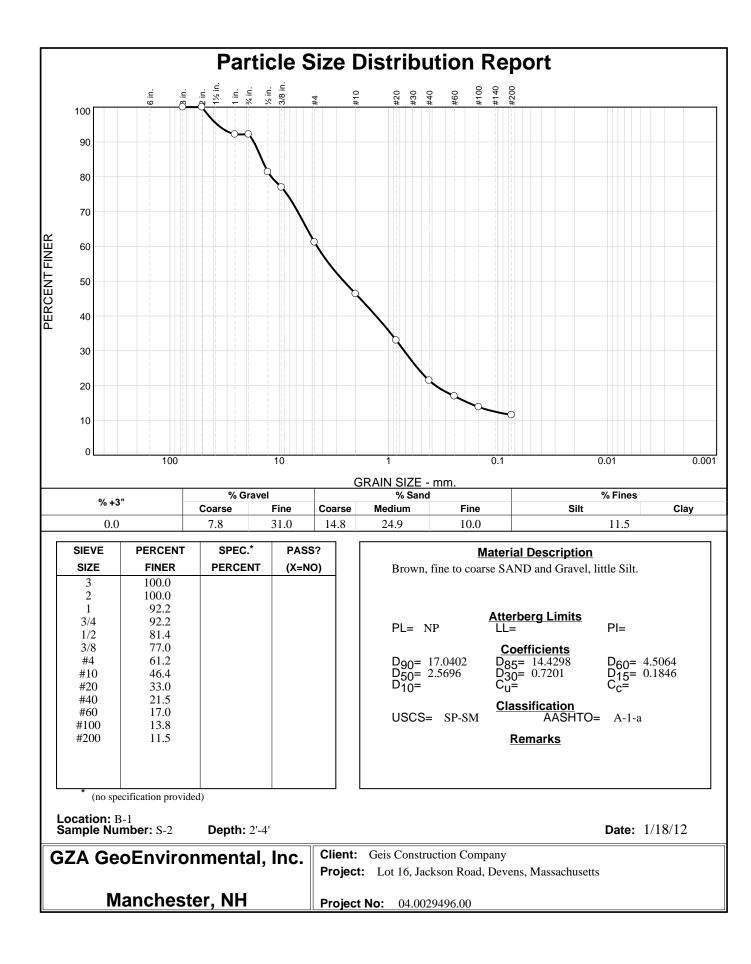


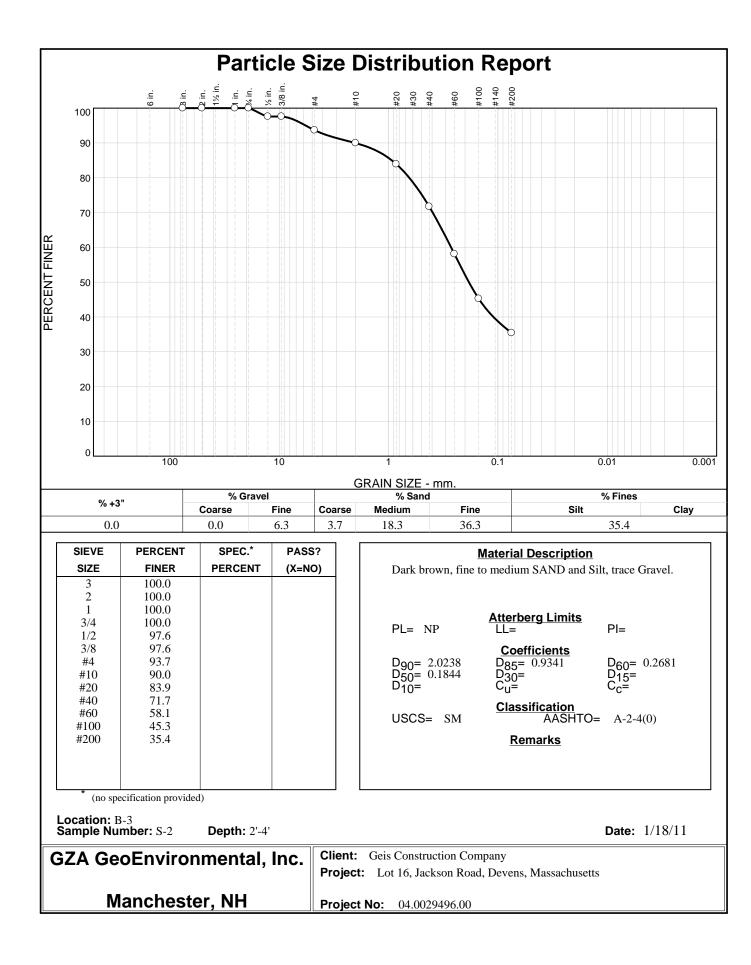
(F

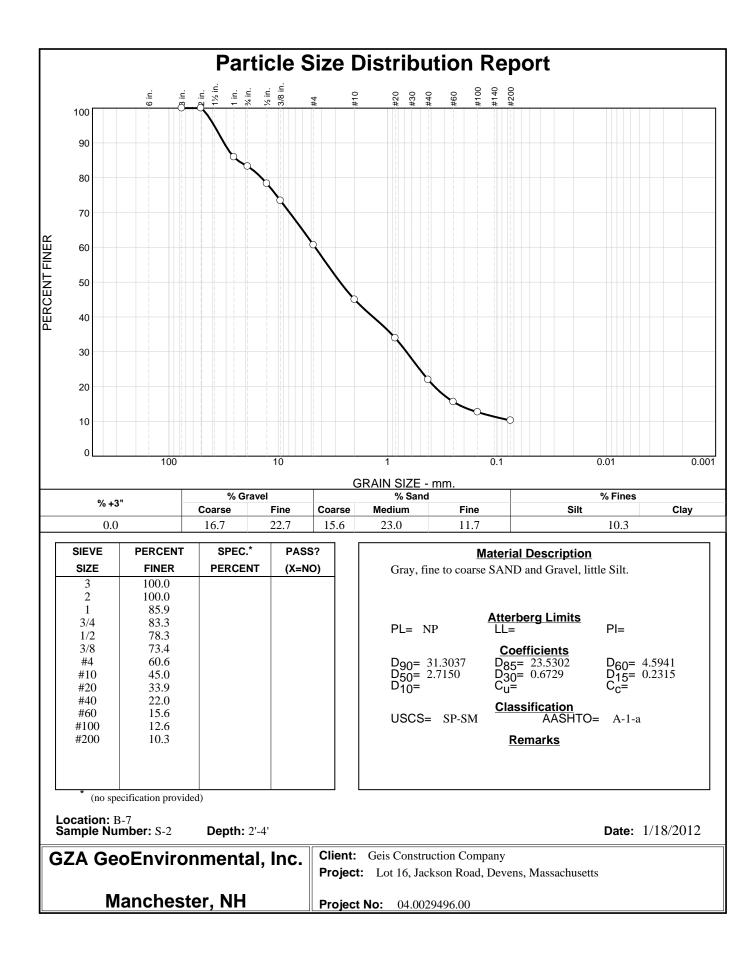


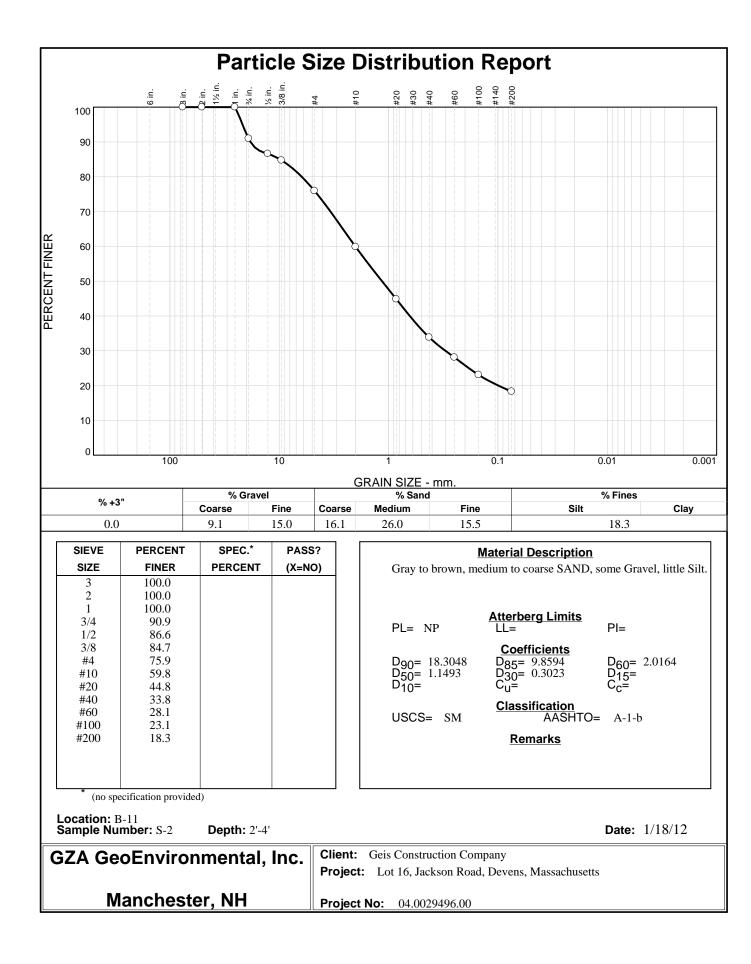


Appendix E.2 – 2012 Geotechnical Laboratory Results











Appendix E.3 – 2019 Geotechnical Laboratory Results

TUILICCU	195 Frances Avenue Cranston RI, 02910	Client Information: GZA GeoEnvironmental	Project Informa 45 Jackson Rd DD	
IMELSON	Phone: (401)-467-6454 Fax: (401)-467-2398	Norwood, MA PM: M. Ostrowski	Devens, M GZA Project Number: 0	
ENGINEERING	thielsch.com Let's Build a Solid Foundation	Assigned By: M. Ostrowski Collected By: G. Larose	Summary Page: Report Date:	1 of 1 11.22.19

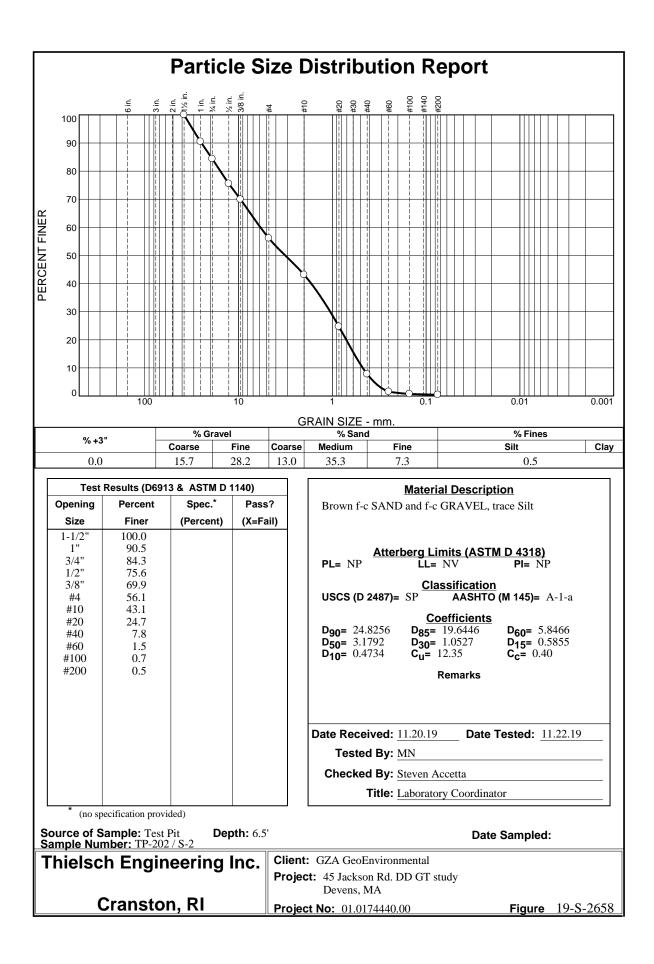
LABORATORY TESTING DATA SHEET, Report No.: 7419-L-163

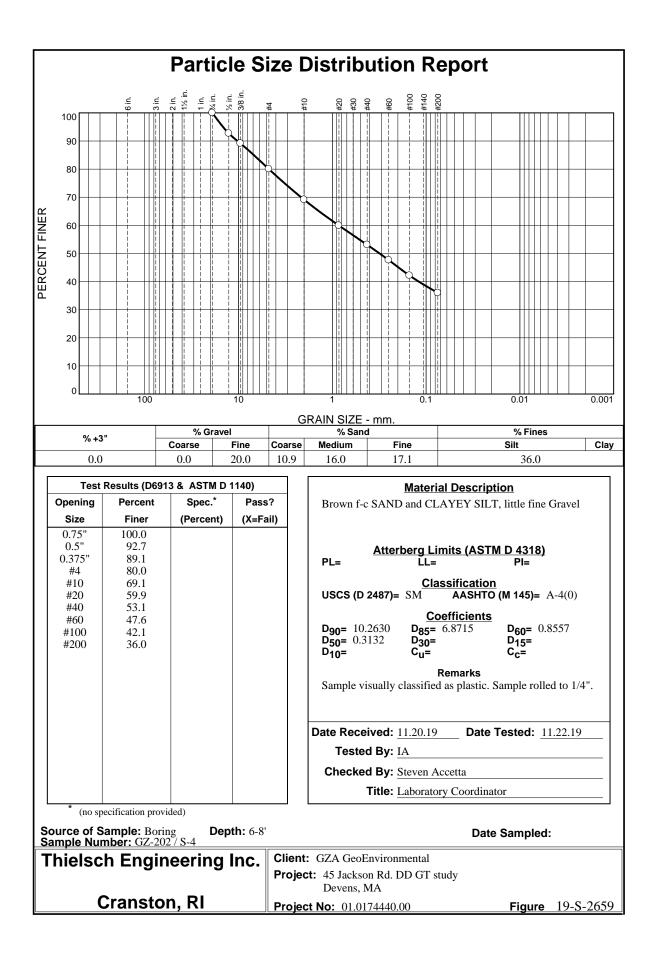
					Identification Tests															
Boring ID	Sample No.	Depth (Ft)	Laboratory No.	As Received Water Content %	LL %	PL %	Gravel %	Sand %	Fines %	Org. %	Gs	Dry unit wt. pcf	Test Water Content %	γ _d <u>MAX (pcf)</u> W _{opt} (%)	γ _d <u>MAX (pcf)</u> W _{opt} (%) (Corr.)	Target Test Setup as % of Proctor	CBR @ 0.1"	CBR @ 0.2"	Permeability cm/sec	Laboratory Log and Soil Description
				D2216	D4	318		D6913		D2974	D854			D1	557					
TP-202	S-2	6.5	19-S-2658				43.9	55.6	0.5											Brown f-c SAND and f-c GRAVEL, trace Silt
GZ-202	S-4	6-8	19-S-2659				20.0	44.0	36.0											Brown f-c SAND and CLAYEY SILT, little fine Gravel

