



R.W. Gillespie & Associates, Inc.

Geotechnical Engineering • Environmental Consulting • Materials Testing Services

19 September 2014

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Subject: Geotechnical Engineering Services
Proposed AE Research Addition
VA Jamaica Plain Campus
Boston, Massachusetts
RWG&A Project No. 0435-011

Dear Mr. Webster:

R. W. Gillespie & Associates, Inc., (RWG&A) is pleased to present the attached report of Geotechnical Engineering Services for the proposed AE Research Addition at the VA Jamaica Plain Campus in Boston, Massachusetts. This work was performed in general accordance with RWG&A Proposal No. P-8521.GI, Modification No. 1, dated 07 July 2014. The purpose of the services was to obtain information needed for geotechnical engineering evaluations in support of foundation design for the proposed AE Research Addition.

The attached report provides logs of previous subsurface explorations by others and of recent test borings by RWG&A, results of geotechnical engineering evaluations, and design recommendations made for the proposed AE Research Addition located at the north end of the circa 1997 Ambulatory Care Addition. RWG&A understands the proposed AE Research Addition will be three-stories high with a basement.

Subsurface conditions consist of fill over alluvial soils underlain by glaciofluvial soils, overlying glaciolacustrine soils and till, on bedrock. Bedrock is conglomerate locally called Roxbury Puddingstone. Free water levels in test borings and observation wells occur near the interface between soil and bedrock.

Subsurface conditions are suitable for support the proposed AE Research Addition on rock bearing drilled shafts. Ground floors that will support heavy settlement-sensitive equipment (e.g., the Magnetic Resonance Imaging (MRI) machine) will need to be structural slabs supported by drilled shafts. Ground floors in other areas may be either slabs-on-grade, built after removal of the existing fill and replacement with compacted granular fill, or structural slabs.

RWG&A appreciates the opportunity to be of service on this project, and has enjoyed working with VA, PDT Architects, and Becker Structural Engineers, Inc. If there are any questions regarding the attached report, or if RWG&A can be of further service, please do not hesitate to contact us.

Sincerely,
R. W. GILLESPIE & ASSOCIATES, INC.



Charles R. Nickerson, P.E.
Principal Geotechnical Engineer

CRN:md
In duplicate and via email

Copy: Daniel S. Burne, P.E, Becker Structural Engineers, Inc. – via email

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R.W. Gillespie & Associates, Inc.

**Report
of
GEOTECHNICAL ENGINEERING SERVICES
for
PROPOSED AE RESEARCH ADDITION
VA JAMAICA PLAIN CAMPUS
BOSTON, MASSACHUSETTS**

**Prepared
for
PDT ARCHITECTS
PORTLAND, MAINE**

**Prepared
by
R. W. GILLESPIE & ASSOCIATES, INC.
MANSFIELD, MASSACHUSETTS**



**Charles R. Nickerson
State of Massachusetts License No. 31159 Civil**

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1.0 INTRODUCTION

1.01 Background

The VA Jamaica Plain Campus is located at 150 South Huntington Avenue in the Jamaica Plain neighborhood of Boston, Massachusetts, as illustrated on Figure 1, *Locus Map*. RWG&A's understanding of the proposed AE Research Addition (Research Addition) is based on communications with PDT Architects and Becker Structural Engineers, Inc., site visits, and review of the record documents for the Ambulatory Care Addition (1997 Addition) listed in Table I, *Selected Record Documents for the Ambulatory Care Addition*.

The Research Addition will be located at the north end of the 1997 Addition. Overall dimensions of the Research Addition are about 100 feet east to west by 55 feet north to south. Based on the above information, the 1997 Addition is supported on caissons (a.k.a., drilled shafts) and spread footings bearing on bedrock. It is understood that the basement level ground floors for the 1997 Addition are slab-on-grade construction built after removal of the existing fills down to the naturally deposited soils and replacement with compacted granular fill.

1.02 Scope of Services

RWG&A's geotechnical engineering services were performed to develop subsurface information, laboratory test data, and to make geotechnical engineering evaluations for the Research Addition. As performed, RWG&A's scope of services included the following:

1. Visited the site and observed conditions exposed at ground surface, drill rig access, and reviewed information regarding underground utilities at the Jamaica Plain Campus near the Research Addition.
2. Reviewed readily available geologic maps, subsurface information prepared by others, and record drawings for the 1997 Addition for use in geotechnical evaluations.
3. Provided geotechnical engineering consultation relative to subsurface conditions described in the record documents, and regarding foundation and ground floor slab type.
4. Prepared a geotechnical subsurface exploration program to obtain site specific soil, bedrock, and groundwater information.
5. Marked and located the test borings in the field by tape survey methods from fixed features shown on the drawings provided. Contacted DigSafe to locate and mark public underground utilities.
6. Arranged for a subcontractor to drill four test borings. RWG&A provided technical monitoring of drilling activities so that depths, locations, and sampling could be modified in response to the subsurface conditions encountered.
7. Installed a groundwater observation well in one of the completed boreholes.

8. Designed and performed a laboratory testing program to aid in estimation of geotechnical engineering properties of bedrock. The laboratory testing consisted of three unconfined compressive strength tests on intact bedrock cores.
9. Evaluated acquired data with respect to the Research Addition including seismic site class, foundation depth, drilled shaft foundations, allowable bearing capacity, lateral load resistance, ground floor slab type, foundation drainage, and anticipated construction dewatering and excavation support requirements.
10. Prepared this report of geotechnical evaluation presenting the findings, conclusions and geotechnical engineering recommendations.

1.03 Excluded Services

RWG&A's scope of services did not include an environmental site assessment relative to oil and hazardous materials or evidence of a potential release or threat of oil or hazardous materials on, below, or around the site. It is understood that environmental site assessments have been performed by others. RWG&A anticipates that disposal requirements for fill and soil, bedrock, and groundwater from the Research Addition construction will be provided by the VA's environmental consultant. The scope of services also did not include any service to investigate or detect the presence of mold or other biological contaminants, or any service that was designed or intended to prevent or lower the risk of the occurrence of an infestation of mold or other biological contaminants (MOBC infestation).

2.0 SUBSURFACE EXPLORATION

2.01 Subsurface Exploration for Research Addition

The subsurface exploration program for the Research Addition consisted of four test borings (designated B-101 through B-104) advanced between about 30 to 48 feet below local ground surface. Figure 2, *Exploration Location Plan*, shows the approximate locations of the test borings. The recent explorations were drilled on 22, 23, and 24 July 2014 by Great Works Pump & Test Boring, Inc., of Rollinsford, New Hampshire, using a track-mounted drill rig.

Standard Penetration Testing (SPT) with split-barrel sampling was performed in general accordance with *ASTM D1586, Standard Test Method for Penetration Test and Split-Barrel Sampling of Soils*. SPT tests and samples were taken semi-continuously in the fill materials and at about 5-foot intervals through the naturally deposited soils. The test borings were advanced with 4-inch diameter steel casing using drive and wash drilling methods through fill and soil, and about 11 to 12.5 feet into bedrock using a roller cone drill bit and an NQ (1.874 inch diameter rock core) double tube core barrel.

The exploration activities were coordinated and monitored by RWG&A, who also prepared the test boring logs included as Appendix A. Soil descriptions used on the logs are in general accordance with *ASTM D2488, Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)*. Stratification lines shown on the logs represent the estimated thickness of fill, the boundaries between the different soil types, and the approximate depth to bedrock; the actual

transitions will be more gradual and vary in elevation over short horizontal distances. Subsurface information should only be considered representative of subsurface conditions encountered within the vertical reach of the test borings, at the locations, and on the date(s) they were drilled.

A groundwater observation well to measure stabilized free water levels was installed in the completed borehole designated B-101. The groundwater well installation detail is presented in Appendix B, *Groundwater Observation Well Construction Detail*.

As-drilled locations of the test borings made for the Research Addition were measured in the field by RWG&A using taping and/or pacing survey methods with reference to fixed site features. Ground surface elevations at the test boring locations were estimated to the closest half-foot by linear interpolation of ground surface contours shown on the Record Drawing revised dated 9/19/03 prepared for the VAMC Boston Ambulatory Care Addition project titled, *Proposed Utility, Grading & Drainage Plan (North)*, Drawing No. 1-L14, prepared by Payette Associates, Inc. Test boring locations and associated ground surface elevations should be considered accurate only to the degree implied by the methods used to determine them. RWG&A recommends the as-drilled locations and ground surface elevations of the test borings be surveyed by the project surveyor or site/civil engineer. The surveyed test boring locations and elevations will need to be shown on contract drawings.

2.02 Subsurface Exploration for 1997 Addition

The VA provided logs of test borings drilled by Guild Drilling Company, Inc. in 1994 (designated B-1 through B-18) and by Carr-Dee Corporation in 1997 (designated B-201 through B-210), for the 1997 Addition. Test borings B-3 and B-7, and B-201 and B-210 were located near the Research Addition and have been shown, herein, on Figure 2 for reference. The 1994 test borings were advanced with 4-inch diameter steel casing using drive and wash drilling methods with SPT sampling. These borings were advanced into bedrock with a roller cone drill bit; rock cores were obtained in selected test borings drilled in 1994 with an NV-II (1.996 inch diameter rock core) double tube core barrel. A groundwater observation well was installed in the completed borehole B-3. The 1997 test borings were drilled by hollow-stem auger methods with SPT sampling, and without coring bedrock.

Test boring logs, water level measurements, location plans, and an interpretive summary table are presented for informational purposes in Appendix D, *Subsurface Information for 1997 Addition*. RWG&A is unable to ensure the accuracy or completeness of information provided by others, either because doing so is impossible, or because errors and omissions others may have committed when assembling the information. RWG&A does not accept responsibility for use, interpretation, or accuracy of information prepared by others.

3.0 LABORATORY TESTING

Laboratory compressive strength tests were performed on three bedrock samples cut from the cores taken in the Research Addition test borings. The tests were performed in general accordance with *ASTM D 7012 Standard Test Methods for Compressive Strength and Elastic Moduli of Intact Rock Core Specimens under Varying States of Stress and Temperatures, Method C*.

The dimensions of the cut samples did not conform to the tolerances of *ASTM D 4543 Standard Practices for Preparing Rock Core as Cylindrical Test Specimens and Verifying Conformance to Dimensional and Shape Tolerances* and were capped to have flat and parallel top and bottom surfaces. The above non-conformances would cause the test results to be lower than, but representative of, the bedrock unconfined compressive strength. The tests were performed at the RWG&A soil and materials testing laboratory, which is accredited by the American Association of State Highway and Transportation Officials (AASHTO). Test results are provided in Appendix C.

4.0 SUBSURFACE CONDITIONS

Descriptions of the soil, bedrock, and groundwater conditions encountered in the test borings made for the 1997 Addition and the Research Addition are presented below. Descriptions of subsurface conditions encountered in test borings B-1, B-7, B-201 and B-210 made for the 1997 Addition have been included. An interpretive summary of subsurface conditions is provided in Table II, *Summary of Subsurface Explorations*.

4.01 Soils

Beneath the surficial asphalt parking areas, Portland cement walkways, and the loamed and grassed landscaped ground surface, the test borings encountered five soil units overlying bedrock. Individual units were absent in some of the test borings. Proceeding downward from ground surface the soil units, as described on the test boring logs, are as provided below.

Fill: Each boring encountered fill to depths ranging from about 4.5 to 13.5 feet below local ground surface. The fill consisted of silty sand, sand with gravel, and gravelly sand with silt, dark brown. Brick fragments were encountered in test boring B-103, rock fragments were noted on the log of B-3, and cobbles were noted on the log of B-7. (Note: It is anticipated that fill observed in the previous test borings located near the Research Addition might have been removed and replaced with compacted granular or other fill materials in connection with the construction of the 1997 Addition. In turn, fill descriptions on the logs of the test borings drilled in 1994 and 1997 might not be representative of current conditions.)