Date Received: 11.20.19

Reviewed By: Sthe But

Date Reviewed: 11.26.19







Appendix E.4 – 2020 Geotechnical Laboratory Test Results

	195 Frances Avenue	Client Information:	Project Informa	tion:
	Cranston RI, 02910	GZA GeoEnvironmental	45 Jackson Re	bad
	Phone: (401)-467-6454	Norwood, MA	Devens, MA	L
	Fax: (401)-467-2398	PM: Michael Ostrowski	GZA Project Number: 0	1.017444.01
ENGINEERING	thielsch.com	Assigned By: Michael Ostrowski	Summary Page:	1 of 1
ENGINEERING	Let's Build a Solid Foundation	Collected By: L. Prohaske	Report Date:	09.28.2020

LABORATORY TESTING DATA SHEET, Report No.: 7420-J-175

						Ι	dentificat	ion Test	ts						Proctor / C	BR / Permea	bility Tests			
Boring	Sample No.	Depth (Ft)	Laboratory No.	As Received Water Content %	LL %	PL %	Gravel %	Sand %	Fines %	Org. %	Gs	Dry unit wt. pcf	Test Water Content %	γ_{d} <u>MAX</u> <u>(pcf)</u> W _{opt} (%)	$\begin{array}{c} \gamma_{d} \\ \underline{MAX} \\ \underline{(pcf)} \\ W_{opt} (\%) \\ (Corr.) \end{array}$	Target Test Setup as % of Proctor		CBR @ 0.2"	Permeability cm/sec	Laboratory Log and Soil Description
				D2216	D4	318		D6913		D2974	D854			D1	557					
GZ-301	S-3	4-6	20-S-2804				24.7	47.3	28.0											Brown f-c SAND, some Silt, some fine Gravel
GZ-302	S-3	4-6	20-8-2805				29.3	58.6	12.1											Brown f-c SAND, some f-c Gravel, little Silt
GZ-304	S-4	6-8	20-8-2806				39.2	51.7	9.1											Brown f-c SAND and f-c GRAVEL, trace Silt
GZ-307	S-2	2-4	20-S-2807				55.4	36.9	7.7											Brown fine GRAVEL and f-c SAND, trace Silt

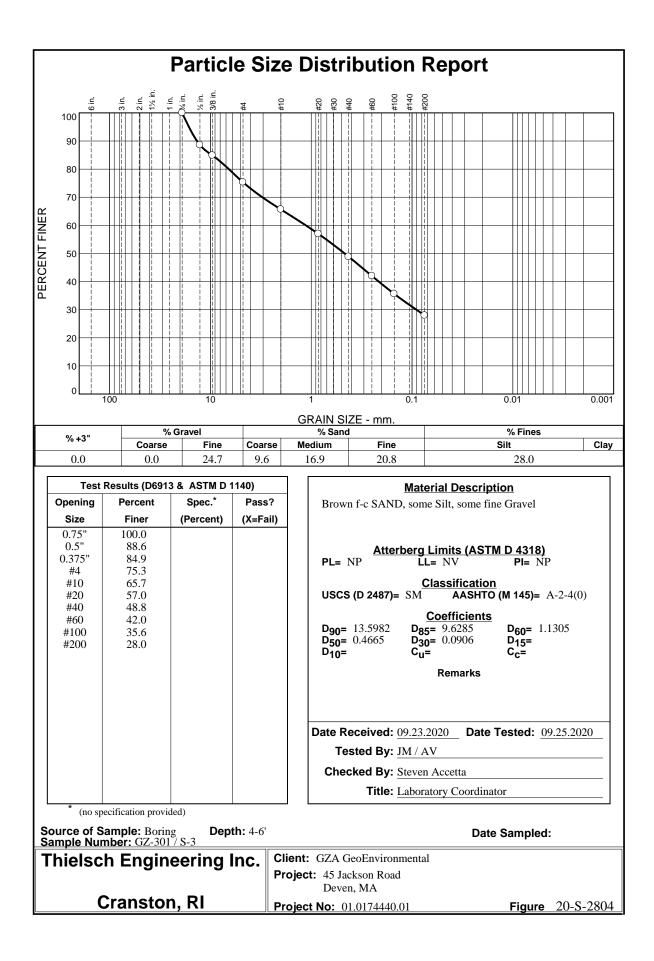
Date Received:

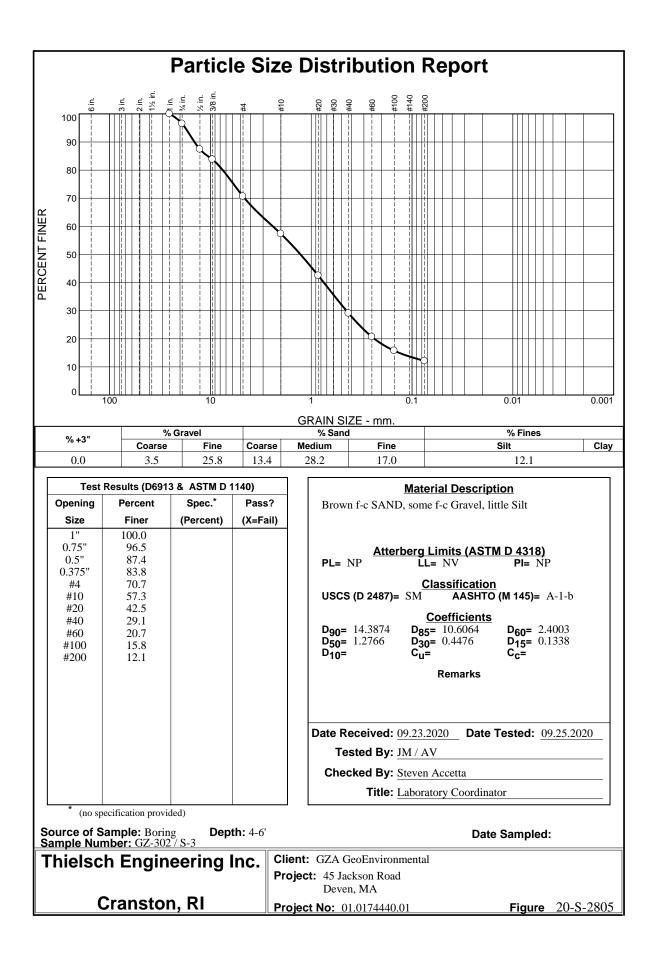
09.23.2020

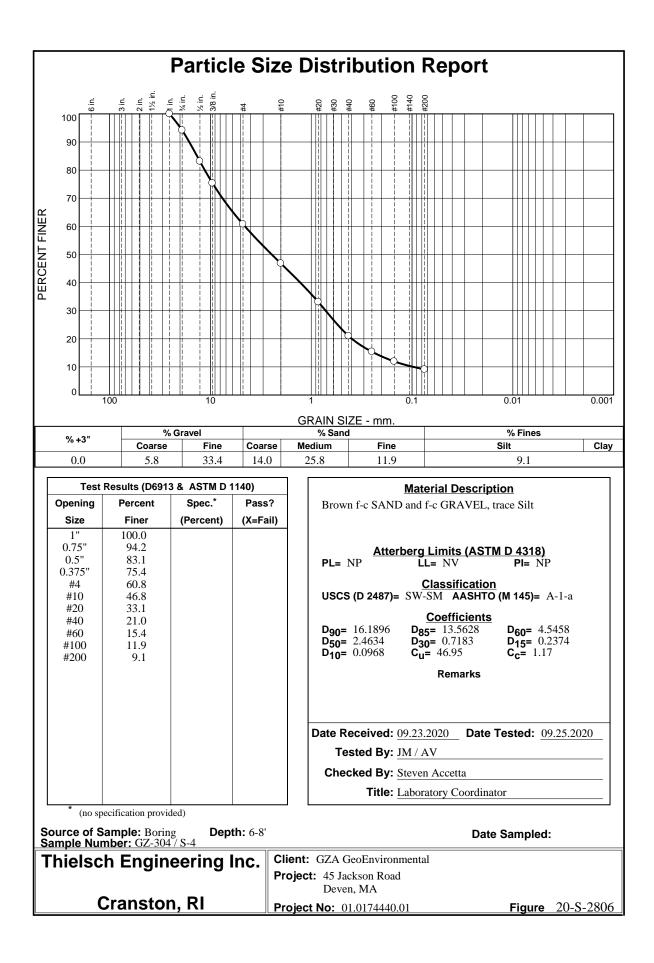
Reviewed By:

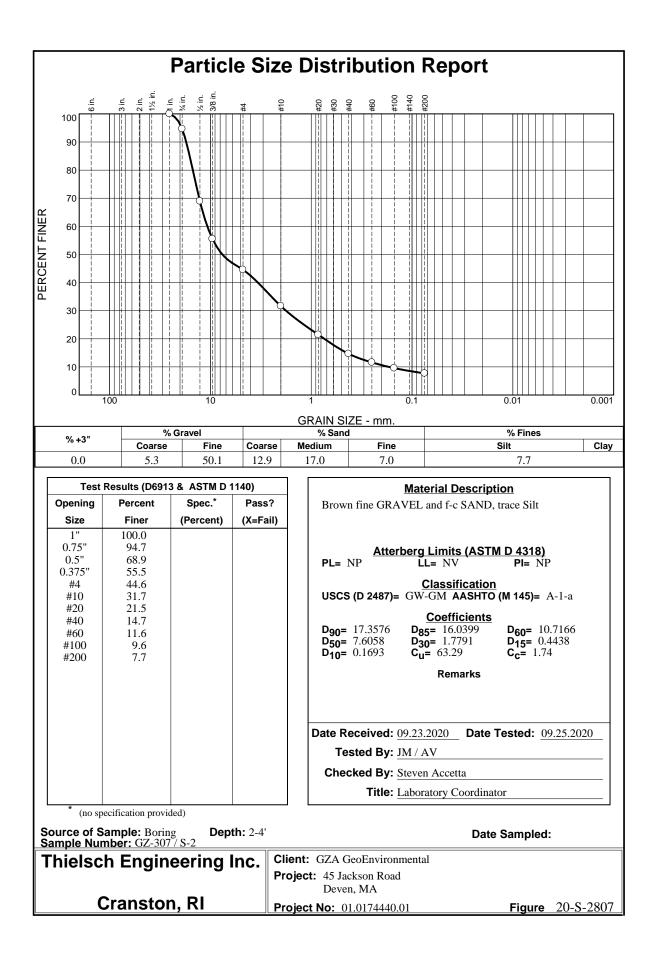
States -

Date Reviewed: 09.29.2020



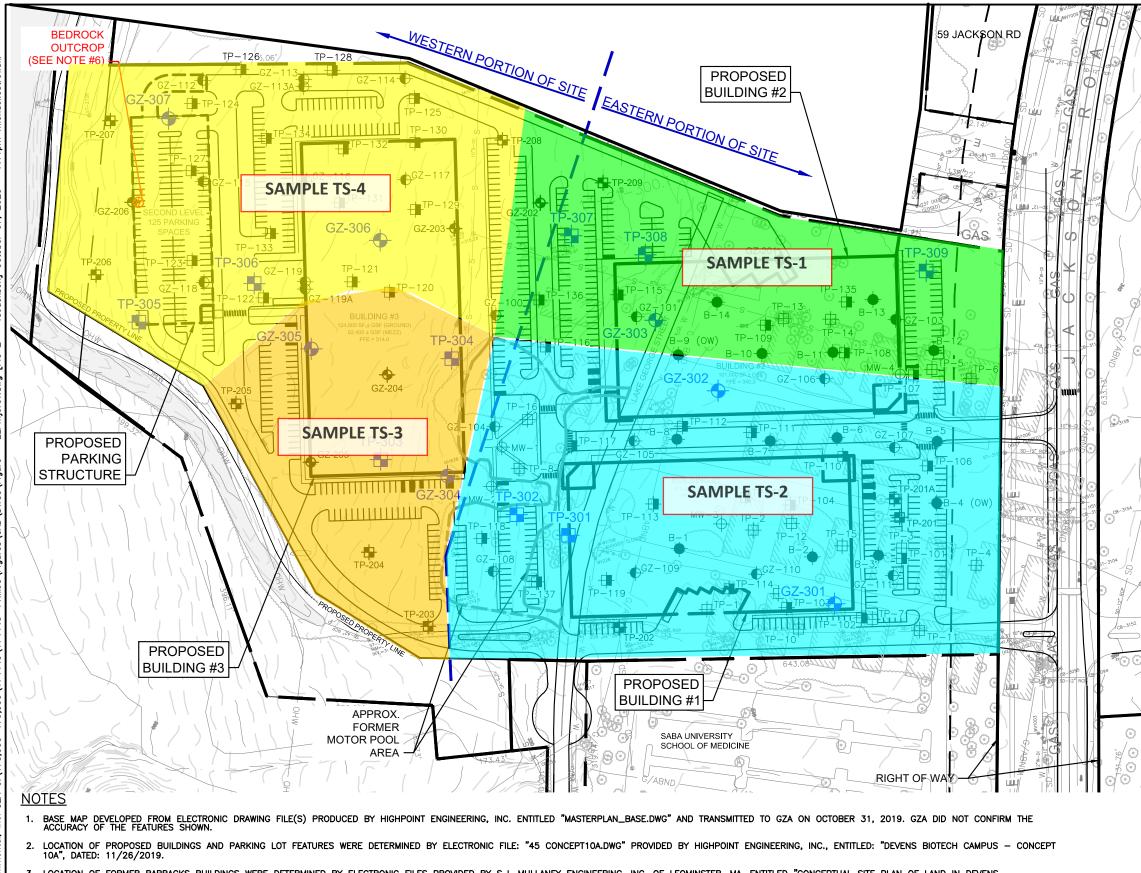








Appendix F – Topsoil Laboratory Test Results



- 3. LOCATION OF FORMER BARRACKS BUILDINGS WERE DETERMINED BY ELECTRONIC FILES PROVIDED BY S.J. MULLANEY ENGINEERING, INC. OF LEOMINSTER, MA, ENTITLED "CONCEPTUAL SITE PLAN OF LAND IN DEVENS, MASSACHUSETTS LOCATED AT LOT 16 – JACKSON ROAD, WITH A REVISION DATE OF JANUARY 8, 2008, AND A PLAN ENTITLED "SITE PLAN OF LAND IN DEVENS, MASSACHUSETTS LOCATED AT LOT 16A – JACKSON ROAD", PLAN NO. 80–D–5, DATED MARCH 6, 2008.
- 4. LOCATIONS OF THE 2020 EXPLORATIONS WERE APPROXIMATELY DETERMINED USING A TRIMBLE GEO7X GPS/GNSS DEVICE, HOWEVER TEST BORINGS GZ-302, GZ-305, AND GZ-306 WERE LOCATED USING TAPED MEASUREMENTS THE GPS-LOCATED STAKES. LOCATIONS OF THE 2019 EXPLORATIONS WERE APPROXIMATELY DETERMINED USING A TRIMBLE R1 HANDHELD WITH IPAD GPS/GNSS DEVICE. PREVIOUS EXPLORATIONS WERE LOCATED BASED ON LINE OF SIGHT AND FROM EXISTING TOPOGRAPHIC SITE FEATURES. THE EXPLORATION LOCATIONS SHOWN SHOULD BE CONSIDERED ACCURATE ONLY TO THE DEGREE IMPLIED BY THE METHOD USED.
- 5. PER MASSDEVELOPMENT THE ELEVATION DATUM IS REFERENCED TO NATIONAL GEODETIC VERTICAL DATUM OF 1929 (NGVD29).
- 6. BEDROCK OUTCROP LOCATION APPROXIMATED BASED ON TAPED MEASUREMENT FROM BORING GZ-206 AND IS NOT DEPICTED TO SCALE.

LEGEND

GZ-301

TP-301

0

GZ-201

TP-201

GZ-10

⊕

TP -

 \oplus

MW-1

75

0

B

INDICATES BORINGS PERFORMED BY DRILEX ENVIRONMENTAL OF AUBURN, MASSACHUSETTS FROM SEPTEMBER 10 TO 12, 2020 AND OBSERVED AND LOGGED BY GZA PERSONNEL.

INDICATES TEST PITS PERFORMED BY DRILEX ENVIRONMENTAL OF AUBURN, MASSACHUSETTS ON SEPTEMBER 17, 18, AND 21, 2020 AND OBSERVED AND LOGGED BY GZA PERSONNEL.

INDICATES BORINGS PERFORMED BY DRILEX ENVIRONMENTAL OF AUBURN, MASSACHUSETTS ON NOVEMBER 5, 2019 AND OBSERVED AND LOGGED BY GZA PERSONNEL.

INDICATES TEST PITS PERFORMED BY ANCHOR EXCAVATING CORPORATION OF HANOVER, MASSACHUSETTS ON NOVEMBER 14 AND 15, 2019 AND OBSERVED AND LOGGED BY GZA PERSONNEL.

- INDICATES BORINGS PERFORMED BY NEW HAMPSHIRE BORING, 10. OF DERRY, NEW HAMPSHIRE FROM JANUARY 12 -4(OW) THROUGH 16, 2012 AND OBSERVED AND LOGGED BY GZA PERSONNEL.

"(OW)" INDICATES MONITORING WELL INSTALLED IN BOREHOLE

INDICATES TEST PITS PERFORMED BY CROWLEY COMPANY FROM JANUARY 7 THROUGH 10, 2008 AND OBSERVED AND TP-101 LOGGED BY GZA PERSONNEL.

> INDICATES BORINGS PERFORMED BY NEW HAMPSHIRE BORING OF BROCKTON, MASSACHUSETTS FROM JANUARY 15 THROUGH 23, 2008 AND OBSERVED AND LOGGED BY GZA PERSONNEL.

> INDICATES TEST PITS PERFORMED BY CROWLEY COMPANY ON JANUARY 15, 2008 AND OBSERVED AND LOGGED BY GZA PERSONNEL.

INDICATES BORING/MONITORING WELL INSTALLED BY GEOSEARCH, INC, OF FITCHBURG, MASSACHUSETTS ON JANUARY 16 AND 17, 2008 AND OBSERVED AND LOGGED BY GZA PERSONNEL.

INDICATES APPROXIMATE FORMER BARRACKS BUILDING LOCATION

SCALE IN FEET INLESS SPECIFICALLY STATED BY WRITTEN AGREEMENT, THIS DRAWING IS THE SOLE PROPERTY OF ECOENVIRONMENTAL, INC. (GZA). THE INFORMATION SHOWN ON THE DRAWING IS SOLELY FOR USE BY GZ LIGHT OR THE OLCHEN'S DEGINATED REPRESENTATIVE FOR THE SPECIFIC PROVECT AND LOCATION IDENTIFIED HE DRAWING. THE DRAWING SHALL NOT BE TRANSFERRED, REUSED, COPIED, OR ALTERED IN ANY MANNER & AT ANY OTHER LOCATION OR FOR ANY OTHER PURPOSE WITHOUT THE PROC WRITEN CONSENT OF GZA.

150

SUPPLEMENTAL GEOTECHNICAL EVALUATION PROPOSED DEVELOPMENT 45 JACKSON ROAD DEVENS. MASSACHUSETTS

300

TOPSOIL SAMPLE SKETCH

PREPARED BY:		PREPARED FOR:					
Engineer	Environmental, Inc. s and Scientists w.gza.com	KING DEVENS LLC					
PROJ MGR: MJO	REVIEWED BY: MAR	CHECKED BY: TMK	FIGURE NO.				
DESIGNED BY: MJO	DRAWN BY: MJO / AJP	SCALE: AS SHOWN	F 4				
DATE:	PROJECT NO.	REVISION NO.					
OCTOBER 2020	01.0174440.01						

PLANT SCIENCE AND LANDSCAPE ARCHITECTURE

RESULTS REPORT

October 7th, 2020

Name:	Michael Ostrowski GZA GeoEnvironmental, Inc 249 Vanderbilt Avenue Norwood, MA 02062
Order Number:	13256
Lab Number:	MA20-426
Sample Name:	TS-1
	Textural Analysis Percentages are based on the Fine Earth Fraction (Less than 2mm)
Sand:	96.4 %
Silt:	1.8 %
Clay:	1.8 %
Sand: Silt:	Textural Analysis Percentages are based on the Fine Earth Fraction (Less than 2mm) 96.4 % 1.8 %

According to USDA criteria, this sample classifies as a **SAND**. Classification is based on particles that are sand size or finer (i.e. Less than 2 millimeters in diameter.)

Organic Matter

The organic matter as determined by loss on ignition is 2.3 %

University of Connecticut Soil Nutrient Analysis Laboratory 6 Sherman Place Unit 5102 Storrs, CT 06269-5102

Tel: (860) 486-4274 Fax: (860) 486-4562 Web: www.soiltest.uconn.edu

PLANT SCIENCE AND LANDSCAPE ARCHITECTURE

RESULTS REPORT

October 7th, 2020

Name:	Michael Ostrowski GZA GeoEnvironmental, Inc 249 Vanderbilt Avenue Norwood, MA 02062					
Order Number:	13256					
Lab Number:	MA20-427					
Sample Name:	TS-2					
	Textural Analysis Percentages are based on the Fine Earth Fraction (Less than 2mm)					
Sand:	86.4 %					
Silt:	12.0 %					
Clay:	1.6 %					

According to USDA criteria, this sample classifies as a **SAND**. Classification is based on particles that are sand size or finer (i.e. Less than 2 millimeters in diameter.)

Organic Matter

The organic matter as determined by loss on ignition is 1.5 %

University of Connecticut Soil Nutrient Analysis Laboratory 6 Sherman Place Unit 5102 Storrs, CT 06269-5102

Tel: (860) 486-4274 Fax: (860) 486-4562 Web: www.soiltest.uconn.edu

PLANT SCIENCE AND LANDSCAPE ARCHITECTURE

RESULTS REPORT

October 7th, 2020

Name:	Michael Ostrowski GZA GeoEnvironmental, Inc 249 Vanderbilt Avenue Norwood, MA 02062
Order Number:	13256
Lab Number:	MA20-428
Sample Name:	TS-3
	Textural Analysis Percentages are based on the Fine Earth Fraction (Less than 2mm)
Sand:	84.7 %
Silt:	15.0 %
Clay:	0.3 %

According to USDA criteria, this sample classifies as a **LOAMY SAND**. Classification is based on particles that are sand size or finer (i.e. Less than 2 millimeters in diameter.)

Organic Matter

The organic matter as determined by loss on ignition is 4.4 %

University of Connecticut Soil Nutrient Analysis Laboratory 6 Sherman Place Unit 5102 Storrs, CT 06269-5102 Tel: (860) 486-4274 Fax: (860) 486-4562 Web: www.soiltest.uconn.edu

PLANT SCIENCE AND LANDSCAPE ARCHITECTURE

RESULTS REPORT

October 7th, 2020

Name:	Michael Ostrowski GZA GeoEnvironmental, Inc 249 Vanderbilt Avenue Norwood, MA 02062
Order Number:	13256
Lab Number:	MA20-429
Sample Name:	TS-4
	Textural Analysis Percentages are based on the Fine Earth Fraction (Less than 2mm)
Sand:	71.7 %
Silt:	27.9 %
Clay:	0.4 %

According to USDA criteria, this sample classifies as a **LOAMY SAND**. Classification is based on particles that are sand size or finer (i.e. Less than 2 millimeters in diameter.)

Organic Matter

The organic matter as determined by loss on ignition is 6.0 %

University of Connecticut Soil Nutrient Analysis Laboratory 6 Sherman Place Unit 5102 Storrs, CT 06269-5102 Tel: (860) 486-4274 Fax: (860) 486-4562 Web: www.soiltest.uconn.edu



6 Sherman Place, Unit 5102, Union Cottage Storrs, CT 06269-5102 860-486-4274 www.soiltest.uconn.edu

Soil Test Report

Prepared For:

Michael Ostrowski GZA Environmental Inc. 249 Vanderbilt Avenue Norwood, MA 02062

michael.ostrowski@gza.com 781.603.5934

Results

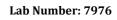
Nutrients Extracted From Your Soil (Modified Morgan)

Below Optimum Above Optimum Excessive* **Optimum** Calcium 744 lbs/acre Magnesium 82 lbs/acre **Phosphorus** 4 lbs/acre **Potassium** 72 lbs/acre * Excessive only defined for Phosphorus (>40 lbs/acre) Soil pH (1:1, H2O) 5.2 Element Soil Range in CT ppm Boron (B) 0.1 0.1 - 2.0 Est. Cation Exch. Capacity 8.0 0.2 0.3 - 0.8 (cmole + /100g)Copper (Cu) Iron (Fe) 8.2 1.0 - 40.0 Buffered pH (Mod. Mehlich) 6.1 Manganese (Mn) 3.1 3.0 - 20.0 2.5 0.1 - 70.0 Zinc (Zn) Sulfur (S) 11.7 10 - 100**Base Saturation** <u>%</u> **Suggested** 46.5 10 - 300 Aluminum (Al) Potassium 1 2.0 - 7.0Magnesium 4 10 - 30 Calcium 40 - 50 23 Est. Total Lead (Pb) low

Limestone & Fertilizer Recommendations for Needleleaf Trees & Shrubs

Limestone (Target pH of 6.0)

5 lbs / 100 sq ft





PLANT SCIENCE AND LANDSCAPE ARCHITECTURE

Order Number: 13256

Sample Information:

Sample Name:	TS-1
Lab Number:	7976
Area Sampled:	
Received:	9/30/2020
Reported:	10/7/2020

LIMESTONE:

Apply ground limestone as recommended to raise the soil pH. For new plantings, work the entire amount into the top 6 to 8 inches of soil before planting. For established beds, gently scratch in limestone into soil around plants. If more than 10 lbs of limestone per 100 sq. ft. is recommended, put one-half down now and the other half in a month or more. FERTILIZER:

Soil test values for both PHOSPHORUS and POTASSIUM are BELOW OPTIMUM.

Apply 1 pound of 5-10-10 or the equivalent from other sources per 100 square feet. See the SUGGESTED FERTILIZER PRACTICES TREES, SHRUBS, VINES AND GROUNDCOVERS fact sheet for instructions on how and when to add fertilizer.

If you have questions about this report or fertilizer recommendations, contact the UConn Soil Nutrient Analysis Lab at (860) 486-4274 or email soiltest@uconn.edu.

If you have questions about any other plant, pest or disease problems, contact the UConn HOME and GARDEN EDUCATION CENTER, Dept. of Plant Science and Landscape Architecture. Phone: (877) 486-6271; email:ladybug@uconn.edu; website:www.ladybug.uconn.edu.