Alluvial: Naturally deposited alluvial soils consisting of fine sand, little to few silt, and few medium sand, light brown, were encountered below the fill. Boulders were noted in the alluvial soil on the log of B-3. Based on SPT N-value blow counts the relative density of the alluvial soils ranged from very loose to dense, and averaged about 35 to 65 percent, or medium relative density. Encountered thicknesses in the vicinity of the Research Addition ranged from 3 to 11.5 feet. The soil unit was not observed in B-104, and not indicated on the logs for test borings B-7, B-201 and B-210.

Glaciofluvial: Medium to very dense (i.e., relative density about 35 to 85 percent) glaciofluvial soils were encountered below the alluvial soils. The glaciofluvial soils were described as fine to coarse sand, little to trace gravel, and little silt; color varied locally from brown to light brown to gray-brown. Encountered thicknesses ranged from 1.5 to 22 feet. The glaciofluvial soils were over bedrock in test borings B-102 and B-3, and over the refusal surface encountered in B-201.

Glaciolacustrine: Glaciolacustrine soils were encountered below the glaciofluvial soils, and above bedrock in B-101, B-103, B-104, and B-7. SPT blow count N-values indicate the glaciolacustrine soils have medium relative density of about 35 to 65 percent. The glaciofluvial soils were described as fine sand, with little to some silt, brown. Encountered thicknesses ranged from about 3.5 to 20 feet.

Till: Till was apparently encountered in test boring B-210 drilled for the 1997 Addition, and might be present beneath the Research Addition, especially where the bedrock surface locally undulates. Description of the Till on the test boring log of B-210 was as follows: *Dense coarse to fine sand, trace gravel, inorganic silt, cobbles*. Encountered thickness of the Till was about 10.2 feet. Based on the SPT N-value blow counts indicate the relative density of the till is dense. Till in the Boston area is typically dense to very dense and contains cobbles and boulders (i.e., boulders are stones greater than 12 inches in size). (Note: A boulder was noted at the top of the Till on the log of test boring B-8, see Appendix D.)

4.02 Bedrock

Depth to bedrock encountered in the test borings located near the research addition ranged from about 17.5 to 35.5 feet below local ground surface when the test borings were made. Bedrock elevation contours are shown on Figure 2. The elevation contours were estimated by linear interpretation based on ground surface elevations and the combined fill and soil thicknesses measured in the test borings. The elevation contours are provided to indicate general trends in the bedrock surface. Local variations and undulation of the bedrock surface elevation should be anticipated.

Recovered bedrock cores taken in the recent test borings were described as fresh to slightly weathered, moderately hard, medium grained to aphanitic, gray conglomerate (ROXBURY PUDDINGSTONE) with occasional high angle fractures and jointing; highly fractured zones were encountered locally. Rock Quality Designation (RQD) was calculated for the bedrock cores. RQD is a modified core recovery ratio that provides an estimate of the in-place bedrock quality in accordance with the classification system indicated below. RQD is calculated by measuring the sum of core pieces with lengths equal to or longer than 4 inches (i.e., about twice the core diameter). The percentage ratio of the added length of the core pieces divided by the total length of core drilled is the RQD. The RQD ranged from about 0 to 96 percent, and averaged 47 percent.

RQD (Percent)	Bedrock Quality
90 to 100	Excellent
75 to 90	Good
50 to 75	Fair
25 to 50	Poor
0 to 25	Very Poor

Based on the RQD of the Research Addition bedrock cores, the bedrock quality ranges from *Excellent* to *Very Poor*, and on average *Poor*. Results of the laboratory unconfined compressive

strength tests of the three rock core samples ranged from about 3,580 to 12,980 pounds per square inch, and averaged about 8,330 pounds per square inch.

Where indicated on the logs of the test borings made for the 1997 Addition, the bedrock was described as gray, dark gray or multi-colored conglomerate. Neither the recovery ratio or RQD was not provided on the 1994 or 1997 logs of test borings made for the 1997 Addition; the bedrock was described as “fractured” on the log of test boring B-1.

4.03 Groundwater

Free water levels measured in the test borings made for the Research Addition are indicated on the test boring logs in Appendix A. On 03 September 2014, or about six weeks after the observation well was installed in B-101, free water was measured at a depth of 36.8 feet or about elevation 29.2 feet (about 1.3 feet below the estimated interface between soil and bedrock), see Appendix B. Free water levels in the previous test borings when drilled, and stabilized levels measurements in the monitoring wells, are presented in Appendix D.

In general, free water levels measured in test borings and observation wells located near the Research Addition have ranged from 5.2 feet below to 3.5 feet above the estimated interface between soil and bedrock. Water levels at the site will fluctuate due to season, temperature, rainfall, proximity to underground utilities, and construction activity near the area of the Research Addition. It is understood that foundation drainage was not provided for the 1997 Addition.

5.0 EVALUATION OF GEOTECHNICAL DATA

Soil, bedrock, and groundwater conditions for the previous and recent test borings (note: drilled about 20 years apart) are very similar to one another. Inconsistencies in descriptions can be attributed to differences in classification systems used to describe the fill materials, naturally deposited soils, and bedrock. Geotechnical evaluations made for this report have been based on the following:

- Previous test borings drilled for the 1997 Addition.
- The record documents listed in Table I
- Performance of the 1997 Addition foundation and ground floors.
- Recent test borings drilled for the Research Addition and laboratory bedrock test results.
- The 30 percent schematic design drawings for the Research Addition.

If additional and/or differing information becomes known prior to or during construction, then the evaluations and recommendations provided in this report will need be reviewed by RWG&A to confirm their continued applicability.

5.01 Proposed Foundation Loads

Becker Structural Engineers, Inc. provided preliminary foundation reactions via email dated 15 August 2014 3:20AM. Foundation reactions range from about 30 kips to 430 kips (Allowable Stress Design) or from about 40 kips to 540 kips (Load Resistance Factor Design). In accordance with the *2012 International Building Code*® and the *Massachusetts Amendments to the International Building Code 2009 (Basic/ Commercial) Eighth Edition*, the design recommendations provided in this report are intended to be used with Allowable Stress Design load combinations. Proposed site grading, and settlement tolerances determined by PDT Architects and Becker Structural Engineers were not provided when this report was prepared. When information becomes available RWG&A should be provided the opportunity to review additional information and verify continued applicability of the recommendations in this report.

5.02 Foundation Considerations

If the Research Addition were to be supported on compacted granular fill and/or the naturally deposited soils, then differential settlements between the 1997 Addition and Research Addition would be expected to be more than an inch, which RWG&A anticipates would not be tolerable. Based on the above considerations, technically feasible foundation types include micropiles and drilled shafts.

Micropiles are bored, grouted-in-place deep foundation elements that would develop their load-carrying capacity by bond in the underlying bedrock. Drilled shafts were used to support the 1997 Addition and consisted of end-bearing foundation elements, without permanent casings, with the bottom of shafts socketed a minimum of 6 inches into hard bedrock. Based on installation duration and load testing requirements associated with micropiles, and the performance of the 1997 Addition foundation; RWG&A recommends the Research Addition also be supported on drilled shafts.

Ground floors may be either structural slabs supported by drilled shafts, or slabs-on-grade built after removal of the existing fill and replacement with compacted granular fill. A layer of aggregate base fill will be needed to cushion between parts of the foundation supported on drilled shafts (e.g., drilled shaft caps and tie beams) and soil supported slab-on-grade floors, to reduce abrupt differential settlements between bedrock supported foundations and soil supported floors.

5.03 Construction Considerations

Protection of existing buildings and nearby utilities from disturbance during excavation and construction of the Research Addition is a foundation construction issue. Tolerable lateral and vertical movements of the 1997 Addition, underground utilities, and other nearby structures should be determined for construction purposes by the Structural Engineer and Architect during final design of the Research Addition.

Temporary Excavations: Removing soil near the 1997 Addition will change current unbalanced lateral earth pressures acting on foundation walls which might result in lateral movement, settlement, cracking of the walls and ground floors, and movement of underground utilities. The Contractor's responsibilities for construction of the Research Addition should include designing

and providing temporary lateral support, bracing, and shoring of the 1997 Addition based on the Contractor's planned construction methods and sequencing.

Construction Vibrations: Vibrations from construction activities might have deleterious effects on occupants, vibration sensitive equipment, and the existing structures. If self-propelled vibratory drum rollers are used to compact fill, then they might need to be operated in static mode. If compaction requirements cannot be met with this approach, then light, hand-operated compaction equipment and thinner lifts of backfill might be needed to reduce vibrations to tolerable levels and achieve compaction requirements.

Construction Dewatering: Groundwater levels observed during the explorations were within a few feet of the interface between soil and bedrock. The Contractor should be advised that the on-site fill and naturally deposited soils are sensitive to disturbance when wet. It will be important to pitch temporary construction ground surfaces to divert surface runoff away from excavations, and to remove groundwater infiltration to reduce disturbance of exposed fill and soils. RWG&A anticipates that groundwater control could be accomplished to depths of about 1 foot below free water levels encountered during construction through the use of ditches, sumps, and open pumping methods. The Contractor should identify and provide any applicable permits for the discharge and/or disposal of effluent from the construction dewatering system.

Use of On-site Soils: RWG&A's scope of services did not include an environmental site assessment and has only considered the use of the on-site fill and naturally deposited soils from a geotechnical perspective. Much of the information provided by the VA listed in Table I consisted of analytical test results for characterization of the fill, soil, and groundwater for oil and/or hazardous materials for the 1997 Addition. It is understood the VA has an environmental consultant for the Jamaica Plain Campus. RWG&A anticipates the VA's environmental consultant will assess issues related to the impacts of oil and/or hazardous materials on construction of the Research Addition including earthwork and foundation construction, disposal of excess materials on and/or off site, worker health and safety, and preparation of a release abatement measure plan in accordance with regulatory agency and Massachusetts Contingency Plan requirements.

From a geotechnical perspective, RWG&A anticipates that on-site topsoil will be stripped and either incorporated into landscaped areas or hauled off-site. Topsoil and organic materials are not considered suitable for use as common fill. Materials from foundation and utility excavations are expected to consist of fill, sand, and silty sand, which are not anticipated to be suitable for use as compacted granular fill, but might be suitable for use as common fill in landscaped areas. If on-site fill or naturally deposited soils are proposed for use other than common fill, then the soil should be stockpiled separately and tested to determine if it meets specification requirements for the proposed use.

6.0 RECOMMENDATIONS

Recommendations presented below are provided for use in design and construction of the geotechnical aspects of Research Addition. Foundation and site work construction will be greatly influenced by subsurface conditions at the project site. RWG&A recommends foundation design and construction be in compliance with the requirements of all applicable codes, regulations, and

ordinances. RWG&A understands that, when this report was prepared, VA requires to project design and construction be in compliance with the latest edition of the International Building Code which is the *2012 International Building Code*®. The State of Massachusetts adheres to the *Massachusetts Amendments to the International Building Code 2009 (Basic/Commercial) Eighth Edition*.

6.01 Site Preparation

1. Obstructions to drilled shaft construction should be removed from the Research Addition area prior to installation. Due to the previously developed nature of the site, the Contractor should be sensitive to the potential of encountering obstructions such as remnants of previous structures, building foundations, and underground utilities (note: both active and abandoned) during site work activities and drilled shaft installation. Where such items are encountered beneath the Research Addition plan limits they will need to be excavated to their full extent, removed, and replaced with compacted granular fill. It is anticipated that obstruction removal would be accomplished by hydraulic excavators and hydraulic hammers in open excavations and by rock core bits in drilled shafts.
2. Excavations adjacent to the 1997 Addition and utilities to remain should be designed to limit movements to tolerable amounts as determined by the project Architect, Structural and Civil Engineers. The Contractor's excavation procedures, bracing, shoring and temporary excavation support design, should be submitted for informational purposes, and review and comment by the VA and Research Addition design engineers, prior to construction.
3. Site grading should provide positive drainage away from Research Addition both during and after construction.
4. Backfill should be placed in level, uniform lifts and compacted to at least 95 percent of the maximum dry density as determined by *ASTM D1557, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³))*, (ASTM D1557). In confined areas, backfill should be placed in lifts not exceeding 6 inches in uncompacted thickness (note: maximum particle size 3 inches).
5. Only compacted granular fill may be used to backfill excavations made to remove obstructions, below ground floors, and to backfill drilled shaft caps and tie beams. Gravel borrow (Mass Highway M1.03.0 Type a) for compacted granular fill should be a well-graded sand and gravel mixture meeting the following gradation requirements:

Screen or Sieve Size	Percent Passing
6 inches	100
½ inch	50-85
No. 4	40 - 70
No. 50	8-28
No. 200	0-10

Note: Maximum particle size should be limited to 3 inches within 2 feet of caps, tie beams, ground floor slabs and grade beams, and/or if compacted by hand-guided equipment.

6.02 Foundations

6. The Research Addition needs to be designed to withstand lateral, uplift, and overturning forces due to earthquake. The naturally deposited soils encountered in the previous and recent test borings are not considered susceptible to liquefaction. In accordance with the *2012 International Building Code*® and the *Massachusetts Amendments to the International Building Code 2009 (Basic/Commercial) Eighth Edition*, the soil profile at the site is classified as Site Class D.
7. The Research Addition may be supported on drilled shafts socketed a minimum of 6 inches into hard, competent bedrock and that develop load-carrying capacity in bearing. The shafts should be designed for an allowable bearing pressure of 20 tons (40 kips) per square foot. Drilled shaft design should be consistent with applicable parts of ACI 336.3R-93, Latest Edition, *Design and Construction of Drilled Piers*.
8. Drilled shafts should have a minimum diameter of 2 feet. Based on the foundations reactions provided and recommended allowable bearing pressure, anticipated drilled shaft diameters would range from about 2 to 4 feet.
9. Bottoms of drilled shaft caps, foundation walls, and tie beams, in unheated locations should be a minimum of 4 feet below the lowest adjacent exterior ground surface for frost protection.
10. Lateral loads from wind and earthquake may be resisted by earth pressure against sides of drilled shafts, foundation walls and tie beams and by friction between the bottoms of drilled shafts and bedrock subgrades. An earth pressure equivalent fluid unit weight of 125 pounds per cubic foot per foot below finished grade may be used for lateral resistance. Batter drilled shafts are not recommended.
11. Drilled shafts should be spaced a minimum of two diameters from center-to-center. Installed drilled shafts should not vary from design locations more than 1/24th of the drilled shaft diameter or 3 inches, whichever is less. Drilled shafts should not be out of plumb more than 1 inch in 10 feet for the installed depth. As-built cross sections and diameters of should not be less than design dimensions for their respective installed depth.
12. Drilled shaft lengths are anticipated to range from about 20 to 40 feet below current, local ground surface elevation. Drilled shafts need to be socketed a minimum of 6 inches into hard, competent bedrock over their entire bottom and perimeter. It should be anticipated that individual drilled shaft subgrades might occur on sloping bedrock surfaces, and sockets might extend several feet into bedrock. The bearing surface should be cleaned of soft, loose, and disturbed bedrock fragments. Drilled shaft bearing subgrades be documented by remote video photography methods.
13. Project design and specifications should require temporary casings. The temporary casing will need to be steel and sufficiently strong to resist collapse and sufficiently water tight to exclude any foreign materials during placing of concrete.

14. Concrete should not be placed until the rock conditions have been verified, and cleaning of the drilled shaft bottom has been adequately performed. If water is present in drilled shaft excavation and cannot be removed, then concrete should be placed using a tremie or pumped concrete methods.
15. The drilled shaft Contractor should submit prepare a site specific plan that identifies type, capacity, layout and work space of the drilling equipment, material safety data sheets for any proposed drilling fluids used in the work, qualifications of the Contractor and driller(s), and protocols for spill and clean-up/disposal of excavated materials.
16. Project specifications should require materials testing and inspection during in accordance with VA specifications *Section 31 63 26 Drilled Caissons*, latest edition. Special inspection of the drilled shafts should also be in accordance with *2012 International Building Code®*, *Section 1705.8 Cast-in-place deep foundations*, *Table 1705.8 Required Verification and Inspection of Cast-In-Place Deep Foundations*.

6.03 Ground Floor Slabs

17. Ground floors that will support heavy settlement-sensitive equipment (e.g., the Magnetic Resonance Imaging (MRI) machine) will need to be structural slabs supported by drilled shafts. Ground floors in other areas may be either slabs-on-grade, built after removal of the existing fill and replacement with compacted granular fill, or structural slabs. Slab-on-grade ground floors may be based on a subgrade modulus of 150 pounds per cubic inch.
18. The tops of drilled shaft caps, foundation walls, and tie beams should be placed a minimum of 12 inches below the bottom of ground floor slabs. A 12-inch thick layer of aggregate base fill will be needed beneath slab-on-grade floors to reduce abrupt differential settlements between the bedrock supported foundation and slab-on-grade ground floors.
19. It is understood that foundation drainage was not provided for the 1997 Addition. At the minimum, the foundation walls and floor slabs should be damp proofed to minimize moisture infiltration. It is anticipated design and construction details of floor slabs, including concrete thickness, reinforcing, control joint depth and spacing, and the vapor retarder type and thickness, will be provided by the project Structural Engineer and Architect based on slab used and floor finishes.
20. Granular fill beneath slab-on-grade floors will need to be compacted to at least 95 percent of the maximum dry density as determined by ASTM D1557. Beneath structural floor slabs, granular fill will need to be compacted to at least 92 percent of the maximum dry density as determined by ASTM D1557.

6.04 Foundation Walls and Elevator Pit

21. Foundation walls with unbalanced earth pressures acting upon them should be designed to withstand an at-rest equivalent fluid unit weight of 65 lbs. per cu. ft. ($K_0 = 0.5$). Any foundation walls that cannot be allowed to move or are otherwise restrained, such as ones

attached to building foundations, should be designed for at-rest conditions as well. Lateral load from motor vehicle surcharge can be accounted for by applying a uniform vertical pressure equal to 250 lbs. per sq. ft. multiplied by the at-rest earth pressure coefficient.

22. Typical of elevator pit design and construction, it is anticipated the proposed elevator pit in the Research Addition would be fully waterproofed with a pumped internal sump. The walls and bottom of the elevator pit should be designed to resist hydrostatic uplift pressures with free water level no lower than the exterior finished grade or ground floor finished elevation, whichever is higher. An equivalent fluid unit weight (i.e., combined earth and water unit weight) of 90 pounds per cubic foot is recommended for design of elevator pit and foundation walls below free water level; above free water level an equivalent fluid unit weight of 65 pounds per cubic foot is recommended.

6.05 Underground Utilities

23. Underground utilities may either be earth supported below ground floors or be attached to the Research Addition foundation supported by drilled shafts. In either case, earth-supported utilities will need to pass through over-sized sleeves and/or have flexible connections where they connect to or penetrate the foundation. It is recommended that sleeves and flexible connections allow for 2 inches, minimum, of abrupt differential movement where utilities are affixed to or pass thru drilled shaft caps, foundation walls, tie beams, and other parts of the foundation supported on drilled shafts.
24. Bedding and cover placed below and over earth-supported utilities should be in compliance with the utility and manufacturer requirements for the type of conduit or pipe being installed.
25. Trench backfill below slab-on-grade ground floors, sidewalks and pavements should be systematically compacted in lifts to at least 95 percent of the maximum dry density as determined by *ASTM D1557, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort* (56,000 ft-lbf/ft³ (2,700 kN-m/m³)) to reduce post-construction differential settlements.

6.06 Temporary Excavations

Contractors should make themselves aware of, and become familiar with, applicable local, state, and federal safety regulations, including the current OSHA Excavation and Trench Safety Standards. Construction site safety is considered the sole responsibility of the Contractor, who shall also be solely responsible for the means, methods, and sequencing of construction operations. RWG&A has not evaluated the earthwork and foundation construction from a site safety perspective. Under no circumstance should the Contractor assume or interpreted this report to mean that VA and/or RWG&A, PDT Architects, and Becker Structural Engineers, Inc. are assuming responsibility for construction site safety or the Contractor's activities; such responsibility is not being implied and should not be inferred.

26. As a precautionary measure, it is recommended all vehicles and spoil piles be kept a minimum lateral distance from the top of excavations equal to no less than 100 percent of the excavation height.
27. Subsurface soils at this site encountered within the anticipated depths of excavations consist of fill and naturally deposited sand with silt, silty sand, and sand with gravel. The naturally deposited soils are sensitive to disturbance when wet. To reduce disturbance of exposed subgrade soils, it will be important to divert runoff and provide positive grading to shed seepage and runoff. Exposed soils should be compacted to reduce rutting, ponding, and surface water infiltration.
28. The integrity of natural soils and fill must be maintained during cold weather conditions. Slab subgrades should not be allowed to freeze. The naturally deposited soils are considered to be frost-susceptible. Freezing of subgrade soils beneath floor slabs may result in frost heaving and post-construction settlement and cracking. Every effort should be made to prevent freezing of subgrade soils. In the event that frost penetration occurs, fill or naturally deposited soils should be removed and replaced to the depth of the frozen soils with compacted granular fill. At no time should frozen material be placed as fill. After floor slabs are built, they should be protected from freezing temperatures by insulation or other suitable methods.

7.0 CLOSURE

This report has been prepared for specific application to the proposed Research Addition to the VA Jamaica Plain Campus in Boston, Massachusetts and for the exclusive use of PDT Architects and the project design team. These services have been completed in accordance with generally accepted soil and foundation engineering practices. No other warranty, expressed or implied, is made. RWG&A will need to perform a general review of the final design and specifications in order to complete the scope of services on this project. The final design review is intended to determine that earthwork and foundation recommendations have been interpreted in the manner in which they were intended.

In the event any changes are made in the nature, design, or location of the proposed construction, the conclusions and recommendations of this report should be reviewed by RWG&A and reaffirmed or revised in writing. The recommendations presented above are based on the results of widely spaced explorations. The nature of variations between the explorations may not become evident until construction has begun. If variations are encountered, it will be necessary for RWG&A to re-evaluate the recommendations presented in this report.