Limestone & Fertilizer Recommendations for Deciduous Trees & Shrubs

Limestone (Target pH of 6.3)

10 lbs / 100 sq ft

Comments:

LIMESTONE:

Apply ground limestone as recommended to raise the soil pH. For new plantings, work the entire amount into the top 6 to 8 inches of soil before planting. For established beds, gently scratch in limestone into soil around plants. If more than 10 lbs of limestone per 100 sq. ft. is recommended, put one-half down now and the other half in a month or more.

FERTILIZER:

Soil test values for both PHOSPHORUS and POTASSIUM are BELOW OPTIMUM.

Apply 2 pounds (4 cups) of 5-10-10 or the equivalent from other sources per 100 square feet. See the SUGGESTED FERTILIZER PRACTICES FOR TREES, SHRUBS, VINES and GROUNDCOVERS fact sheet for instructions on how and when to add fertilizer.

If you have questions about this report or fertilizer recommendations, contact the UConn Soil Nutrient Analysis Lab at (860) 486-4274 or email soiltest@uconn.edu.

If you have questions about any other plant, pest or disease problems, contact the UConn HOME and GARDEN EDUCATION CENTER, Dept. of Plant Science and Landscape Architecture. Phone: (877) 486-6271; email:ladybug@uconn.edu; website:www.ladybug.uconn.edu.

Soil Test Interpretation and Recommendations	http://www.soiltest.uconn.edu/documents/interpretationofsoiltestresults6-2016.pdf
Fertilizer Practices for Lawns	http://www.soiltest.uconn.edu/documents/suggfertpraclawn6-16.pdf
Suggested Fertilizer Practices for Trees, Shrubs, Groundcovers & Vines Fertilizer Conversions & Garden Measurements	http://www.soiltest.uconn.edu/documents/SuggFertPracttreesshrubsvinesgroundcovers5-20 16.pdf http://www.soiltest.uconn.edu/documents/fertilizerandgardenmeasurements2-5-15.pdf

Soil Test Report

Prepared For:

Michael Ostrowski GZA Environmental Inc. 249 Vanderbilt Avenue Norwood, MA 02062

michael.ostrowski@gza.com 781.603.5934

Results

- An Easter Mandania A J T **T**7 Soil (Madified M

Order Number: 13256

Sample Information:

Sample Name:	TS-1
Lab Number:	7976
Area Sampled:	
Received:	9/30/2020
Reported:	10/7/2020

			Below Optin	num	Optimum	Above Optim	um Excessive*
Calcium	744 lbs/acre						
Magnesium	82 lbs/acre						
Phosphorus	4 lbs/acre						
Potassium	72 lbs/acre						
			*	Excessive only	defined for Phos	phorus (>40 lbs/	acre)
Soil pH (1:1, H	20)		5.2	<u>Element</u>	<u>t</u>	<u>ppm</u>	<u>Soil Range in CT</u>
Est. Cation Exch. Capacity			8.0 Boron (1		B)	0.1	0.1 - 2.0
(cmole+/100g)				Copper	(Cu)	0.2	0.3 - 0.8
Buffered pH (Mod.	Mehlich)		6.1 Iron (Fe)	8.2	1.0 - 40.0
				Mangan	ese (Mn)	3.1	3.0 - 20.0
				Zinc (Zr	ı)	2.5	0.1 - 70.0
Base Saturation		<u>%</u>	% <u>Suggested</u> Sulfur (S)	11.7	10 - 100
Potassium		1	2.0 - 7.0 Aluminum (Al)		ım (Al)	46.5	10 - 300
Magnesium		4	10 - 30				
Calcium		23	40 - 50	Est. Tota	al Lead (Pb)	low	

Limestone (Target pH of 6.6)

100 lbs / 1000 sq ft

LIMESTONE:

Incorporate any recommended ground limestone thoroughly into the top 6 inches of soil before seeding or sodding. Your magnesium level is low. Dolomitic limestone is recommended. FERTILIZER:

Soil test values for both PHOSPHORUS and POTASSIUM are BELOW OPTIMUM. Apply prior to seeding or sodding and before final grading, 10 lbs of 0-46-0 (triple superphosphate) or 20 lbs of 0-20-0 (superphosphate) or 134 lbs of 0-3-0 (rock phosphate) per 1000 sq ft and 5 lbs of 0-0-60 (potash) or 15 lbs 0-0-22 (sul-po-mag) per 1000 sq ft. Incorporate the fertilizers into the top 4 to 6 inches of soil.

After final grading, if seeding, apply 20 lbs of 5-10-10 or 10 lbs of 10-20-20 or 25 lbs of 4-3-4 per 1000 sq ft. Mix into the soil surface with the seed. If sodding, apply to the soil surface 10 lbs of 10-10-10, 25 lbs of 4-3-4 or 20 lbs of 5-4-3 per 1000 sq ft after final grading and before sod placement.

In future years, follow the fertilizer suggestions on the SUGESTED FERTILIZER PRACTICES FOR LAWNS fact sheet or retest the soil (at least three months after an application of fertilizer) for current recommendations.

If you have questions about this report or fertilizer recommendations, contact the UConn Soil Nutrient Analysis Lab at (860) 486-4274 or email soiltest@uconn.edu.

If you have questions about any other plant, pest or disease problems, contact the UConn HOME and GARDEN EDUCATION CENTER, Dept. of Plant Science and Landscape Architecture. Phone: (877) 486-6271; email:ladybug@uconn.edu; website:www.ladybug.uconn.edu.

http://www.soiltest.uconn.edu/documents/interpretationofsoiltestresults6-2016.pdf
http://www.soiltest.uconn.edu/documents/suggfertpraclawn6-16.pdf
http://www.soiltest.uconn.edu/documents/SuggFertPracttreesshrubsvinesgroundcovers5-20 16.pdf
http://www.soiltest.uconn.edu/documents/fertilizerandgardenmeasurements2-5-15.pdf



6 Sherman Place, Unit 5102, Union Cottage Storrs, CT 06269-5102 860-486-4274 www.soiltest.uconn.edu



Prepared For:

Michael Ostrowski GZA Environmental Inc. 249 Vanderbilt Avenue Norwood, MA 02062

michael.ostrowski@gza.com 781.603.5934

Results

Nutrients Extracted From Your Soil (Modified Morgan)

		Below Optir	num	Optimum	Above Optimu	m Excessive*
Calcium 283 lbs/acre	2					
Magnesium 30 lbs/acro	e					
Phosphorus 7 lbs/acro	2					
Potassium 49 lbs/acro	e					
		*	Excessive only a	defined for Phos	phorus (>40 lbs/a	cre)
Soil pH (1:1, H2O)		4.9	<u>Element</u>		<u>ppm</u>	<u>Soil Range in CT</u>
Est. Cation Exch. Capacity		7.4	7.4 Boron (B)		0.0	0.1 - 2.0
(cmole+/100g)			Copper (Cu)	0.3	0.3 - 0.8
Buffered pH (Mod. Mehlich)		6.0	Iron (Fe)		19.5	1.0 - 40.0
			Mangane	se (Mn)	3.1	3.0 - 20.0
			Zinc (Zn))	2.0	0.1 - 70.0
Base Saturation	<u>%</u>	Suggested	Sulfur (S))	9.1	10 - 100
Potassium	1	2.0 - 7.0	Aluminu	m (Al)	82.9	10 - 300
Magnesium	2	10 - 30		•		
Calcium	10	40 - 50	Est. Total	l Lead (Pb)	low	

Limestone & Fertilizer Recommendations for Needleleaf Trees & Shrubs

Limestone (Target pH of 6.0)

8 lbs / 100 sq ft



PLANT SCIENCE AND LANDSCAPE ARCHITECTURE

Order Number: 13256

Sample Information:

Sample Name:	TS-2
Lab Number:	7977
Area Sampled:	
Received:	9/30/2020
Reported:	10/7/2020

LIMESTONE:

Apply ground limestone as recommended to raise the soil pH. For new plantings, work the entire amount into the top 6 to 8 inches of soil before planting. For established beds, gently scratch in limestone into soil around plants. If more than 10 lbs of limestone per 100 sq. ft. is recommended, put one-half down now and the other half in a month or more. FERTILIZER:

Soil test values for both PHOSPHORUS and POTASSIUM are BELOW OPTIMUM.

Apply 1 pound of 5-10-10 or the equivalent from other sources per 100 square feet. See the SUGGESTED FERTILIZER PRACTICES TREES, SHRUBS, VINES AND GROUNDCOVERS fact sheet for instructions on how and when to add fertilizer.

If you have questions about this report or fertilizer recommendations, contact the UConn Soil Nutrient Analysis Lab at (860) 486-4274 or email soiltest@uconn.edu.

If you have questions about any other plant, pest or disease problems, contact the UConn HOME and GARDEN EDUCATION CENTER, Dept. of Plant Science and Landscape Architecture. Phone: (877) 486-6271; email:ladybug@uconn.edu; website:www.ladybug.uconn.edu.

Limestone & Fertilizer Recommendations for Deciduous Trees & Shrubs

Limestone (Target pH of 6.3)

13 lbs / 100 sq ft

Comments:

LIMESTONE:

Apply ground limestone as recommended to raise the soil pH. For new plantings, work the entire amount into the top 6 to 8 inches of soil before planting. For established beds, gently scratch in limestone into soil around plants. If more than 10 lbs of limestone per 100 sq. ft. is recommended, put one-half down now and the other half in a month or more.

FERTILIZER:

Soil test values for both PHOSPHORUS and POTASSIUM are BELOW OPTIMUM.

Apply 2 pounds (4 cups) of 5-10-10 or the equivalent from other sources per 100 square feet. See the SUGGESTED FERTILIZER PRACTICES FOR TREES, SHRUBS, VINES and GROUNDCOVERS fact sheet for instructions on how and when to add fertilizer.

If you have questions about this report or fertilizer recommendations, contact the UConn Soil Nutrient Analysis Lab at (860) 486-4274 or email soiltest@uconn.edu.

If you have questions about any other plant, pest or disease problems, contact the UConn HOME and GARDEN EDUCATION CENTER, Dept. of Plant Science and Landscape Architecture. Phone: (877) 486-6271; email:ladybug@uconn.edu; website:www.ladybug.uconn.edu.

Soil Test Interpretation and Recommendations	http://www.soiltest.uconn.edu/documents/interpretationofsoiltestresults6-2016.pdf
Fertilizer Practices for Lawns	http://www.soiltest.uconn.edu/documents/suggfertpraclawn6-16.pdf
Suggested Fertilizer Practices for Trees, Shrubs, Groundcovers & Vines Fertilizer Conversions & Garden Measurements	http://www.soiltest.uconn.edu/documents/SuggFertPracttreesshrubsvinesgroundcovers5-20 16.pdf http://www.soiltest.uconn.edu/documents/fertilizerandgardenmeasurements2-5-15.pdf

Soil Test Report

Prepared For:

Michael Ostrowski GZA Environmental Inc. 249 Vanderbilt Avenue Norwood, MA 02062

michael.ostrowski@gza.com 781.603.5934

Results

T7 Soil (Modified M

Order Number: 13256

Sample Information:

Sample Name:	TS-2
Lab Number:	7977
Area Sampled:	
Received:	9/30/2020
Reported:	10/7/2020

			Below Opti	mum	Optimum	Above Optim	um Excessive*
Calcium	283 lbs/acre						
Magnesium	30 lbs/acre						
Phosphorus	7 lbs/acre						
Potassium	49 lbs/acre						
			*	Excessive only	defined for Phos	phorus (>40 lbs/	(acre)
Soil pH (1:1, H2O)			4.9	<u>Element</u>		<u>ppm</u>	<u>Soil Range in CT</u>
Est. Cation Exch. Capacity			7.4 Boron ()	0.0	0.1 - 2.0
(cmole+/100g)				Copper (Cu)	0.3	0.3 - 0.8
Buffered pH (Mod	. Mehlich)		6.0	Iron (Fe)		19.5	1.0 - 40.0
				Mangane	se (Mn)	3.1	3.0 - 20.0
				Zinc (Zn))	2.0	0.1 - 70.0
Base Saturation		<u>%</u>	Suggested	Sulfur (S)		9.1	10 - 100
Potassium		1	2.0 - 7.0	Aluminum (Al) 82		82.9	10 - 300
Magnesium		2	10 - 30				
Calcium		10	40 - 50	Est. Tota	l Lead (Pb)	low	

Limestone (Target pH of 6.6)

125 lbs / 1000 sq ft

LIMESTONE:

Incorporate any recommended ground limestone thoroughly into the top 6 inches of soil before seeding or sodding. Your magnesium level is low. Dolomitic limestone is recommended. FERTILIZER:

Soil test POTASSIUM values are BELOW OPTIMUM. Apply prior to seeding or sodding and before final grading, 5 lbs of 0-0-60 (potash) or 15 lbs 0-0-22 (sul-po-mag) per 1000 sq ft. Incorporate the potassium fertilizer into the top 4 to 6 inches of soil.

After final grading, if seeding apply 20 lbs of 5-10-10 or 10 lbs of 10-20-20 or 25 lbs of 4-1-4 or 4-3-4 per 1000 sq ft, or the equivalent, and mix into the soil surface with the seed. If sodding, apply to the soil surface 10 lbs of 10-10-10 or 25 lbs of 4-3-4 or 20 lbs of 5-4-3 per 1000 sq ft after final grading but before sod placement.

In future years, follow the fertilizer suggestions on the SUGGESTED FERTILIZER PRACTICES FOR LAWNS fact sheet or retest the soil (at least three months after an application of fertilizer) for current recommendations.

If you have questions about this report or fertilizer recommendations, contact the UConn Soil Nutrient Analysis Lab at (860) 486-4274 or email soiltest@uconn.edu.

If you have questions about any other plant, pest or disease problems, contact the UConn HOME and GARDEN EDUCATION CENTER, Dept. of Plant Science and Landscape Architecture. Phone: (877) 486-6271; email:ladybug@uconn.edu; website:www.ladybug.uconn.edu.