TABLE I

SELECTED RECORD DOCUMENTS FOR THE
AMBULATORY CARE ADDITION

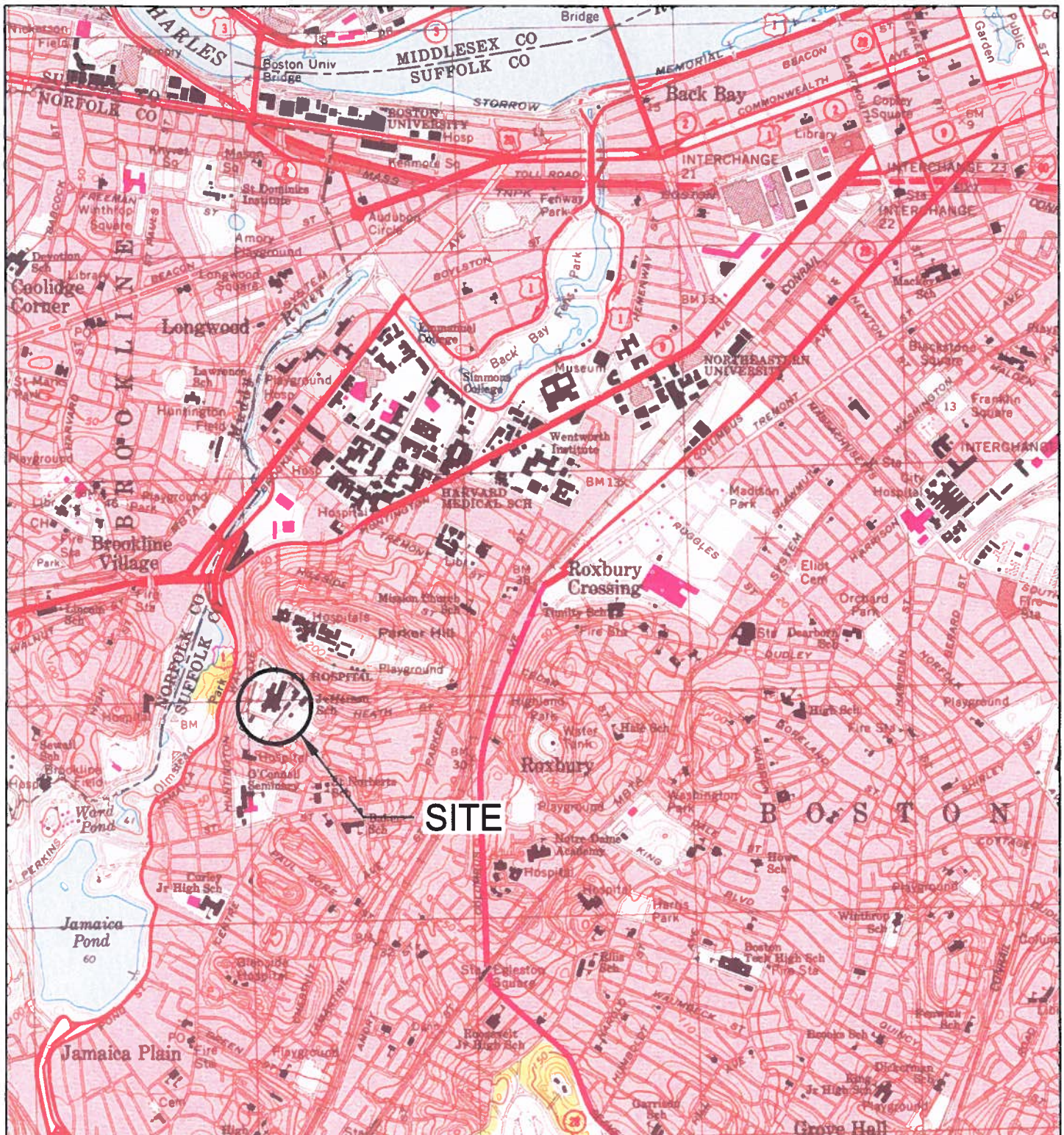
- Drawing Number 15-04-01, *Site Topography, Veterans Administration Hospital Boston, Mass.*, dated 15 December 1949, prepared by Coolidge Shepley Bulfinch & Abbott and Chas. T. Main, Inc.
- Drawing Number 15-04-02, *Core Boring Data, Veterans Administration Hospital Boston, Mass.*, dated 15 December 1949, prepared by Coolidge Shepley Bulfinch & Abbott and Chas. T. Main, Inc.
- *2nd & 3rd Floor – Lighting, Building No. 1A, Additions and Alterations for Research*, Veterans Administration Boston, Mass., dated 28 April 1969, prepared by Charles A. Maguire & Associates.
- Note to Bidders, Table 1, Figures 1, 2, 4, and 6, Appendix A, and Appendix C from Haley & Aldrich, Inc. report titled *Report on Geotechnical Design Recommendations for Veteran's Administration Ambulatory Care Addition and Parking Deck*, for Payette Associated, Inc., dated June 1994.
- Report by Haley & Aldrich, Inc., *Proposed Ambulatory Care Addition and Parking Deck, Veteran's Administration Medical Center, Roxbury, Massachusetts*, for Payette Associated, Inc., date 27 July 1994.
- *Release Abatement Measure Plan, Veteran's Administration Medical Center, Ambulatory Care Addition and Parking Facility, Boston, Massachusetts, RTN:3-11323*, prepared by Haley & Aldrich, Inc., dated 13 December 1996.
- Report by Haley & Aldrich, Inc., *Supplemental Geotechnical and Environmental Data Report, Proposed Ambulatory Care Addition, Veteran's Administration Medical Center*, for Payette Associated, Inc., dated 13 March 1997. Geotechnical Laboratory Test Results.
- Letter from Haley & Aldrich to Payette Associates, Inc. titled *Supplemental Geotechnical and Environmental Recommendations for Design and Construction*, dated 13 March 1997.
- Sheet 1-S26, *Typical Details and General Notes, VAMC Boston Ambulatory Care Addition*, dated 5 June 1997, prepared by Payette Associates Architects Planners.

TABLE II
SUMMARY OF SUBSURFACE EXPLORATIONS
PROPOSED AE RESEARCH ADDITION
VA JAMAICA PLAIN CAMPUS
BOSTON, MASSACHUSETTS

Test Boring Designation	Date Drilled	Approximate Ground Surface Elevation (Feet - NGVD)	Encountered Thickness of Unit (Feet)					Combined Fill and Soil Thickness (Feet)	Drilled into Bedrock (Feet)	Observed Free Water Depth (Feet)
			Fill	Alluvial	Glaciofluvial	Glaciolacustrine	Till			
B-101	July 2014	66	9.5	3	11	12	Not Observed	35.5	12.5	36.8 (OW)
B-102	July 2014	67	4.5	11.5	1.5	Not Observed	Not Observed	17.5	12.5	21
B-103	July 2014	67	7	4	2.5	20	Not Observed	33.5	12	30
B-104	July 2014	67	10.5	Not Observed	8.5	12	Not Observed	31.0	11	Not Measured
B-3	May 1994	68.5	5.5	5	8.5	Not Indicated	Not Indicated	19.0	18.5	24.2 (OW)
B-7	May 1994	67	13.5	Not Indicated	13	5	Not Indicated	31.5	2.0	31
B-201	February 1997	67*	6.5	Not Indicated	22	Not Indicated	Not Indicated	28.5R	Not Drilled	Not Encountered
B-210	February 1997	68*	10	Not Indicated	5	3.5	10.2	28.7R	Not Drilled	Not Encountered

Comments:

1. **Elevation Datum:** Elevations are in feet and referenced to National Geodetic Vertical Datum (NGVD).
2. **An asterisk*:** Ground surface elevations at February 1997 test boring locations were not provided on the test boring logs. RWG&A estimated the elevations for test borings B-201 and B-210 shown in the above Table. Elevation were estimated to the closest half-foot by linear interpolation of ground surface contours shown on Figure 1, *Exploration Location Plan Ambulatory Care Addition*, dated March 1997 provided in the Appendix D.
3. **Not Observed:** Soil unit was not observed in the 2014 test boring made for the Research Addition.
4. **Not Indicated:** Soil unit was not indicated on the test boring log of the 1994 or 1997 test boring made for the 1997 Addition.
5. **R:** Test boring stopped at Refusal. Refusal might have occurred on cobble(s), boulder(s), and/or on bedrock. See test boring logs for definition of Refusal.
6. **(OW):** Free water level measurement taken in a groundwater monitoring well.
7. **Not Measured:** Indicates free water did not accumulate in B-104 such that a water level could be measure during or after drilling the test boring.
8. **Not Encountered:** "NO WATER ENCOUNTERED" noted on logs of test borings B-201 and B-210 made for 1997 Addition. These borings were drilled with hollow-team augers, in turn free water might have been encountered but not observed due to drilling method used.



0 2000 3000 4000

SCALE, FEET

SOURCE:
USGS 7.5-MINUTE TOPOGRAPHIC QUADRANGLE OF
BOSTON SOUTH, MASS., DATED 1970, PHOTOREVISED 1979.

FIGURE 1
LOCUS MAP
GEOTECHNICAL ENGINEERING SERVICES
PROPOSED AE RESEARCH ADDITION
VA JAMAICA PLAIN CAMPUS
BOSTON, MASSACHUSETTS

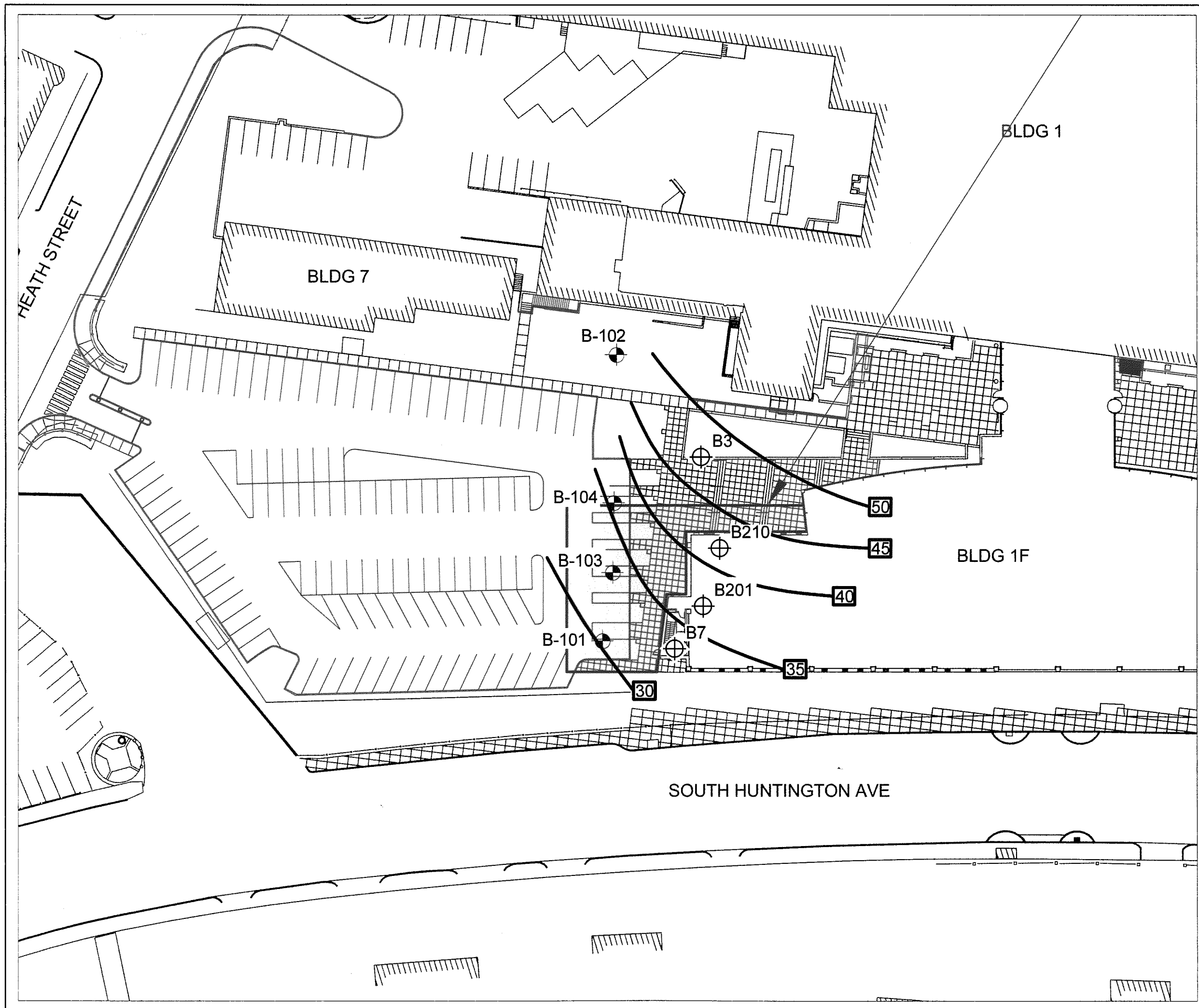
SEPTEMBER 2014

PROJECT NO. 0435-011







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LEGEND:

-  **B-104** APPROXIMATE LOCATION OF SOIL BORING DRILLED JULY 2014.
-  **B4** APPROXIMATE LOCATION OF SOIL BORING DRILLED 1994.
-  **B201** APPROXIMATE LOCATION OF SOIL BORING DRILLED 1997.
-  **50** APPROXIMATE ELEVATION CONTOURS OF BEDROCK

NOTE: ELEVATIONS ARE IN FEET AND ARE REFERENCED TO NATIONAL GEODETIC VERTICAL DATUM (NGVD).

SOURCE:

- DRAWING TITLED "VAJP RESEARCH ADDITION" BY PDT ARCHITECTS, DATED JANUARY.
- DRAWING TITLED "EXPLORATION LOCATION PLAN AMBULATORY CARE ADDITION" BY HALEY & ALDRICH, DATED MARCH 1997.

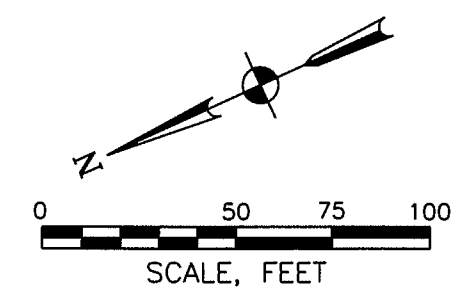


FIGURE 2
EXPLORATION LOCATION PLAN
GEOTECHNICAL ENGINEERING SERVICES
PROPOSED AE RESEARCH ADDITION
VA JAMAICA PLAIN CAMPUS
BOSTON, MASSACHUSETTS

SEPTEMBER 2014 PROJECT NO. 0435-011



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APPENDIX A
EXPLORATION LOGS
RWG&A (2014)

Geotechnical Engineering Services
Proposed AE Research Addition
VA Jamaica Plain Campus
Boston, Massachusetts



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Geotechnical Engineering • Geohydrology • Materials Testing Services

Boring Log: B-101

Total Depth (ft): 48

Sheet 1 of 2

Project Name: Proposed AE Research Addition

RWG&A Project No. 0435-011

Location: Boston, Massachusetts

Client: PDT Architects

RWG&A Representative: C. Morrell

Boring Location: See Exploration Location Plan

Boring Abandonment Method: Installed Well

Observed Water Depth: 36'

Drilling Contractor: Great Works Test Boring

Drill Rig: CME 850

Driller Rep.: P. Michaud

Date Started: 22 July 2014

Date Completed: 22 July 2014

Surface Elevation: 66 (Feet)

Drilling Method: Rotary Wash

Casing Type: 4" Steel

DEPTH, FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	LAB TESTS	CORING RATE (MIN/FT)
0			ASPHALTIC PAVEMENT (4 inches).	14	5	20		
		S-1	FILL; Silty sand, medium dense to very loose, moist, fine to medium sand, some to little silt, few gravel dark brown.		5			
		S-2		16	15	15		
					11			
					10			
					8			
					7			
5		S-3		14	12	2		
					3			
		S-4		4	1	5		
					1			
					1			
					2			
					3			
10		S-5	SAND WITH SILT (SP-SM); Loose, moist, fine sand, little to few silt, light brown.	17	3	8		
			-ALLUVIAL-		3			
			SILTY SAND WITH GRAVEL (SM); Very dense, moist, fine to coarse sand, some silt, little gravel and cobble fragments, gray-brown.		4			
					5			
15		S-6		3	18	50/5"		
			-GLACIOFLUVIAL-					
			GRAVELLY SAND WITH SILT (SM); Medium dense, wet, medium to coarse sand, some fine gravel, little to few silt, brown.					
20		S-7		3	10	28		
					12			
					16			
					20			
			-GLACIOFLUVIAL-					
25		S-8	SAND WITH SILT (SP-SM); Medium dense, wet, fine sand, little silt, brown.	19	9	15		
					6			
					9			
					9			
30								

Notes: Groundwater level measured twice after installation of well, at 24 hrs. and 48 hrs.



R.W. Gillespie & Associates, Inc.
Geotechnical Engineering • Geohydrology • Materials Testing Services

Boring Log: B-101

Total Depth: 48

Sheet 2 of 2

Project Name: Proposed AE Research Addition

Location: Boston, Massachusetts

Client: PDT Architects

Observed Water Depth: 36'

RWG&A Project No. 0435-011

Surface Elevation: 66 (Feet)

Casing Type: 4" Steel

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	LAB TESTS	CORING RATE (MIN/FT)
30			S-9		14	7 6 5 6	11		
35			S-10	-GLACIOLACUSTRINE- SPT refusal on bedrock at 35.5'; roller cone drilled to 38', began NQ rock core at 38'.	4	30 50/3"			
40			R-1	Fresh to slightly weathered, moderately hard, medium grained to aphanitic, gray CONGLOMERATE, heavily fractured from 38' - 44', with occasional high angle fractures/jointing. Recovery = 33/60" RQD = 0%					R-1 3.0 4.0 3.5 4.5 5.0
45			R-2	Recovery = 32/60" RQD = 0%					R-2 4.5 5.0 6.0 8.0 7.0
50				-ROXBURY PUDDINGSTONE- Bottom of Exploration at 48'; Installed Observation Well.					
55									
60									

Notes: Groundwater level measured twice after installation of well, at 24 hrs. and 48 hrs.



Project Name: Proposed AE Research Addition
RWG&A Project No. 0435-011
Location: Boston, Massachusetts
Client: PDT Architects
RWG&A Representative: C. Morrell
Boring Location: See Exploration Location Plan
Boring Abandonment Method: Backfilled with cuttings
Observed Water Depth: 21'

Drilling Contractor: Great Works Test Boring
Drill Rig: CME 850
Driller Rep.: P. Michaud
Date Started: 23 July 2014
Date Completed: 23 July 2014
Surface Elevation: 67 (Feet)
Drilling Method: Rotary Wash
Casing Type: 4" Steel

DEPTH, FT.	SYMBOL	SAMPLES SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	LAB TESTS	CORING RATE (MIN/FT)
0		S-1	FILL; TOPSOIL AND ORGANIC MATERIAL (2 inches).	16	6	12		
		S-2	FILL; Silty sand, medium dense, moist, fine to medium sand, some silt, few gravel from 2' - 3', brown.	4	6 6 14 14 13	27		
5		S-3	SAND WITH SILT (SP-SM); Very loose to medium dense, moist, fine sand, little silt, few medium sand, light brown.	10	13 2	3		
		S-4		6	2 1 2 3 5 6	11		
10		S-5		6	10 18 13 10 12	23		
15		S-6	-ALLUVIAL-	9	7 7 13	20		
			SAND (SP); Medium dense, moist, medium to coarse sand, few fine sand, few silt, brown.		50/0"			
			-GLACIOFLUVIAL-					
20		R-1	Bedrock encountered at 17.5'; roller cone drilled to 20', began NQ rock core at 20'. Fresh to slightly weathered, moderately hard, coarse to fine grained, gray CONGLOMERATE; heavily fractured from 20' - 23'. Recovery = 48/60" RQD = 21%					R-1 4.0 4.0 5.0 5.5 5.0
25		R-2	Recovery = 60/60" RQD = 96%					R-2 4.0 5.0 4.5 5.5 6.5
30								

Notes: Groundwater level measured after boring was left open for 30 minutes.



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Boring Log: B-102

Total Depth: 30

Sheet 2 of 2

Project Name: Proposed AE Research Addition

Location: Boston, Massachusetts

Client: PDT Architects

Observed Water Depth: 21'

RWG&A Project No. 0435-011

Surface Elevation: 67 (Feet)

Casing Type: 4" Steel

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	LAB TESTS	CORING RATE (MIN/FT)
30				Bottom of Exploration at 30'; Terminated boring 12.5' into rock.					
35									
40									
45									
50									
55									
60									

Notes: Groundwater level measured after boring was left open for 30 minutes.



R.W. Gillespie & Associates, Inc.

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Boring Log: B-103

Total Depth (ft): 45.5

Sheet 1 of 2

Project Name: Proposed AE Research Addition

RWG&A Project No. 0435-011

Location: Boston, Massachusetts

Client: PDT Architects

RWG&A Representative: C. Morrell

Boring Location: See Exploration Location Plan

Boring Abandonment Method: Backfilled with cuttings

Observed Water Depth: 30'

Drilling Contractor: Great Works Test Boring

Drill Rig: CME 850

Driller Rep.: P. Michaud

Date Started: 22 July 2014

Date Completed: 23 July 2014

Surface Elevation: 67 (Feet)

Drilling Method: Rotary Wash

Casing Type: 4" Steel

DEPTH, FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	LAB TESTS	CORING RATE (MIN/FT)
0								
		S-1	ASPHALTIC PAVEMENT (4 inches).	7	8	16		
			FILL; Sand with gravel, medium dense, moist, fine to coarse sand, little gravel, few silt, dark brown.		7			
		S-2	Brick fragments around 3'.	4	9	28		
					8			
					6			
5		S-3		11	14	19		
					14			
					13			
					4			
		S-4	FILL; Sand with gravel, medium dense, moist, fine to coarse sand, little gravel, few silt, dark brown.	12	7	8		
			SAND WITH SILT (SP-SM); Loose, moist, fine sand, little silt, brown.		12			
					16			
					13			
					4			
10		S-5	-ALLUVIAL-	13	4	38		
					5			
					16			
			SAND WITH GRAVEL (SP); Dense, moist, fine to medium sand, little gravel, few silt, brown.		13			
			-GLACIOFLUVIAL-		25			
			SAND WITH SILT (SM); Medium dense, moist, fine sand, little silt, brown.		20			
15		S-6		19	10	20		
					10			
					10			
					10			
20		S-7		16	9	17		
					10			
					7			
					10			
25		S-8		17	8	15		
					7			
					8			
					8			
					7			
30								

Notes: Groundwater level measured after boring was left open for 30 minutes.



R.W. Gillespie & Associates, Inc.
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Boring Log: B-103

Total Depth: 45.5

Sheet 2 of 2

Project Name: Proposed AE Research Addition

Location: Boston, Massachusetts

Client: PDT Architects

Observed Water Depth: 30'

RWG&A Project No. 0435-011

Surface Elevation: 67 (Feet)

Casing Type: 4" Steel

DEPTH, FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	LAB TESTS	CORING RATE (MIN/FT)
30		S-9		0	10	21		
					10			
					10			
					11			
					10			
35		R-1	-GLACIOLACUSTRINE- Bedrock encountered at 33.5'; roller cone drilled to 35.5' and began NQ rock core AT 35.5'. Fresh, moderately hard, medium grained to aphanitic, dark gray CONGLOMERATE; with moderate to heavy fracturing, and moderate to high angle fractures from 41' - 43'. Recovery = 60/60" RQD = 61%					R-1 3.0 3.5 3.0 4.0 5.0
40		R-2	Recovery = 60/60" RQD = 41%					R-2 5.0 5.0 4.5 4.5 5.0
45			Bottom of Exploration at 45.5'; Terminated boring 12' into rock.					
50								
55								
60								

Notes: Groundwater level measured after boring was left open for 30 minutes.



Project Name: Proposed AE Research Addition

RWG&A Project No. 0435-011

Location: Boston, Massachusetts

Client: PDT Architects

RWG&A Representative: C. Morrell

Boring Location: See Exploration Location Plan

Boring Abandonment Method: Backfilled with cuttings

Observed Water Depth: Not Obs.

Drilling Contractor: Great Works Test Boring

Drill Rig: CME 850

Driller Rep.: P. Michaud

Date Started: 24 July 2014

Date Completed: 24 July 2014

Surface Elevation: 67 (Feet)

Drilling Method: Rotary Wash

Casing Type: 4" Steel

DEPTH, FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	LAB TESTS	CORING RATE (MIN/FT)
0		S-1	ASPHALTIC PAVEMENT (4 inches).	14	8	15		
			FILL; Gravelly sand with silt, medium dense, moist, fine to coarse sand, some gravel, little silt, dark brown.		8			
		S-2	FILL; Silty sand, medium dense, moist, fine to medium sand, some silt, few coarse sand, trace gravel, dark brown.	5	7	20		
					7			
					4			
5		S-3	FILL; Silty sand, loose, moist, fine to medium sand, some silt, trace coarse sand, dark brown.	14	10	5		
					10			
					9			
		S-4		4	3	2		
					4			
					3			
					1			
10		S-5	SILTY SAND WITH GRAVEL (SM); Dense, moist, fine to coarse sand, some silt, little gravel, brown.	16	1	36		
					1			
					7			
					14			
					22			
					24			
15		S-6		18	14	28		
					14			
					14			
					21			
			-GLACIOFLUVIAL-					
20		S-7	SILTY SAND (SM); Medium dense, moist, fine sand, some silt, trace medium sand, brown.	7	8	17		
					9			
					8			
					7			
25		S-8		13	7	17		
					8			
					9			
					7			
30								

Notes:



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Boring Log: B-104

Total Depth: 42

Sheet 2 of 2

Project Name: Proposed AE Research Addition

Location: Boston, Massachusetts

Client: PDT Architects

Observed Water Depth: Not Obs.