Soil Test Interpretation and Recommendations	http://www.soiltest.uconn.edu/documents/interpretationofsoiltestresults6-2016.pdf
Fertilizer Practices for Lawns	http://www.soiltest.uconn.edu/documents/suggfertpraclawn6-16.pdf
Suggested Fertilizer Practices for Trees, Shrubs, Groundcovers & Vines	http://www.soiltest.uconn.edu/documents/SuggFertPracttreesshrubsvinesgroundcovers5-20 16.pdf
Fertilizer Conversions & Garden Measurements	http://www.soiltest.uconn.edu/documents/fertilizerandgardenmeasurements2-5-15.pdf

UConn Soil Nutrient Analysis Laboratory

6 Sherman Place, Unit 5102, Union Cottage Storrs, CT 06269-5102 860-486-4274 www.soiltest.uconn.edu

Soil Test Report

Prepared For:

Michael Ostrowski GZA Environmental Inc. 249 Vanderbilt Avenue Norwood, MA 02062

michael.ostrowski@gza.com 781.603.5934

Results

Nutrients Extracted From Your Soil (Modified Morgan)

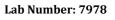
			Below Optin	num	Optimum	Above Optimu	Im Excessive*
Calcium	514 lbs/acre						
Magnesium	66 lbs/acre						
Phosphorus	4 lbs/acre						
Potassium	87 lbs/acre						
		1	*	Excessive only	y defined for Phos	phorus (>40 lbs/a	ucre)
Soil pH (1:1, H2	20)		4.7	<u>Elemen</u>	<u>t</u>	<u>ppm</u>	<u>Soil Range in CT</u>
Est. Cation Exch. Capacity			13.2	13.2 Boron (B)		0.1	0.1 - 2.0
(cmole+/100g)	1 2			Copper	(Cu)	0.2	0.3 - 0.8
Buffered pH (Mod.	Mehlich)		5.6	Iron (Fe	e)	14.3	1.0 - 40.0
I X	,			Mangar	nese (Mn)	5.9	3.0 - 20.0
				Zinc (Zi	n)	3.1	0.1 - 70.0
<u>Base Saturation</u>		<u>%</u>	Suggested	Sulfur (S)	13.3	10 - 100
Potassium		1	2.0 - 7.0	Alumin	um (Al)	117.9	10 - 300
Magnesium		2	10 - 30				
Calcium		10	40 - 50	Est. Tot	al Lead (Pb)	low	

Limestone & Fertilizer Recommendations for Needleleaf Trees & Shrubs

Limestone (Target pH of 6.0)

18 lbs / 100 sq ft







PLANT SCIENCE AND LANDSCAPE ARCHITECTURE

Order Number: 13256

Sample Information:

Sample Name:	TS-3
Lab Number:	7978
Area Sampled:	
Received:	9/30/2020
Reported:	10/7/2020

LIMESTONE:

Apply ground limestone as recommended to raise the soil pH. For new plantings, work the entire amount into the top 6 to 8 inches of soil before planting. For established beds, gently scratch in limestone into soil around plants. If more than 10 lbs of limestone per 100 sq. ft. is recommended, put one-half down now and the other half in a month or more. FERTILIZER:

Soil test values for both PHOSPHORUS and POTASSIUM are BELOW OPTIMUM.

Apply 1 pound of 5-10-10 or the equivalent from other sources per 100 square feet. See the SUGGESTED FERTILIZER PRACTICES TREES, SHRUBS, VINES AND GROUNDCOVERS fact sheet for instructions on how and when to add fertilizer.

If you have questions about this report or fertilizer recommendations, contact the UConn Soil Nutrient Analysis Lab at (860) 486-4274 or email soiltest@uconn.edu.

If you have questions about any other plant, pest or disease problems, contact the UConn HOME and GARDEN EDUCATION CENTER, Dept. of Plant Science and Landscape Architecture. Phone: (877) 486-6271; email:ladybug@uconn.edu; website:www.ladybug.uconn.edu.

Limestone & Fertilizer Recommendations for Deciduous Trees & Shrubs

Limestone (Target pH of 6.3)

23 lbs / 100 sq ft

Comments:

LIMESTONE:

Apply ground limestone as recommended to raise the soil pH. For new plantings, work the entire amount into the top 6 to 8 inches of soil before planting. For established beds, gently scratch in limestone into soil around plants. If more than 10 lbs of limestone per 100 sq. ft. is recommended, put one-half down now and the other half in a month or more.

FERTILIZER:

Soil test values for both PHOSPHORUS and POTASSIUM are BELOW OPTIMUM.

Apply 2 pounds (4 cups) of 5-10-10 or the equivalent from other sources per 100 square feet. See the SUGGESTED FERTILIZER PRACTICES FOR TREES, SHRUBS, VINES and GROUNDCOVERS fact sheet for instructions on how and when to add fertilizer.

If you have questions about this report or fertilizer recommendations, contact the UConn Soil Nutrient Analysis Lab at (860) 486-4274 or email soiltest@uconn.edu.

If you have questions about any other plant, pest or disease problems, contact the UConn HOME and GARDEN EDUCATION CENTER, Dept. of Plant Science and Landscape Architecture. Phone: (877) 486-6271; email:ladybug@uconn.edu; website:www.ladybug.uconn.edu.

Soil Test Interpretation and Recommendations	http://www.soiltest.uconn.edu/documents/interpretationofsoiltestresults6-2016.pdf
Fertilizer Practices for Lawns	http://www.soiltest.uconn.edu/documents/suggfertpraclawn6-16.pdf
Suggested Fertilizer Practices for Trees, Shrubs, Groundcovers & Vines Fertilizer Conversions & Garden Measurements	http://www.soiltest.uconn.edu/documents/SuggFertPracttreesshrubsvinesgroundcovers5-20 16.pdf http://www.soiltest.uconn.edu/documents/fertilizerandgardenmeasurements2-5-15.pdf

Soil Test Report

Prepared For:

Michael Ostrowski GZA Environmental Inc. 249 Vanderbilt Avenue Norwood, MA 02062

michael.ostrowski@gza.com 781.603.5934

Results

Masteriante Faster astad Fa Sail (Madified M **T**7

Order Number: 13256

Sample Information:

Sample Name:	TS-3
Lab Number:	7978
Area Sampled:	
Received:	9/30/2020
Reported:	10/7/2020

			Below Optimum		Optimum	Above Optim	um Excessive*
Calcium Magnesium	514 lbs/acre 66 lbs/acre						
Phosphorus	4 lbs/acre						
Potassium	87 lbs/acre						
			*	Excessive only	defined for Phos	phorus (>40 lbs/	acre)
Soil pH (1:1, H2O)			4.7	<u>Element</u>		<u>ppm</u>	<u>Soil Range in CT</u>
Est. Cation Exch. Capacity (cmole+/100g)			13.2	Boron (E	Boron (B)		0.1 - 2.0
			Co		Cu)	0.2	0.3 - 0.8
Buffered pH (Mod. Mehlich)			5.6	Iron (Fe)		14.3	1.0 - 40.0
				Mangane	ese (Mn)	5.9	3.0 - 20.0
				Zinc (Zn)	3.1	0.1 - 70.0
Base Saturation		<u>%</u>	<u>Suggested</u>	Sulfur (S)		13.3	10 - 100
Potassium		1	2.0 - 7.0 Alumin		m (Al)	117.9	10 - 300
Magnesium		2	10 - 30				
Calcium 1		10	0 40 - 50 Est. T		l Lead (Pb)	low	

Limestone (Target pH of 6.6)

225 lbs / 1000 sq ft

LIMESTONE:

Incorporate any recommended ground limestone thoroughly into the top 6 inches of soil before seeding or sodding. Your magnesium level is low. Dolomitic limestone is recommended. FERTILIZER:

Soil test values for both PHOSPHORUS and POTASSIUM are BELOW OPTIMUM. Apply prior to seeding or sodding and before final grading, 10 lbs of 0-46-0 (triple superphosphate) or 20 lbs of 0-20-0 (superphosphate) or 134 lbs of 0-3-0 (rock phosphate) per 1000 sq ft and 5 lbs of 0-0-60 (potash) or 15 lbs 0-0-22 (sul-po-mag) per 1000 sq ft. Incorporate the fertilizers into the top 4 to 6 inches of soil.

After final grading, if seeding, apply 20 lbs of 5-10-10 or 10 lbs of 10-20-20 or 25 lbs of 4-3-4 per 1000 sq ft. Mix into the soil surface with the seed. If sodding, apply to the soil surface 10 lbs of 10-10-10, 25 lbs of 4-3-4 or 20 lbs of 5-4-3 per 1000 sq ft after final grading and before sod placement.

In future years, follow the fertilizer suggestions on the SUGESTED FERTILIZER PRACTICES FOR LAWNS fact sheet or retest the soil (at least three months after an application of fertilizer) for current recommendations.

If you have questions about this report or fertilizer recommendations, contact the UConn Soil Nutrient Analysis Lab at (860) 486-4274 or email soiltest@uconn.edu.

If you have questions about any other plant, pest or disease problems, contact the UConn HOME and GARDEN EDUCATION CENTER, Dept. of Plant Science and Landscape Architecture. Phone: (877) 486-6271; email:ladybug@uconn.edu; website:www.ladybug.uconn.edu.

Soil Test Interpretation and Recommendations	http://www.soiltest.uconn.edu/documents/interpretationofsoiltestresults6-2016.pdf
Fertilizer Practices for Lawns	http://www.soiltest.uconn.edu/documents/suggfertpraclawn6-16.pdf
Suggested Fertilizer Practices for Trees, Shrubs, Groundcovers & Vines	http://www.soiltest.uconn.edu/documents/SuggFertPracttreesshrubsvinesgroundcovers5-20 16.pdf
Fertilizer Conversions & Garden Measurements	http://www.soiltest.uconn.edu/documents/fertilizerandgardenmeasurements2-5-15.pdf



6 Sherman Place, Unit 5102, Union Cottage Storrs, CT 06269-5102 860-486-4274 www.soiltest.uconn.edu



Prepared For:

Michael Ostrowski GZA Environmental Inc. 249 Vanderbilt Avenue Norwood, MA 02062

michael.ostrowski@gza.com 781.603.5934

Results

Nutrients Extracted From Your Soil (Modified Morgan)

			Below Optim	um	Optimum	Above Optimu	Im Excessive*
Calcium 2	07 lbs/acre						
Magnesium	56 lbs/acre						
Phosphorus	4 lbs/acre						
Potassium	82 lbs/acre						
			* <i>E</i>	Excessive only	y defined for Phos	ohorus (>40 lbs/c	ucre)
Soil pH (1:1, H2O)			4.3	<u>Element</u>		<u>ppm</u>	<u>Soil Range in CT</u>
Est. Cation Exch. Capacity			15.7	Boron (B)		0.0	0.1 - 2.0
(cmole+/100g)			Copper		(Cu)	0.1	0.3 - 0.8
Buffered pH (Mod. Mehlich)		5.4 Ir		Iron (Fe	2)	43.7	1.0 - 40.0
• •	,			Mangan	ese (Mn)	9.1	3.0 - 20.0
				Zinc (Zi	n)	2.1	0.1 - 70.0
Base Saturation		<u>%</u>	<u>6 Suggested</u> Sulfur (S)	22.6	10 - 100
Potassium		1	2.0 - 7.0	Aluminum (Al)		239.1	10 - 300
Magnesium		1	10 - 30				
-		3	40 - 50	Est. Tot	al Lead (Pb)	low	

Limestone & Fertilizer Recommendations for Needleleaf Trees & Shrubs

Limestone (Target pH of 6.0)

25 lbs / 100 sq ft



PLANT SCIENCE AND LANDSCAPE ARCHITECTURE

Order Number: 13256

Sample Information:

TS-4
7979
9/30/2020
10/7/2020

LIMESTONE:

Apply ground limestone as recommended to raise the soil pH. For new plantings, work the entire amount into the top 6 to 8 inches of soil before planting. For established beds, gently scratch in limestone into soil around plants. If more than 10 lbs of limestone per 100 sq. ft. is recommended, put one-half down now and the other half in a month or more.

Your soil pH is very low! Select plants adapted to very acid soils or apply limestone as directed. FERTILIZER: Soil test values for both PHOSPHORUS and POTASSIUM are BELOW OPTIMUM.

Apply 1 pound of 5-10-10 or the equivalent from other sources per 100 square feet. See the SUGGESTED FERTILIZER PRACTICES TREES, SHRUBS, VINES AND GROUNDCOVERS fact sheet for instructions on how and when to add fertilizer.

If you have questions about this report or fertilizer recommendations, contact the UConn Soil Nutrient Analysis Lab at (860) 486-4274 or email soiltest@uconn.edu.

If you have questions about any other plant, pest or disease problems, contact the UConn HOME and GARDEN EDUCATION CENTER, Dept. of Plant Science and Landscape Architecture. Phone: (877) 486-6271; email:ladybug@uconn.edu; website:www.ladybug.uconn.edu.

Limestone & Fertilizer Recommendations for Deciduous Trees & Shrubs

Limestone (Target pH of 6.3)

30 lbs / 100 sq ft

Comments:

LIMESTONE:

Apply ground limestone as recommended to raise the soil pH. For new plantings, work the entire amount into the top 6 to 8 inches of soil before planting. For established beds, gently scratch in limestone into soil around plants. If more than 10 lbs of limestone per 100 sq. ft. is recommended, put one-half down now and the other half in a month or more.

Your soil pH is very low! Select plants adapted to very acid soils or apply limestone as directed. FERTILIZER: Soil test values for both PHOSPHORUS and POTASSIUM are BELOW OPTIMUM.

Soil test values for both PHOSPHORUS and POTASSIUM are BELOW OPTIMUM.

Apply 2 pounds (4 cups) of 5-10-10 or the equivalent from other sources per 100 square feet. See the SUGGESTED FERTILIZER PRACTICES FOR TREES, SHRUBS, VINES and GROUNDCOVERS fact sheet for instructions on how and when to add fertilizer.

If you have questions about this report or fertilizer recommendations, contact the UConn Soil Nutrient Analysis Lab at (860) 486-4274 or email soiltest@uconn.edu.

If you have questions about any other plant, pest or disease problems, contact the UConn HOME and GARDEN EDUCATION CENTER, Dept. of Plant Science and Landscape Architecture. Phone: (877) 486-6271; email:ladybug@uconn.edu; website:www.ladybug.uconn.edu.

<u>References (Crop Related):</u>

Soil Test Interpretation and Recommendations	http://www.soiltest.uconn.edu/documents/interpretationofsoiltestresults6-2016.pdf
Fertilizer Practices for Lawns	http://www.soiltest.uconn.edu/documents/suggfertpraclawn6-16.pdf
Suggested Fertilizer Practices for Trees, Shrubs, Groundcovers & Vines	$\underline{http://www.soiltest.uconn.edu/documents/SuggFertPracttreesshrubsvinesgroundcovers 5-20} \\ \underline{16.pdf}$
Fertilizer Conversions & Garden Measurements	http://www.soiltest.uconn.edu/documents/fertilizerandgardenmeasurements2-5-15.pdf

Soil Test Report

Prepared For:

Michael Ostrowski GZA Environmental Inc. 249 Vanderbilt Avenue Norwood, MA 02062

michael.ostrowski@gza.com 781.603.5934

Results

Faster a stad Fa Sail (Madified M Mandania . **T**7

Order Number: 13256

Sample Information:

Sample Name:	TS-4
Lab Number:	7979
Area Sampled:	
Received:	9/30/2020
Reported:	10/7/2020

			Below Optimum		Optimum	Above Optim	um Excessive*
Calcium	207 lbs/acre						
Magnesium	56 lbs/acre						
Phosphorus	4 lbs/acre						
Potassium	82 lbs/acre						
			*	Excessive only	defined for Phos	phorus (>40 lbs/	acre)
Soil pH (1:1, H2O)			4.3	<u>Element</u>		<u>ppm</u>	<u>Soil Range in CT</u>
Est. Cation Exch. Capacity (cmole+/100g)			15.7	Boron (1	Boron (B)		0.1 - 2.0
				Copper	Copper (Cu)		0.3 - 0.8
Buffered pH (Mod.	Mehlich)		5.4	Iron (Fe)		43.7	1.0 - 40.0
-				Mangan	ese (Mn)	9.1	3.0 - 20.0
				Zinc (Zr	n)	2.1	0.1 - 70.0
Base Saturation		<u>%</u>	<u>% Suggested</u> Sulfur		S)	22.6	10 - 100
Potassium		1	2.0 - 7.0	Aluminum (Al)		239.1	10 - 300
Magnesium		1	10 - 30				
Calcium		3	3 40 - 50 Est. To		al Lead (Pb)	low	

Limestone (Target pH of 6.6)

300 lbs / 1000 sq ft

LIMESTONE:

Incorporate any recommended ground limestone thoroughly into the top 6 inches of soil before seeding or sodding. Your magnesium level is low. Dolomitic limestone is recommended. FERTILIZER:

Soil test values for both PHOSPHORUS and POTASSIUM are BELOW OPTIMUM. Apply prior to seeding or sodding and before final grading, 10 lbs of 0-46-0 (triple superphosphate) or 20 lbs of 0-20-0 (superphosphate) or 134 lbs of 0-3-0 (rock phosphate) per 1000 sq ft and 5 lbs of 0-0-60 (potash) or 15 lbs 0-0-22 (sul-po-mag) per 1000 sq ft. Incorporate the fertilizers into the top 4 to 6 inches of soil.

After final grading, if seeding, apply 20 lbs of 5-10-10 or 10 lbs of 10-20-20 or 25 lbs of 4-3-4 per 1000 sq ft. Mix into the soil surface with the seed. If sodding, apply to the soil surface 10 lbs of 10-10-10, 25 lbs of 4-3-4 or 20 lbs of 5-4-3 per 1000 sq ft after final grading and before sod placement.

In future years, follow the fertilizer suggestions on the SUGESTED FERTILIZER PRACTICES FOR LAWNS fact sheet or retest the soil (at least three months after an application of fertilizer) for current recommendations.

If you have questions about this report or fertilizer recommendations, contact the UConn Soil Nutrient Analysis Lab at (860) 486-4274 or email soiltest@uconn.edu.

If you have questions about any other plant, pest or disease problems, contact the UConn HOME and GARDEN EDUCATION CENTER, Dept. of Plant Science and Landscape Architecture. Phone: (877) 486-6271; email:ladybug@uconn.edu; website:www.ladybug.uconn.edu.

http://www.soiltest.uconn.edu/documents/interpretationofsoiltestresults6-2016.pdf
http://www.soiltest.uconn.edu/documents/suggfertpraclawn6-16.pdf
http://www.soiltest.uconn.edu/documents/SuggFertPracttreesshrubsvinesgroundcovers5-20 16.pdf
http://www.soiltest.uconn.edu/documents/fertilizerandgardenmeasurements2-5-15.pdf



Soil Test Report

Prepared For:

Michael Ostrowski GZA Environmental Inc. 249 Vanderbilt Avenue Norwood, MA 02062

michael.ostrowski@gza.com 781.603.5934

Results

Nutrients Extracted From Your Soil (Modified Morgan)

		Below Optin	num	Optimum	Above Optimu	m Excessive*
Calcium 1194 lbs/acre						
Magnesium 88 lbs/acre						
Phosphorus 4 lbs/acre						
Potassium 96 lbs/acre						
		* ,	Excessive only	defined for Phos	phorus (>40 lbs/a	cre)
Soil pH (1:1, H2O)		4.9	<u>Elemen</u>	<u>t</u>	<u>ppm</u>	<u>Soil Range in CT</u>
Est. Cation Exch. Capacity		13.2	13.2 Boron (B)		0.1	0.1 - 2.0
(cmole+/100g)			Copper	(Cu)	0.2	0.3 - 0.8
Buffered pH (Mod. Mehlich)		5.8	Iron (Fe)	9.7	1.0 - 40.0
			Mangan	ese (Mn)	5.1	3.0 - 20.0
			Zinc (Zr	n)	4.7	0.1 - 70.0
Base Saturation	<u>%</u>	Suggested	Sulfur (S)	18.7	10 - 100
Potassium	1	2.0 - 7.0	Alumin	ım (Al)	116.1	10 - 300
Magnesium	3	10 - 30				
Calcium	23	40 - 50	Est. Tot	al Lead (Pb)	107.3	

Limestone & Fertilizer Recommendations for Needleleaf Trees & Shrubs

Limestone (Target pH of 6.0)

15 lbs / 100 sq ft



PLANT SCIENCE AND LANDSCAPE ARCHITECTURE

Order Number: 13256

Sample Name:	TS75-1
Lab Number:	7980
Area Sampled:	
Received:	9/30/2020
Reported:	10/7/2020

LIMESTONE:

Apply ground limestone as recommended to raise the soil pH. For new plantings, work the entire amount into the top 6 to 8 inches of soil before planting. For established beds, gently scratch in limestone into soil around plants. If more than 10 lbs of limestone per 100 sq. ft. is recommended, put one-half down now and the other half in a month or more. FERTILIZER:

Soil test values for both PHOSPHORUS and POTASSIUM are BELOW OPTIMUM.

Apply 1 pound of 5-10-10 or the equivalent from other sources per 100 square feet. See the SUGGESTED FERTILIZER PRACTICES TREES, SHRUBS, VINES AND GROUNDCOVERS fact sheet for instructions on how and when to add fertilizer.

The lead level in this soil is elevated. See Soil Lead Interpretation Sheet for more information: http://soiltest.uconn.edu/factsheets/SoilLead_new.pdf

If you have questions about this report or fertilizer recommendations, contact the UConn Soil Nutrient Analysis Lab at (860) 486-4274 or email soiltest@uconn.edu.

If you have questions about any other plant, pest or disease problems, contact the UConn HOME and GARDEN EDUCATION CENTER, Dept. of Plant Science and Landscape Architecture. Phone: (877) 486-6271; email:ladybug@uconn.edu; website:www.ladybug.uconn.edu.

Limestone & Fertilizer Recommendations for Deciduous Trees & Shrubs

Limestone (Target pH of 6.3)

20 lbs / 100 sq ft

Comments:

LIMESTONE:

Apply ground limestone as recommended to raise the soil pH. For new plantings, work the entire amount into the top 6 to 8 inches of soil before planting. For established beds, gently scratch in limestone into soil around plants. If more than 10 lbs of limestone per 100 sq. ft. is recommended, put one-half down now and the other half in a month or more. FERTILIZER:

Soil test values for both PHOSPHORUS and POTASSIUM are BELOW OPTIMUM.

Apply 2 pounds (4 cups) of 5-10-10 or the equivalent from other sources per 100 square feet. See the SUGGESTED FERTILIZER PRACTICES FOR TREES, SHRUBS, VINES and GROUNDCOVERS fact sheet for instructions on how and when to add fertilizer.

The lead level in this soil is elevated. See Soil Lead Interpretation Sheet for more information: http://soiltest.uconn.edu/factsheets/SoilLead_new.pdf

If you have questions about this report or fertilizer recommendations, contact the UConn Soil Nutrient Analysis Lab at (860) 486-4274 or email soiltest@uconn.edu.

If you have questions about any other plant, pest or disease problems, contact the UConn HOME and GARDEN EDUCATION CENTER, Dept. of Plant Science and Landscape Architecture. Phone: (877) 486-6271; email:ladybug@uconn.edu; website:www.ladybug.uconn.edu.

Soil Test Interpretation and Recommendations	http://www.soiltest.uconn.edu/documents/interpretationofsoiltestresults6-2016.pdf
Fertilizer Practices for Lawns	http://www.soiltest.uconn.edu/documents/suggfertpraclawn6-16.pdf
Suggested Fertilizer Practices for Trees, Shrubs, Groundcovers & Vines	$\underline{http://www.soiltest.uconn.edu/documents/SuggFertPracttreesshrubsvinesgroundcovers 5-20} \\ \underline{16.pdf}$
Fertilizer Conversions & Garden Measurements	http://www.soiltest.uconn.edu/documents/fertilizerandgardenmeasurements2-5-15.pdf
Suggested Fertilizer Practices for Trees, Shrubs, Groundcovers & Vines	http://www.soiltest.uconn.edu/documents/SuggFertPracttreesshrubsvinesgroundcove

Prepared For:

Michael Ostrowski GZA Environmental Inc. 249 Vanderbilt Avenue Norwood, MA 02062

michael.ostrowski@gza.com 781.603.5934

Results

Nutrients Extracted From Your Soil (Modified Morgan)

Order Number: 13256

Sample Information:

Sample Name:	TS75-1
Lab Number:	7980
Area Sampled:	
Received:	9/30/2020
Reported:	10/7/2020

			Below Opti	mum	Optimum	Above Optimu	Im Excessive*
Calcium	1194 lbs/acre						
Magnesium	88 lbs/acre						
Phosphorus	4 lbs/acre						
Potassium	96 lbs/acre						
			*	Excessive only	defined for Phos	sphorus (>40 lbs/d	acre)
Soil pH (1:1, H	120)		4.9	<u>Element</u>		<u>ppm</u>	<u>Soil Range in CT</u>
Est. Cation Exch. Capacity		13.2	Boron (E	3)	0.1	0.1 - 2.0	
(cmole+/100g)	· ·			Copper (Cu)	0.2	0.3 - 0.8
Buffered pH (Mod	l. Mehlich)		5.8	Iron (Fe)		9.7	1.0 - 40.0
				Mangane	ese (Mn)	5.1	3.0 - 20.0
				Zinc (Zn)	4.7	0.1 - 70.0
Base Saturation		<u>%</u>	<u>Suggested</u>	Sulfur (S)	18.7	10 - 100
Potassium		1	2.0 - 7.0	Aluminu	m (Al)	116.1	10 - 300
Magnesium		3	10 - 30				
Calcium		23	40 - 50	Est. Tota	l Lead (Pb)	107.3	

Limestone (Target pH of 6.6)

LIMESTONE:

Incorporate any recommended ground limestone thoroughly into the top 6 inches of soil before seeding or sodding. Your magnesium level is low. Dolomitic limestone is recommended. FERTILIZER:

Soil test values for both PHOSPHORUS and POTASSIUM are BELOW OPTIMUM. Apply prior to seeding or sodding and before final grading, 10 lbs of 0-46-0 (triple superphosphate) or 20 lbs of 0-20-0 (superphosphate) or 134 lbs of 0-3-0 (rock phosphate) per 1000 sq ft and 5 lbs of 0-0-60 (potash) or 15 lbs 0-0-22 (sul-po-mag) per 1000 sq ft. Incorporate the fertilizers into the top 4 to 6 inches of soil.

After final grading, if seeding, apply 20 lbs of 5-10-10 or 10 lbs of 10-20-20 or 25 lbs of 4-3-4 per 1000 sq ft. Mix into the soil surface with the seed. If sodding, apply to the soil surface 10 lbs of 10-10-10, 25 lbs of 4-3-4 or 20 lbs of 5-4-3 per 1000 sq ft after final grading and before sod placement.

In future years, follow the fertilizer suggestions on the SUGESTED FERTILIZER PRACTICES FOR LAWNS fact sheet or retest the soil (at least three months after an application of fertilizer) for current recommendations.

The lead level in this soil is elevated. See Soil Lead Interpretation Sheet for more information: http://soiltest.uconn.edu/factsheets/SoilLead_new.pdf

If you have questions about this report or fertilizer recommendations, contact the UConn Soil Nutrient Analysis Lab at (860) 486-4274 or email soiltest@uconn.edu.

If you have questions about any other plant, pest or disease problems, contact the UConn HOME and GARDEN EDUCATION CENTER, Dept. of Plant Science and Landscape Architecture. Phone: (877) 486-6271; email:ladybug@uconn.edu; website:www.ladybug.uconn.edu.