RWG&A Project No. 0435-011

Surface Elevation: 67 (Feet)

Casing Type: 4" Steel

DEPTH, FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	LAB TESTS	CORING RATE (MIN/FT)
30		S-9	-GLACIOLUCSTRINE-	6	9			
		R-1	Bedrock encountered at 31'; roller cone drilled to 32', began NQ rock core. Recovery = 60/60" RQD = 85% Fresh to slightly weathered, moderately hard, coarse to fine grained gray CONGLOMERATE; heavily fractured with steep angled, nearly vertical joints from 40.5' - 42'.	10	50/0"			R-1 3.0 3.5 3.5 3.0 5.0
35		R-2	Recovery = 60/60" RQD = 68%					R-2 4.0 4.5 4.0 3.5 4.0
40			Bottom of Exploration at 42'; Terminated boring 11' into rock.					
45								
50								
55								
60								

Notes:

APPENDIX B

GROUNDWATER OBSERVATION WELL CONSTRUCTION DETAIL

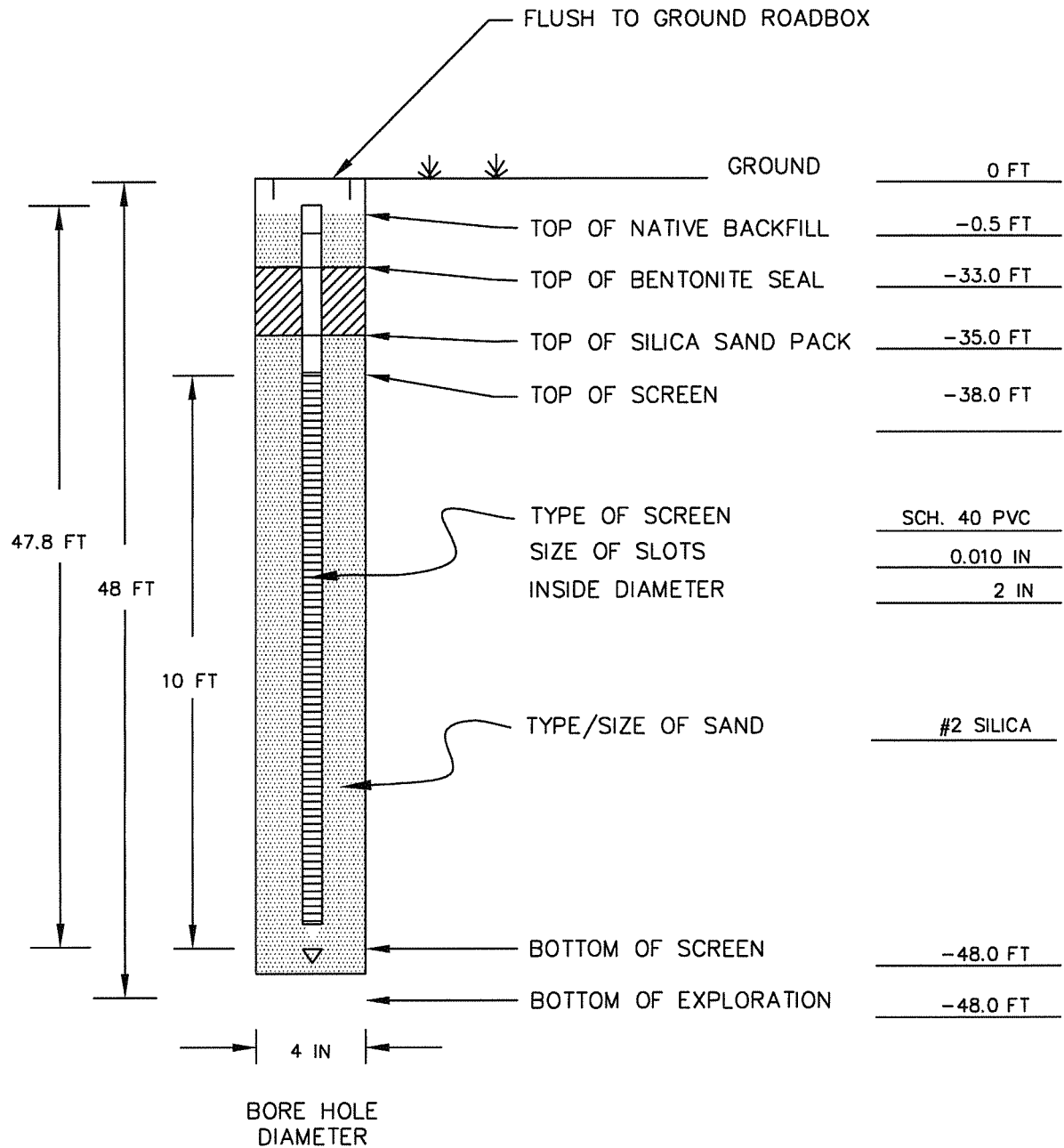
Geotechnical Engineering Services
Proposed AE Research Addition
VA Jamaica Plain Campus
Boston, Massachusetts

GROUNDWATER OBSERVATION WELL CONSTRUCTION DETAIL

WELL ID: B-101

DATE: 07/23/2014

GROUNDWATER
DISTANCE BELOW GROUND: 36.0 FT



WATER LEVEL READINGS

REFERENCE POINT: GROUND SURFACE
ELEVATION: 66 FT.

DATE:	ELAPSED TIME:	WATER DEPTH, BELOW REFERENCE	WATER ELEVATION	BY:
07-23-14	1 DAY	36.0 FT.	30.0	CSM
07-24-14	2 DAYS	36.0 FT.	30.0	CSM
09-03-14	42 DAYS	36.8 FT.	29.2	CSM

R.W. GILLESPIE & ASSOCIATES, INC.

PROJECT: PROPOSED AE RESEARCH ADDITION
LOCATION: VA JAMAICA PLAIN CAMPUS
PROJECT NO.: BOSTON, MASSACHUSETTS 0435-011
DESCRIPTION: OVERBURDEN GROUNDWATER
MONITORING WELL
(SHALLOW, UNCONFINED)
DRILLING DATE: 22 JULY 2014

APPENDIX C
LABORATORY TEST RESULTS

Geotechnical Engineering Services
Proposed AE Research Addition
VA Jamaica Plain Campus
Boston, Massachusetts

Unconfined Compressive Strength by ASTM 7012, Method C

Standard Test Methods for Compressive Strength of Elastic Moduli of Intact Rock Core Specimens under Varying States of Stress and Temperatures

Project Name: Proposed AE Research Addition

Lab No.: 13317

Client: PDT Architects

Test Date: 7/31/2014

Project No.: 0435-011

Project Location: Boston, MA

Boring ID	Sample ID	Depth (ft)	Compressive Strength (psi)	Failure Type	ASTM D 4543*
B-2	R-1	23.2-23.8	12,980	4	No
B-3	R-1	42.3-43	8,440	2	No
B-4	R-1	32.5-33.1	3,580	4	No

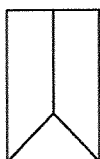
*Note: Samples did not meet Dimensional and Shape Tolerances (ASTM D 4543) and were capped before testing.

Boring ID	Sample ID	Length (in.)	Diameter (in.)	L/D
B-2	R-1	4.203	2.002	2.10
B-3	R-1	4.247	1.985	2.14
B-4	R-1	4.080	1.996	2.04

Failure Types



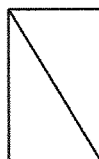
Cone
1



Cone & Split
2



Columnar
3



Shear
4



Side Fracture
5



Double Side Fracture
6

Tested By: LFT/JSL

Checked By: JMB



R.W. Gillespie & Associates

APPENDIX D

SUBSURFACE INFORMATION FOR 1997 ADDITION

Geotechnical Engineering Services
Proposed AE Research Addition
VA Jamaica Plain Campus
Boston, Massachusetts

1994 SUBSURFACE INFORMATION

TABLE 1 - SUMMARY OF RECENT SUBSURFACE EXPLORATIONS

VA HOSPITAL AMBULATORY CARE ADDITION
ROXBURY, MASSACHUSETTS

TEST BORING NO.	APPROXIMATE GROUND SURFACE ELEVATION (FT.)	DEPTH OF BORING (FT.)	THICKNESS OF SOIL AND ROCK STRATUM, FT.					GLACIAL TILL	BEDROCK
			FILL	ALLUVIAL	GLACIO- FLUVIAL	GLACIO- LACUSTRINE	GLACIO- TILL		
B1	74.5	41.5	16.0	---	4.5	---	---	---	21.0*
B2	74.0	19.0	8.0	---	4.0	---	---	---	24.0*
B3	68.5	37.5	5.5	5.0	8.5	---	---	---	18.5*
B4	71.5	21.5	7.0	---	12.5	---	---	---	2.0*
B5	73.7	8.8	4.0	1.5	---	---	---	---	3.3*
B6	73.8	16.5	13.5	---	---	---	---	---	3.0*
B7	67.0	33.5	13.5	---	13.0	5.0	---	---	2.0*
B8	70.5	32.0	10.5	---	9.0	---	10.5	---	2.0*
B9	72.5	20.5	8.0	---	---	---	---	---	12.5*
B10	92.5	9.0	4.0	---	---	---	---	---	5.0*
B11	76.0	13.0	12.0	---	---	---	---	---	1.0*
B12	92.5	15.5	5.0	---	---	---	---	---	10.5*
B13	77.0	8.8	8.8	---	---	---	---	---	---
B14	81.5	16.8	15.5	---	---	---	---	1.3*	1.3*
B15	81.5	17.3	14.0	---	---	---	---	2.3*	2.3*
B16	80.5	21.5	14.0	---	---	---	---	1.0	5.0*
B17	83.5	30.5	25.0	---	---	---	---	2.5	5.5*
B18	91.5	4.8	3.0	---	---	---	---	---	1.8*

NOTES:

1. Ground surface elevation is based on interpolation between contour lines on base plan and should be considered approximate.
2. Elevations are in feet and are referenced to National Geodetic Vertical Datum of 1929.
3. Refer to test boring logs in Appendix B for more detailed information about soil strata.
4. --- indicates not encountered.
5. * indicates stratum penetrated to depth shown.

gwh8:tabivmc.wql

GUILD DRILLING CO., INC.
100 WATER STREET • EAST PROVIDENCE, R.I.

SHEET 1 OF 2

TO Haley & Aldrich, Inc.
PROJECT NAME Prop. Ambulatory Care Addn.
REPORT SENT TO above

ADDRESS Cambridge, Mass.
LOCATION Jamaica Plain (Boston), Mass.
OUR JOB NO. 94-294

HOLE NO. B-1
PROJ. NO. 11324-001
SURF. ELEV. _____

GROUND WATER OBSERVATIONS				CASING	SAMPLER	CORE BAR.	DATE	
At <u>22.8'</u>	after <u>36</u> Hours	Type	<u>HW-NW</u>	<u>S/S</u>	<u>NV-II</u>	Start	<u>4/29/94</u>	
At <u>21.5'</u>	after _____ Hours	Size I.D.	<u>4" 3"</u>	<u>1-3/8"</u>		Complete	<u>5/2/94</u>	
	<u>5/2/94</u>	Hammer Wt.	<u>Drilled</u>	<u>140#</u>	BIT	Boring Foreman	<u>A.W & R.A.</u>	
		Hammer Fall		<u>30"</u>	Dia.	Inspector/Engr.	<u>M. Turner</u>	

LOCATION OF BORING

Depth	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler			Moisture Density or Consist.	Strata Change Elev./ Depth	SOIL OR ROCK IDENTIFICATION Remarks include color, gradation, type of soil etc. Rock-color, type, condition, hardness, drilling time, seams, etc.	SAMPLE		
				0-6	6-12	12-18				No.	Pen"	Rec."
		0.5-2.5	D	12	41	37		0.5	Cement Slab	1	24	12
						42		2.0	Brown fine to medium SAND, little gravel, silt -FILL-			
									Boulder			
									-FILL-			
5		4.0-6.0	D	15	8	7		4.0	Dark Brown silty fine to coarse SAND & Gravel, trace cinders - FILL	2	24	17
						7						
10		9.0-11.0	D	8	8	9				3	24	17
						12						
15		14.0-16.0	D	6	4	3				4	24	12
						4						
		16.0-18.0	D	12	9	18		16.0	Light Brown silty fine SAND	5	24	16
						35						
20		19.0-20.5	D	24	31	46			-GLACIOFLUVIAL DEPOSITS-	6	18	13
								20.5				
		21.0-26.5	C				Min/Ft			C1	66	60
							5					
							6					
							7					
25							7		Gray CONGLOMERATE - Fractured			
							7					
		26.5-31.5	C				6			C2	60	60
							6		-BEDROCK-			
30							8					
							9					
		31.5-36.5	C				8			C3	60	60
							8					
35							12					
							14					
		36.5-41.5	C				12					
							13			C4	60	68
							15					
							20					

GROUND SURFACE TO		USED	CASING:	THEN	SUMMARY:			
Sample Type		Proportions Used	140 lb. Wt x 30" fall on 2" O.D. Sampler					
D=Drive	C=Cored	W=Washed	Cohesionless	Density	Cohesive	Consistency	Earth Boring <u>21'</u>	
UP=Fixed Piston	UT=Shelby Tube	trace	0-10	Loose	0-4	Soft	Rock Coring <u>20.5'</u>	
TP=Test Pit	A=Auger	little	10-30	Med. Dense	4-8	M./Stiff	Samples <u>6</u>	
OE = Open End Rod		some	30-50	Dense	8-15	Stiff		
* 300# hammer		and	50+	Very Dense	15-30	V-Stiff	HOLE NO. <u>B-1</u>	

GUILD DRILLING CO., INC.
100 WATER STREET • EAST PROVIDENCE, R.I.

SHEET 2 OF 2

Haley & Aldrich, Inc.

ADDRESS Cambridge, Mass.

HOLE NO. B-1

JECT NAME Prop. Ambulatory Care Addn.

LOCATION Jamaica Plain (Boston), Mass.

PROJ. NO. 11324-001

ORT SENT TO above

OUR JOB NO. 94-294

SURF. ELEV. _____

th	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler			Moisture Density or Consist.	Strata Change Elev./ Depth	SOIL OR ROCK IDENTIFICATION Remarks include color, gradation, type of soil etc. Rock-color, type, condition, hardness, drilling time, seams, etc.	SAMPLE		
				From	To					No.	Pen"	Rec."
				0-6	6-12	12-18	25 20	41.5	Bottom of Boring 41.5'			

OUND SURFACE TO _____ USED _____ CASING: THEN _____

ample Type
=Drive C=Cored W=Washed
P=Fixed Piston UT=Shelby Tube
P=Test Pit A=Auger
IE = Open End Rod
300# hammer

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%
and 35 to 50%

140 lb. Wt x 30" fall on 2" O.D. Sampler
Cohesionless Density Cohesive Consistency
0-10 Loose 0-4 Soft 30 + Hard
10-30 Med. Dense 4-8 M./Stiff
30-50 Dense 8-15 Stiff
50+ Very Dense 15-30 V-Stiff

SUMMARY:
Earth Boring 21'
Rock Coring 20.5'
Samples 6
HOLE NO. B-1

TO Haley & Aldrich, Inc.
PROJECT NAME Prop. Ambulatory Care Addn.
REPORT SENT TO above

ADDRESS Cambridge, Mass.
LOCATION Jamaica Plain (Boston), Mass.
OUR JOB NO. 94-294

HOLE NO. B-2 OW
PROJ. NO. 11324-001
SURF. ELEV. _____

GROUND WATER OBSERVATIONS			CASING	SAMPLER	CORE BAR.	DATE	
At <u>23.2'</u>	after <u>0.0</u> Hours	Type	<u>HW-NW</u>	<u>S/S</u>	<u>NV-II</u>	Start	<u>4/29/94</u>
		Size I.D.	<u>4" 3"</u>	<u>1-3/8"</u>		Complete	<u>5/2/94</u>
At _____	after _____ Hours	Hammer Wt.	<u>300#</u>	<u>140#</u>	<u>BIT</u>	Boring Foreman	<u>P. Vieira</u>
		Hammer Fall	<u>24"</u>	<u>30"</u>	<u>Dia.</u>	Inspector/Engr.	<u>M. Tumer</u>

LOCATION OF BORING

Depth	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler			Moisture Density or Consist.	Strata Change Elev./ Depth	SOIL OR ROCK IDENTIFICATION Remarks include color, gradation, type of soil etc. Rock-color, type, condition, hardness, drilling time, seams, etc.	SAMPLE		
				0-6	6-12	12-18				No.	Pen"	Rec."
	25	0.5-1.5	D	1	5			0.5	Cement Slab	1	12	12
	36	1.5-2.5	D	15	23			1.5	Brown medium to fine SAND - FILL	1A	12	12
	56								Dark Brown silty fine to medium SAND, some gravel, red brick - FILL			
5		4.5-5.6	D	17	26	120/1"			* color change to Brown	2	13	7
								8.0				
10		9.5-11.0	D	20	16	120			Brown silty fine to medium SAND, some gravel	3	18	8
									-GLACIOFLUVIAL DEPOSITS-			
								12.0				
15									(Roller Bit to 15.5') Started Coring at 16.5'			
		16.5-21.5	C				Min/Ft 15			C1	60	60
							9		Gray CONGLOMERATE			
							5					
20							5					
		21.5-22.0	C				5			C2	6	6
		22.0-27.0	C				17/6"			C3	60	60
							4		-BEDROCK-			
25							4					
		27.0-32.0	C				4			C4	60	60
							4					
30							4					
		32.0-36.0	C				4			C5	48	48
							10					
35							8					
							12					
							11					
								36.0	Bottom of Boring 36'			

GROUND SURFACE TO _____ USED _____		CASING: _____ THEN _____	
Sample Type	Proportions Used	140 lb. Wt x 30" fall on 2" O.D. Sampler	SUMMARY:
D=Drive C=Cored W=Washed	trace 0 to 10%	Cohesionless Density Cohesive Consistency	Earth Boring <u>16.5'</u>
UP=Fixed Piston UT=Shelby Tube	little 10 to 20%	Loose 0-4 Soft 30 + Hard	Rock Coring <u>19.5'</u>
TP=Test Pit A=Auger	some 20 to 35%	Med. Dense 4-8 M./Stiff	Samples <u>3</u>
OE = Open End Rod	and 35 to 50%	Dense 8-15 Stiff	
* 300# hammer		Very Dense 15-30 V-Stiff	HOLE NO. <u>B-2 OW</u>

GUILD DRILLING CO., INC.
100 WATER STREET • EAST PROVIDENCE, R.I.

SHEET 2 OF 2

Haley & Aldrich, Inc.
JECT NAME Prop. Ambulatory Care Addn.
ORT SENT TO above

ADDRESS Cambridge, Mass.
LOCATION Jamaica Plain (Boston), Mass.
OUR JOB NO. 94-294

HOLE NO. B-2 OW
PROJ. NO. 11324-001
SURF. ELEV. _____

th	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler			Moisture Density or Consist.	Strata Change Elev./ Depth	SOIL OR ROCK IDENTIFICATION Remarks include color, gradation, type of soil etc. Rock-color, type, condition, hardness, drilling time, seams, etc.	SAMPLE		
				0-6	6-12	12-18				No.	Pen"	Rec."
									Installed 2" PVC Well 10' Screen - 15' Solid 2 Bags of Ottawa Sand 1/4 Bag of Bentonite 1/4 Bag of Cement One Road Box			

FOUND SURFACE TO _____		USED _____	CASING: _____		THEN _____		
Sample Type		Proportions Used		140 lb. Wt x 30" fall on 2" O.D. Sampler			<u>SUMMARY:</u>
=Drive C=Cored W=Washed	trace 0 to 10%	Cohesionless	Density	Cohesive	Consistency	30 + Hard	Earth Boring <u>16.5</u>
P=Fixed Piston UT=Shelby Tube	little 10 to 20%	0-10	Loose	0-4	Soft		Rock Coring <u>19.5</u>
P=Test Pit A=Auger	some 20 to 35%	10-30	Med. Dense	4-8	M./Stiff		Samples <u>3</u>
E = Open End Rod	and 35 to 50%	30-50	Dense	8-15	Stiff		
300# hammer		50+	Very Dense	15-30	V-Stiff		
							HOLE NO. B-2 OW

GUILD DRILLING CO., INC.
100 WATER STREET • EAST PROVIDENCE, R.I.

SHEET 1 OF 2

TO Haley & Aldrich, Inc.
PROJECT NAME Prop. Ambulatory Care Addn.
REPORT SENT TO above

ADDRESS Cambridge, Mass.
LOCATION Jamaica Plain (Boston), Mass.
OUR JOB NO. 94-294

HOLE NO. B-3 OW
PROJ. NO. 11324-001
SURF. ELEV. _____

GROUND WATER OBSERVATIONS			CASING	SAMPLER	CORE BAR.	DATE	
At <u>24.8'</u>	after <u>0.0</u> Hours	Type	<u>HW-NW</u>	<u>S/S</u>	<u>NV-II</u>	Start	<u>5/4/94</u>
At _____	after _____ Hours	Size I.D.	<u>4" 3"</u>	<u>1-3/8"</u>		Complete	<u>5/6/94</u>
		Hammer Wt.	<u>300#</u>	<u>140#</u>	<u>BIT</u>	Boring Foreman	<u>P. Vieira</u>
		Hammer Fall	<u>24"</u>	<u>30"</u>	<u>Dia.</u>	Inspector/Engr.	<u>M. Turner</u>

LOCATION OF BORING

Depth	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler			Moisture Density or Consist.	Strata Change Elev./ Depth	SOIL OR ROCK IDENTIFICATION Remarks include color, gradation, type of soil etc. Rock-color, type, condition, hardness, drilling time, seams, etc.	SAMPLE		
				0-6	6-12	12-18				No.	Pen"	Rec.
5	31	0.5-2.5	D	8	14	24		0.5	Asphalt	1	24	11
	27							Gray Brown silty medium to fine SAND, some gravel, rock fragments				
	87											
	121											
	16	4.0-6.0	D	18	25	39			-FILL -	2	24	12
44	Brown fine sandy SILT, trace fine gravel Boulders							2A				
41												
50												
35												
10	22	9.0-11.0	D	5	5	7		-ALLUVIAL DEPOSITS-	3	24	18	
	44							Brown Sand & Gravel - Boulders	3A			
		11.0-13.0	C						-GLACIOFLUVIAL DEPOSITS-	C1	24	24
									Boulders			
									-GLACIOFLUVIAL DEPOSITS-			
15		15.0-16.5	D	82	100	130		Brown Gray fine to coarse SAND & Gravel	4	18	14	
							-GLACIOFLUVIAL DEPOSITS-					
							Top of Bedrock					
20		19.0-23.0	C				Min/Ft	15	19.0	C2	48	48
		23.0-28.0	C				25	Gray CONGLOMERATE				
25						25						
						24				C3	60	60
						23	-BEDROCK-					
						22						
						43						
	28.0-33.0	C				12						
								6			C4	60
30							4.5					
							4					
							4.5					
							5			C5	54	54
		33.0-37.5	C				4.5					
							5					
							5					
35							5					
							5/6					
								37.5	Bottom of Boring 37.5'			

GROUND SURFACE TO _____ USED _____			CASING: _____ THEN _____			SUMMARY:	
Sample Type	Proportions Used		140 lb. Wt x 30" fall on 2" O.D. Sampler			Earth Boring <u>19'</u>	
D=Drive C=Cored W=Washed	trace 0 to 10%	Cohesionless	Density	Cohesive	Consistency	Rock Coring <u>18.5'</u>	
UP=Fixed Piston UT=Shelby Tube	little 10 to 20%	0-10	Loose	0-4	Soft 30 + Hard	Samples <u>4</u>	
TP=Test Pit A=Auger	some 20 to 35%	10-30	Med. Dense	4-8	M./Stiff		
OE = Open End Rod	and 35 to 50%	30-50	Dense	8-15	Stiff		
* 300# hammer		50+	Very Dense	15-30	V-Stiff		

HOLE NO. **B-3 OW**

GUILD DRILLING CO., INC.
100 WATER STREET • EAST PROVIDENCE, R.I.