Soil Test Interpretation and Recommendations	http://www.soiltest.uconn.edu/documents/interpretationofsoiltestresults6-2016.pdf
Fertilizer Practices for Lawns	http://www.soiltest.uconn.edu/documents/suggfertpraclawn6-16.pdf
Suggested Fertilizer Practices for Trees, Shrubs, Groundcovers & Vines	http://www.soiltest.uconn.edu/documents/SuggFertPracttreesshrubsvinesgroundcovers5-20 16.pdf
Fertilizer Conversions & Garden Measurements	http://www.soiltest.uconn.edu/documents/fertilizerandgardenmeasurements2-5-15.pdf



Soil Test Report

Prepared For:

Michael Ostrowski GZA Environmental Inc. 249 Vanderbilt Avenue Norwood, MA 02062

michael.ostrowski@gza.com 781.603.5934

Results

Nutrients Extracted From Your Soil (Modified Morgan)

			Below Optim	um	Optimum	Above Optimu	Im Excessive*
Calcium	858 lbs/acre						
Magnesium	77 lbs/acre						
Phosphorus	2 lbs/acre						
Potassium	97 lbs/acre						
			* E	Excessive only d	efined for Phos	phorus (>40 lbs/d	ucre)
Soil pH (1:1, H2	20)		5.3 <u>Element</u>		<u>ppm</u>	<u>Soil Range in CT</u>	
Est. Cation Exch. Capacity			7.8	Boron (B)		0.1	0.1 - 2.0
(cmole+/100g)				Copper (C	u)	0.2	0.3 - 0.8
Buffered pH (Mod.	. Mehlich)		6.1	Iron (Fe)		5.5	1.0 - 40.0
•	,			Manganes	e (Mn)	1.7	3.0 - 20.0
				Zinc (Zn)		3.0	0.1 - 70.0
Base Saturation		<u>%</u>	<u>Suggested</u>	Sulfur (S)		11.8	10 - 100
Potassium		2	2.0 - 7.0	Aluminum	n (Al)	60.1	10 - 300
Magnesium		4	10 - 30				
Calcium		28	40 - 50	Est. Total	Lead (Pb)	118.4	

Limestone & Fertilizer Recommendations for Needleleaf Trees & Shrubs

Limestone (Target pH of 6.0)

5 lbs / 100 sq ft



PLANT SCIENCE AND LANDSCAPE ARCHITECTURE

Order Number: 13256

Sample Name:	TS75-2
Lab Number:	7981
Area Sampled:	
Received:	9/30/2020
Reported:	10/7/2020

LIMESTONE:

Apply ground limestone as recommended to raise the soil pH. For new plantings, work the entire amount into the top 6 to 8 inches of soil before planting. For established beds, gently scratch in limestone into soil around plants. If more than 10 lbs of limestone per 100 sq. ft. is recommended, put one-half down now and the other half in a month or more. FERTILIZER:

Soil test values for both PHOSPHORUS and POTASSIUM are BELOW OPTIMUM.

Apply 1 pound of 5-10-10 or the equivalent from other sources per 100 square feet. See the SUGGESTED FERTILIZER PRACTICES TREES, SHRUBS, VINES AND GROUNDCOVERS fact sheet for instructions on how and when to add fertilizer.

The lead level in this soil is elevated. See Soil Lead Interpretation Sheet for more information: http://soiltest.uconn.edu/factsheets/SoilLead_new.pdf

If you have questions about this report or fertilizer recommendations, contact the UConn Soil Nutrient Analysis Lab at (860) 486-4274 or email soiltest@uconn.edu.

If you have questions about any other plant, pest or disease problems, contact the UConn HOME and GARDEN EDUCATION CENTER, Dept. of Plant Science and Landscape Architecture. Phone: (877) 486-6271; email:ladybug@uconn.edu; website:www.ladybug.uconn.edu.

Limestone & Fertilizer Recommendations for Deciduous Trees & Shrubs

Limestone (Target pH of 6.3)

10 lbs / 100 sq ft

Comments:

LIMESTONE:

Apply ground limestone as recommended to raise the soil pH. For new plantings, work the entire amount into the top 6 to 8 inches of soil before planting. For established beds, gently scratch in limestone into soil around plants. If more than 10 lbs of limestone per 100 sq. ft. is recommended, put one-half down now and the other half in a month or more. FERTILIZER:

Soil test values for both PHOSPHORUS and POTASSIUM are BELOW OPTIMUM.

Apply 2 pounds (4 cups) of 5-10-10 or the equivalent from other sources per 100 square feet. See the SUGGESTED FERTILIZER PRACTICES FOR TREES, SHRUBS, VINES and GROUNDCOVERS fact sheet for instructions on how and when to add fertilizer.

The lead level in this soil is elevated. See Soil Lead Interpretation Sheet for more information: http://soiltest.uconn.edu/factsheets/SoilLead_new.pdf

If you have questions about this report or fertilizer recommendations, contact the UConn Soil Nutrient Analysis Lab at (860) 486-4274 or email soiltest@uconn.edu.

If you have questions about any other plant, pest or disease problems, contact the UConn HOME and GARDEN EDUCATION CENTER, Dept. of Plant Science and Landscape Architecture. Phone: (877) 486-6271; email:ladybug@uconn.edu; website:www.ladybug.uconn.edu.

Soil Test Interpretation and Recommendations	http://www.soiltest.uconn.edu/documents/interpretationofsoiltestresults6-2016.pdf
Fertilizer Practices for Lawns	http://www.soiltest.uconn.edu/documents/suggfertpraclawn6-16.pdf
Suggested Fertilizer Practices for Trees, Shrubs, Groundcovers & Vines	$\underline{http://www.soiltest.uconn.edu/documents/SuggFertPracttreesshrubsvinesgroundcovers 5-20} \\ \underline{16.pdf}$
Fertilizer Conversions & Garden Measurements	http://www.soiltest.uconn.edu/documents/fertilizerandgardenmeasurements2-5-15.pdf
Suggested Fertilizer Practices for Trees, Shrubs, Groundcovers & Vines	http://www.soiltest.uconn.edu/documents/SuggFertPracttreesshrubsvinesgroundcove

Prepared For:

Michael Ostrowski GZA Environmental Inc. 249 Vanderbilt Avenue Norwood, MA 02062

michael.ostrowski@gza.com 781.603.5934

Results

Esternated E Soil (Modified M 37 / • . **T**7

Order Number: 13256

Sample Information:

Sample Name:	TS75-2
Lab Number:	7981
Area Sampled:	
Received:	9/30/2020
Reported:	10/7/2020

			Below Opti	mum	Optimum	Above Optim	um Excessive*
Calcium	858 lbs/acre						
Magnesium	77 lbs/acre						
Phosphorus	2 lbs/acre						
Potassium	97 lbs/acre						
			*	Excessive only	defined for Phos	phorus (>40 lbs/	acre)
Soil pH (1:1, H	20)		5.3	<u>Element</u>		<u>ppm</u>	<u>Soil Range in CT</u>
Est. Cation Exc	h. Capacity		7.8	Boron (B	5)	0.1	0.1 - 2.0
(cmole+/100g)				Copper (Cu)	0.2	0.3 - 0.8
Buffered pH (Mod	. Mehlich)		6.1	Iron (Fe)		5.5	1.0 - 40.0
				Mangane	ese (Mn)	1.7	3.0 - 20.0
				Zinc (Zn))	3.0	0.1 - 70.0
Base Saturation		<u>%</u>	Suggested	Sulfur (S)	11.8	10 - 100
Potassium		$\frac{70}{2}$	2.0 - 7.0	Aluminu	m (Al)	60.1	10 - 300
Magnesium		4	10 - 30				
Calcium		28	40 - 50	Est. Tota	l Lead (Pb)	118.4	

Limestone (Target pH of 6.6)

LIMESTONE:

Incorporate any recommended ground limestone thoroughly into the top 6 inches of soil before seeding or sodding. Your magnesium level is low. Dolomitic limestone is recommended. FERTILIZER:

Soil test values for both PHOSPHORUS and POTASSIUM are BELOW OPTIMUM. Apply prior to seeding or sodding and before final grading, 10 lbs of 0-46-0 (triple superphosphate) or 20 lbs of 0-20-0 (superphosphate) or 134 lbs of 0-3-0 (rock phosphate) per 1000 sq ft and 5 lbs of 0-0-60 (potash) or 15 lbs 0-0-22 (sul-po-mag) per 1000 sq ft. Incorporate the fertilizers into the top 4 to 6 inches of soil.

After final grading, if seeding, apply 20 lbs of 5-10-10 or 10 lbs of 10-20-20 or 25 lbs of 4-3-4 per 1000 sq ft. Mix into the soil surface with the seed. If sodding, apply to the soil surface 10 lbs of 10-10-10, 25 lbs of 4-3-4 or 20 lbs of 5-4-3 per 1000 sq ft after final grading and before sod placement.

In future years, follow the fertilizer suggestions on the SUGESTED FERTILIZER PRACTICES FOR LAWNS fact sheet or retest the soil (at least three months after an application of fertilizer) for current recommendations.

The lead level in this soil is elevated. See Soil Lead Interpretation Sheet for more information: http://soiltest.uconn.edu/factsheets/SoilLead_new.pdf

If you have questions about this report or fertilizer recommendations, contact the UConn Soil Nutrient Analysis Lab at (860) 486-4274 or email soiltest@uconn.edu.

If you have questions about any other plant, pest or disease problems, contact the UConn HOME and GARDEN EDUCATION CENTER, Dept. of Plant Science and Landscape Architecture. Phone: (877) 486-6271; email:ladybug@uconn.edu; website:www.ladybug.uconn.edu.

Soil Test Interpretation and Recommendations	http://www.soiltest.uconn.edu/documents/interpretationofsoiltestresults6-2016.pdf
Fertilizer Practices for Lawns	http://www.soiltest.uconn.edu/documents/suggfertpraclawn6-16.pdf
Suggested Fertilizer Practices for Trees, Shrubs, Groundcovers & Vines	http://www.soiltest.uconn.edu/documents/SuggFertPracttreesshrubsvinesgroundcovers5-20 16.pdf
Fertilizer Conversions & Garden Measurements	http://www.soiltest.uconn.edu/documents/fertilizerandgardenmeasurements2-5-15.pdf



Soil Test Report

Prepared For:

Michael Ostrowski GZA Environmental Inc. 249 Vanderbilt Avenue Norwood, MA 02062

michael.ostrowski@gza.com 781.603.5934

Results

Nutrients Extracted From Your Soil (Modified Morgan)

			Below Opti	mum	Optimum	Above Optime	Im Excessive*
Calcium	939 lbs/acre						
Magnesium	81 lbs/acre						
Phosphorus	2 lbs/acre						
Potassium	67 lbs/acre						
		1	*	Excessive only	y defined for Phos	phorus (>40 lbs/d	ucre)
Soil pH (1:1, H2	20)		5.8	<u>Elemen</u>	<u>ot</u>	<u>ppm</u>	<u>Soil Range in CT</u>
Est. Cation Exch. Capacity			7.2	Boron (B)	0.1	0.1 - 2.0
(cmole+/100g)				Copper	(Cu)	0.2	0.3 - 0.8
Buffered pH (Mod. Mehlich)			6.2 Iron (Fe		e)	4.5	1.0 - 40.0
•	·			Mangan	nese (Mn)	1.0	3.0 - 20.0
				Zinc (Zi	n)	1.4	0.1 - 70.0
Base Saturation		<u>%</u>	<u>Suggested</u>	Sulfur ((S)	11.5	10 - 100
Potassium		1	2.0 - 7.0	Alumin	um (Al)	38.8	10 - 300
Magnesium		5	10 - 30				
Calcium		33	40 - 50	Est. Tot	tal Lead (Pb)	low	

Limestone & Fertilizer Recommendations for Needleleaf Trees & Shrubs

Limestone (Target pH of 6.0)

5 lbs / 100 sq ft



PLANT SCIENCE AND LANDSCAPE ARCHITECTURE

Order Number: 13256

Sample Name:	TS75-3
Lab Number:	7982
Area Sampled:	
Received:	9/30/2020
Reported:	10/7/2020

LIMESTONE:

Apply ground limestone as recommended to raise the soil pH. For new plantings, work the entire amount into the top 6 to 8 inches of soil before planting. For established beds, gently scratch in limestone into soil around plants. If more than 10 lbs of limestone per 100 sq. ft. is recommended, put one-half down now and the other half in a month or more. FERTILIZER:

Soil test values for both PHOSPHORUS and POTASSIUM are BELOW OPTIMUM.

Apply 1 pound of 5-10-10 or the equivalent from other sources per 100 square feet. See the SUGGESTED FERTILIZER PRACTICES TREES, SHRUBS, VINES AND GROUNDCOVERS fact sheet for instructions on how and when to add fertilizer.

If you have questions about this report or fertilizer recommendations, contact the UConn Soil Nutrient Analysis Lab at (860) 486-4274 or email soiltest@uconn.edu.

If you have questions about any other plant, pest or disease problems, contact the UConn HOME and GARDEN EDUCATION CENTER, Dept. of Plant Science and Landscape Architecture. Phone: (877) 486-6271; email:ladybug@uconn.edu; website:www.ladybug.uconn.edu.

Limestone & Fertilizer Recommendations for Deciduous Trees & Shrubs

Limestone (Target pH of 6.3)

8 lbs / 100 sq ft

Comments:

LIMESTONE:

Apply ground limestone as recommended to raise the soil pH. For new plantings, work the entire amount into the top 6 to 8 inches of soil before planting. For established beds, gently scratch in limestone into soil around plants. If more than 10 lbs of limestone per 100 sq. ft. is recommended, put one-half down now and the other half in a month or more.

FERTILIZER:

Soil test values for both PHOSPHORUS and POTASSIUM are BELOW OPTIMUM.

Apply 2 pounds (4 cups) of 5-10-10 or the equivalent from other sources per 100 square feet. See the SUGGESTED FERTILIZER PRACTICES FOR TREES, SHRUBS, VINES and GROUNDCOVERS fact sheet for instructions on how and when to add fertilizer.

If you have questions about this report or fertilizer recommendations, contact the UConn Soil Nutrient Analysis Lab at (860) 486-4274 or email soiltest@uconn.edu.

If you have questions about any other plant, pest or disease problems, contact the UConn HOME and GARDEN EDUCATION CENTER, Dept. of Plant Science and Landscape Architecture. Phone: (877) 486-6271; email:ladybug@uconn.edu; website:www.ladybug.uconn.edu.

Soil Test Interpretation and Recommendations	http://www.soiltest.uconn.edu/documents/interpretationofsoiltestresults6-2016.pdf
Fertilizer Practices for Lawns	http://www.soiltest.uconn.edu/documents/suggfertpraclawn6-16.pdf
Suggested Fertilizer Practices for Trees, Shrubs, Groundcovers & Vines Fertilizer Conversions & Garden Measurements	http://www.soiltest.uconn.edu/documents/SuggFertPracttreesshrubsvinesgroundcovers5-20 16.pdf http://www.soiltest.uconn.edu/documents/fertilizerandgardenmeasurements2-5-15.pdf

Prepared For:

Michael Ostrowski GZA Environmental Inc. 249 Vanderbilt Avenue Norwood, MA 02062

michael.ostrowski@gza.com 781.603.5934

Results

Nutrients Extracted From Your Soil (Modified Morgan)

Order Number: 13256

Sample Information:

Sample Name:	TS75-3
Lab Number:	7982
Area Sampled:	
Received:	9/30/2020
Reported:	10/7/2020

			Below Opti	mum Optimum	Above Optimu	m Excessive*
Calcium	939 lbs/acre					
Magnesium	81 lbs/acre					
Phosphorus	2 lbs/acre					
Potassium	67 lbs/acre					
			*	Excessive only defined for Pho	osphorus (>40 lbs/ac	cre)
Soil pH (1:1, H	20)		5.8	<u>Element</u>	<u>ppm</u>	<u>Soil Range in CT</u>
Est. Cation Exch. Capacity			7.2	Boron (B)	0.1	0.1 - 2.0
(cmole+/100g)				Copper (Cu)	0.2	0.3 - 0.8
Buffered pH (Mod.	Mehlich)		6.2	Iron (Fe)	4.5	1.0 - 40.0
				Manganese (Mn)	1.0	3.0 - 20.0
				Zinc (Zn)	1.4	0.1 - 70.0
Base Saturation		<u>%</u>	<u>Suggested</u>	Sulfur (S)	11.5	10 - 100
Potassium		1	2.0 - 7.0	Aluminum (Al)	38.8	10 - 300
Magnesium		5	10 - 30			
Calcium		33	40 - 50	Est. Total Lead (Pb)	low	

Limestone (Target pH of 6.6)

LIMESTONE:

Incorporate any recommended ground limestone thoroughly into the top 6 inches of soil before seeding or sodding. Your magnesium level is low. Dolomitic limestone is recommended. FERTILIZER:

Soil test values for both PHOSPHORUS and POTASSIUM are BELOW OPTIMUM. Apply prior to seeding or sodding and before final grading, 10 lbs of 0-46-0 (triple superphosphate) or 20 lbs of 0-20-0 (superphosphate) or 134 lbs of 0-3-0 (rock phosphate) per 1000 sq ft and 5 lbs of 0-0-60 (potash) or 15 lbs 0-0-22 (sul-po-mag) per 1000 sq ft. Incorporate the fertilizers into the top 4 to 6 inches of soil.

After final grading, if seeding, apply 20 lbs of 5-10-10 or 10 lbs of 10-20-20 or 25 lbs of 4-3-4 per 1000 sq ft. Mix into the soil surface with the seed. If sodding, apply to the soil surface 10 lbs of 10-10-10, 25 lbs of 4-3-4 or 20 lbs of 5-4-3 per 1000 sq ft after final grading and before sod placement.

In future years, follow the fertilizer suggestions on the SUGESTED FERTILIZER PRACTICES FOR LAWNS fact sheet or retest the soil (at least three months after an application of fertilizer) for current recommendations.

If you have questions about this report or fertilizer recommendations, contact the UConn Soil Nutrient Analysis Lab at (860) 486-4274 or email soiltest@uconn.edu.

If you have questions about any other plant, pest or disease problems, contact the UConn HOME and GARDEN EDUCATION CENTER, Dept. of Plant Science and Landscape Architecture. Phone: (877) 486-6271; email:ladybug@uconn.edu; website:www.ladybug.uconn.edu.

Soil Test Interpretation and Recommendations	http://www.soiltest.uconn.edu/documents/interpretationofsoiltestresults6-2016.pdf
Fertilizer Practices for Lawns	http://www.soiltest.uconn.edu/documents/suggfertpraclawn6-16.pdf
Suggested Fertilizer Practices for Trees, Shrubs, Groundcovers & Vines	http://www.soiltest.uconn.edu/documents/SuggFertPracttreesshrubsvinesgroundcovers5-20 16.pdf
Fertilizer Conversions & Garden Measurements	http://www.soiltest.uconn.edu/documents/fertilizerandgardenmeasurements2-5-15.pdf



Soil Test Report

Prepared For:

Michael Ostrowski GZA Environmental Inc. 249 Vanderbilt Avenue Norwood, MA 02062

michael.ostrowski@gza.com 781.603.5934

Results

Nutrients Extracted From Your Soil (Modified Morgan)

		Below Optime	um	Optimum	Above Optimu	m Excessive*
Calcium 1324 lbs/acre						
Magnesium 105 lbs/acre						
Phosphorus 2 lbs/acre						
Potassium 87 lbs/acre						
		* E.	xcessive only	y defined for Phos	ohorus (>40 lbs/a	cre)
Soil pH (1:1, H2O)		5.6 <u>Element</u> ppm		<u>ppm</u>	<u>Soil Range in CT</u>	
Est. Cation Exch. Capacity		8.9	Boron (B)		0.1	0.1 - 2.0
(cmole+/100g)			Copper	(Cu)	0.2	0.3 - 0.8
Buffered pH (Mod. Mehlich)		6.1 Iron (Fe)		e)	4.1	1.0 - 40.0
•			Mangan	nese (Mn)	1.8	3.0 - 20.0
			Zinc (Zi	n)	1.6	0.1 - 70.0
Base Saturation	<u>%</u>	Suggested	Sulfur (S)	16.7	10 - 100
Potassium	1	2.0 - 7.0	Alumin	um (Al)	49.6	10 - 300
Magnesium	5	10 - 30				
Calcium	37	40 - 50	Est. Tot	al Lead (Pb)	low	

Limestone & Fertilizer Recommendations for Needleleaf Trees & Shrubs

Limestone (Target pH of 6.0)

5 lbs / 100 sq ft



PLANT SCIENCE AND LANDSCAPE ARCHITECTURE

Order Number: 13256

Sample Name:	TS75-4
Lab Number:	7983
Area Sampled:	
Received:	9/30/2020
Reported:	10/7/2020

LIMESTONE:

Apply ground limestone as recommended to raise the soil pH. For new plantings, work the entire amount into the top 6 to 8 inches of soil before planting. For established beds, gently scratch in limestone into soil around plants. If more than 10 lbs of limestone per 100 sq. ft. is recommended, put one-half down now and the other half in a month or more. FERTILIZER:

Soil test values for both PHOSPHORUS and POTASSIUM are BELOW OPTIMUM.

Apply 1 pound of 5-10-10 or the equivalent from other sources per 100 square feet. See the SUGGESTED FERTILIZER PRACTICES TREES, SHRUBS, VINES AND GROUNDCOVERS fact sheet for instructions on how and when to add fertilizer.

If you have questions about this report or fertilizer recommendations, contact the UConn Soil Nutrient Analysis Lab at (860) 486-4274 or email soiltest@uconn.edu.

If you have questions about any other plant, pest or disease problems, contact the UConn HOME and GARDEN EDUCATION CENTER, Dept. of Plant Science and Landscape Architecture. Phone: (877) 486-6271; email:ladybug@uconn.edu; website:www.ladybug.uconn.edu.

Limestone & Fertilizer Recommendations for Deciduous Trees & Shrubs

Limestone (Target pH of 6.3)

8 lbs / 100 sq ft

Comments:

LIMESTONE:

Apply ground limestone as recommended to raise the soil pH. For new plantings, work the entire amount into the top 6 to 8 inches of soil before planting. For established beds, gently scratch in limestone into soil around plants. If more than 10 lbs of limestone per 100 sq. ft. is recommended, put one-half down now and the other half in a month or more.

FERTILIZER:

Soil test values for both PHOSPHORUS and POTASSIUM are BELOW OPTIMUM.

Apply 2 pounds (4 cups) of 5-10-10 or the equivalent from other sources per 100 square feet. See the SUGGESTED FERTILIZER PRACTICES FOR TREES, SHRUBS, VINES and GROUNDCOVERS fact sheet for instructions on how and when to add fertilizer.

If you have questions about this report or fertilizer recommendations, contact the UConn Soil Nutrient Analysis Lab at (860) 486-4274 or email soiltest@uconn.edu.

If you have questions about any other plant, pest or disease problems, contact the UConn HOME and GARDEN EDUCATION CENTER, Dept. of Plant Science and Landscape Architecture. Phone: (877) 486-6271; email:ladybug@uconn.edu; website:www.ladybug.uconn.edu.

Soil Test Interpretation and Recommendations	http://www.soiltest.uconn.edu/documents/interpretationofsoiltestresults6-2016.pdf
Fertilizer Practices for Lawns	http://www.soiltest.uconn.edu/documents/suggfertpraclawn6-16.pdf
Suggested Fertilizer Practices for Trees, Shrubs, Groundcovers & Vines Fertilizer Conversions & Garden Measurements	http://www.soiltest.uconn.edu/documents/SuggFertPracttreesshrubsvinesgroundcovers5-20 16.pdf http://www.soiltest.uconn.edu/documents/fertilizerandgardenmeasurements2-5-15.pdf

Prepared For:

Michael Ostrowski GZA Environmental Inc. 249 Vanderbilt Avenue Norwood, MA 02062

michael.ostrowski@gza.com 781.603.5934

Results

Nutrients Extracted From Your Soil (Modified Morgan)

Order Number: 13256

Sample Information:

Sample Name:	TS75-4
Lab Number:	7983
Area Sampled:	
Received:	9/30/2020
Reported:	10/7/2020

			Below Opti	mum	Optimum	Above Optime	ım Excessive*
Calcium	1324 lbs/acre						
Magnesium	105 lbs/acre						
Phosphorus	2 lbs/acre						
Potassium	87 lbs/acre						
			*	Excessive only	defined for Phos	sphorus (>40 lbs/d	acre)
Soil pH (1:1, H	120)		5.6	<u>Element</u>		<u>ppm</u>	<u>Soil Range in CT</u>
Est. Cation Exch. Capacity			8.9	8.9 Boron (B)		0.1	0.1 - 2.0
(cmole+/100g)				Copper (Cu)	0.2	0.3 - 0.8
Buffered pH (Mod	l. Mehlich)		6.1	Iron (Fe)		4.1	1.0 - 40.0
				Mangane	se (Mn)	1.8	3.0 - 20.0
				Zinc (Zn))	1.6	0.1 - 70.0
Base Saturation		<u>%</u>	Suggested	Sulfur (S)	16.7	10 - 100
Potassium		1	2.0 - 7.0	Aluminu	m (Al)	49.6	10 - 300
Magnesium		5	10 - 30				
Calcium		37	40 - 50	Est. Tota	l Lead (Pb)	low	

Limestone (Target pH of 6.6)

LIMESTONE:

Incorporate any recommended ground limestone thoroughly into the top 6 inches of soil before seeding or sodding. FERTILIZER:

Soil test values for both PHOSPHORUS and POTASSIUM are BELOW OPTIMUM. Apply prior to seeding or sodding and before final grading, 10 lbs of 0-46-0 (triple superphosphate) or 20 lbs of 0-20-0 (superphosphate) or 134 lbs of 0-3-0 (rock phosphate) per 1000 sq ft and 5 lbs of 0-0-60 (potash) or 15 lbs 0-0-22 (sul-po-mag) per 1000 sq ft. Incorporate the fertilizers into the top 4 to 6 inches of soil.

After final grading, if seeding, apply 20 lbs of 5-10-10 or 10 lbs of 10-20-20 or 25 lbs of 4-3-4 per 1000 sq ft. Mix into the soil surface with the seed. If sodding, apply to the soil surface 10 lbs of 10-10-10, 25 lbs of 4-3-4 or 20 lbs of 5-4-3 per 1000 sq ft after final grading and before sod placement.

In future years, follow the fertilizer suggestions on the SUGESTED FERTILIZER PRACTICES FOR LAWNS fact sheet or retest the soil (at least three months after an application of fertilizer) for current recommendations.

If you have questions about this report or fertilizer recommendations, contact the UConn Soil Nutrient Analysis Lab at (860) 486-4274 or email soiltest@uconn.edu.

If you have questions about any other plant, pest or disease problems, contact the UConn HOME and GARDEN EDUCATION CENTER, Dept. of Plant Science and Landscape Architecture. Phone: (877) 486-6271; email:ladybug@uconn.edu; website:www.ladybug.uconn.edu.

Soil Test Interpretation and Recommendations	http://www.soiltest.uconn.edu/documents/interpretationofsoiltestresults6-2016.pdf
Fertilizer Practices for Lawns	http://www.soiltest.uconn.edu/documents/suggfertpraclawn6-16.pdf
Groundcovers & Vines	http://www.soiltest.uconn.edu/documents/SuggFertPracttreesshrubsvinesgroundcovers5-20 16.pdf
Fertilizer Conversions & Garden Measurements	http://www.soiltest.uconn.edu/documents/fertilizerandgardenmeasurements2-5-15.pdf