SHEET 2 OF 2

Haley & Aldrich, Inc.

ADDRESS Cambridge, Mass.

HOLE NO. B-3 OW

JECT NAME Prop. Ambulatory Care Addn.

LOCATION Jamaica Plain (Boston), Mass.

PROJ. NO. 11324-001

ORT SENT TO above

OUR JOB NO. 94-294

SURF. ELEV. _____

th	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler			Moisture Density or Consist.	Strata Change Elev./ Depth	SOIL OR ROCK IDENTIFICATION Remarks include color, gradation, type of soil etc. Rock-color, type, condition, hardness, drilling time, seams, etc.	SAMPLE		
				From 0-6	To 6-12	To 12-18				No.	Pen"	Rec."
									Installed 2" PVC Well 15' Riser - 10' Screen 2 Bags of Ottawa Sand 1/4 Bag of Bentonite One Bag of Peastone One Cup of Cement One Road Box			

ROUND SURFACE TO _____ USED _____ CASING: THEN _____

Sample Type
 D=Drive C=Cored W=Washed
 JP=Fixed Piston UT=Shelby Tube
 P=Test Pit A=Auger
 OE = Open End Rod
 300# hammer

Proportions Used
 trace 0 to 10%
 little 10 to 20%
 some 20 to 35%
 and 35 to 50%

Cohesionless
 0-10
 10-30
 30-50
 50+

140 lb. Wt x 30" fall on 2" O.D. Sampler
 Density
 Loose
 Med. Dense
 Dense
 Very Dense

Cohesive
 0-4
 4-8
 8-15
 15-30

Consistency
 Soft
 M./Stiff
 Stiff
 V-Stiff
 30 + Hard

SUMMARY:

Earth Boring 19'
 Rock Coring 18.5'
 Samples 4

HOLE NO. B-3 OW

GUILD DRILLING CO., INC.
100 WATER STREET • EAST PROVIDENCE, R.I.

SHEET 1 OF 1

TO Haley & Aldrich, Inc.
PROJECT NAME Prop. Ambulatory Care Addn.
REPORT SENT TO above

ADDRESS Cambridge, Mass.
LOCATION Jamaica Plain (Boston), Mass.
OUR JOB NO. 94-294

HOLE NO. B-4
PROJ. NO. 11324-001
SURF. ELEV. _____

GROUND WATER OBSERVATIONS			CASING	SAMPLER	CORE BAR.	DATE	
At _____	after _____	Hours	Type <u>HW</u>	<u>S/S</u>	_____	Start	<u>5/10/94</u>
At _____	after _____	Hours	Size I.D. <u>4"</u>	<u>1-3/8"</u>	_____	Complete	<u>5/10/94</u>
			Hammer Wt. <u>300#</u>	<u>140#</u>	BIT	Boring Foreman	<u>P. Vieira</u>
			Hammer Fall <u>24"</u>	<u>30"</u>	_____	Inspector/Engr.	<u>M. Turner</u>

LOCATION OF BORING

Depth	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler			Moisture Density or Consist.	Strata Change Elev./ Depth	SOIL OR ROCK IDENTIFICATION Remarks include color, gradation, type of soil etc. Rock-color, type, condition, hardness, drilling time, seams, etc.	SAMPLE		
				From 0-6	6-12	To 12-18				No.	Pen*	Rec.*
5	Roller Bit ahead to 9'	0.5-2.5	D	26	27	29		0.5	Asphalt	1	24	15
						102			Brown silty medium to fine SAND - FILL some asphalt fragments, cinders			
		4.0-6.0	D	50	43	40		4.0	Gray fine to medium SAND, some silt, trace fine to coarse gravel, cobbles - FILL	2	24	13
10						45		7.0				
	23	9.0-11.0	D	10	11	16			Yellow Brown coarse to fine sandy GRAVEL, little silt	3	24	4
	57					45						
15	123											
	169											
	78											
20	31	14.0-16.0	D	20	23	21		14.0	Brown medium to fine SAND	4	24	14
	40					20						
	57											
20	60											
	110											
		19.0-19.8	D	10	120/3"			19.5	(Hit refusal at 19.8' - Roller Bit to 21.5')	5	9	0
								21.5	-BEDROCK- Bottom of Boring 21.5'			

ROUND SURFACE TO _____ USED _____ CASING: THEN _____

Sample Type
D=Drive C=Cored W=Washed
UP=Fixed Piston UT=Shelby Tube
TP=Test Pit A=Auger
OE = Open End Rod
* 300# hammer

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%
and 35 to 50%

140 lb. Wt x 30" fall on 2" O.D. Sampler
Cohesionless Density Cohesive Consistency
0-10 Loose 0-4 Soft 30 + Hard
10-30 Med. Dense 4-8 M./Stiff
30-50 Dense 8-15 Stiff
50+ Very Dense 15-30 V-Stiff

SUMMARY:

Earth Boring 21.5'
Rock Coring _____
Samples 5

HOLE NO. B-4

GUILD DRILLING CO., INC.
100 WATER STREET • EAST PROVIDENCE, R.I.

SHEET 1 OF 1

Haley & Aldrich, Inc.

ADDRESS Cambridge, Mass.

HOLE NO. B-5

PROJECT NAME Prop. Ambulatory Care Addn.

LOCATION Jamaica Plain (Boston), Mass.

PROJ. NO. 11324-001

PORT SENT TO above

OUR JOB NO. 94-294

SURF. ELEV. _____

GROUND WATER OBSERVATIONS

CASING SAMPLER CORE BAR.

DATE

None after 0.0 Hours

Type

HW

S/S

Start

5/9/94

Size I.D.

4"

1-3/8"

Complete

5/9/94

_____ after _____ Hours

Hammer Wt.

300#

140#

BIT

Boring Foreman

P. Vieira

Hammer Fall

24"

30"

Inspector/Engr.

M. Turner

CATION OF BORING

Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler			Moisture Density or Consist.	Strata Change Elev./ Depth	SOIL OR ROCK IDENTIFICATION Remarks include color, gradation, type of soil etc. Rock-color, type, condition, hardness, drilling time, seams, etc.	SAMPLE		
			0-6	6-12	12-18				No.	Pen"	Rec."
17	0.5-2.0	D	15	18	15		0.5	Asphalt	1	18	13
56								Brown fine SAND & Clayey Silt, little fine to medium gravel	1A		
71								Brown fine SAND & Gravel (Odor of Fuel) -FILL-			
40	4.0-6.0	D	10	8	20		4.0	Brown Black medium to fine SAND, some gravel & silt	2	24	13
70					60				2A		
50							6.5	-ALLUVIAL DEPOSITS-			
								(Roller Bit from 6.5' to 8.8')			
								-BEDROCK-			
							8.8	Refusal - Bottom of Boring 8.8'			

GROUND SURFACE TO _____

USED _____

CASING: _____

THEN _____

Sample Type

= Drive C=Cored W=Washed

= Fixed Piston UT=Shelby Tube

= Test Pit A=Auger

E = Open End Rod

300# hammer

Proportions Used

trace 0 to 10%

little 10 to 20%

some 20 to 35%

and 35 to 50%

Cohesionless

0-10

10-30

30-50

50+

140 lb. Wt x 30" fall on 2" O.D. Sampler

Density

Loose

Med. Dense

Dense

Very Dense

Cohesive

0-4

4-8

8-15

15-30

Consistency

Soft

M./Stiff

Stiff

V-Stiff

30 + Hard

SUMMARY:

Earth Boring 8.8'

Rock Coring _____

Samples 2

HOLE NO. B-5

TO Haley & Aldrich, Inc.
PROJECT NAME Prop. Ambulatory Care Addn.
REPORT SENT TO above

ADDRESS Cambridge, Mass.
LOCATION Jamaica Plain (Boston), Mass.
OUR JOB NO. 94-294

HOLE NO. B-6
PROJ. NO. 11324-001
SURF. ELEV. _____

GROUND WATER OBSERVATIONS			CASING	SAMPLER	CORE BAR.	DATE	
at <u>None</u>	after <u>Comp.</u>	Hours	Type <u>NW</u>	<u>S/S</u>		Start	<u>5/3/94</u>
At _____	after _____	Hours	Size I.D. <u>3"</u>	<u>1-3/8"</u>		Complete	<u>5/3/94</u>
			Hammer Wt. <u>300#</u>	<u>140#</u>	BIT	Boring Foreman	<u>A. Whitaker</u>
			Hammer Fall <u>24"</u>	<u>30"</u>		Inspector/Engr.	<u>M. Turner</u>

LOCATION OF BORING

Depth	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler			Moisture Density or Consist.	Strata Change Elev./Depth	SOIL OR ROCK IDENTIFICATION Remarks include color, gradation, type of soil etc. Rock-color, type, condition, hardness, drilling time, seams, etc.	SAMPLE		
				0-6	6-12	12-18				No.	Pen*	Rec.*
	1							0.4	Asphalt			
	3							1.5	Brown fine to coarse SAND & Crushed Stone			
	10	2.0-4.0	D	3	5	5			Dark Brown silty fine to medium SAND, trace cobbles - FILL	1	24	5
	21					7						
	14	4.0-6.0	D	16	47	44				2	24	12
5	36					15						
	17											
	3							7.3				
	4								Multi-colored silty fine to medium SAND & Cinders - FILL	3	24	14
10	6	9.0-11.0	D	5	3	4						
	9					4						
	12											
	14											
	135							13.5	Gray weathered CONGLOMERATE - BEDROCK -			
15		14.0-14.5	D	125				14.5	(Refusal on Spoon - Roller Bit to 16.5')	4	6	6
								16.5	Multi-colored CONGLOMERATE			
		16.5	D	100/0*					Refusal - Bottom of Boring 16.5'			

GROUND SURFACE TO _____		USED	CASING:	THEN				SUMMARY:
sample Type		Proportions Used		140 lb. Wt x 30" fall on 2" O.D. Sampler				Earth Boring <u>16.5'</u>
D=Drive C=Cored W=Washed		trace 0 to 10%	Cohesionless	Density	Cohesive	Consistency	30 + Hard	Rock Coring _____
UP=Fixed Piston UT=Shelby Tube		little 10 to 20%	0-10	Loose	0-4	Soft		Samples <u>4</u>
TP=Test Pit A=Auger		some 20 to 35%	10-30	Med. Dense	4-8	M./Stiff		
OE = Open End Rod		and 35 to 50%	30-50	Dense	8-15	Stiff		
* 300# hammer			50+	Very Dense	15-30	V-Stiff		HOLE NO. <u>B-6</u>

GUILD DRILLING CO., INC.
100 WATER STREET • EAST PROVIDENCE, R.I.

SHEET 1 OF 1

Haley & Aldrich, Inc.

ADDRESS Cambridge, Mass.

HOLE NO. B-7

JECT NAME Prop. Ambulatory Care Addn.

LOCATION Jamaica Plain (Boston), Mass.

PROJ. NO. 11324-001

ORT SENT TO above

OUR JOB NO. 94-294

SURF. ELEV. _____

GROUND WATER OBSERVATIONS

CASING SAMPLER CORE BAR.

DATE

31.0' after 0.0 Hours

Type HW S/S

Start 5/9/94

after _____ Hours

Size I.D. 4" 1-3/8"

Complete 5/9/94

Hammer Wt. 300# 140#

Boring Foreman P. Vieira

Hammer Fall 24" 30"

Inspector/Engr. M. Turner

CATION OF BORING

th	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler			Moisture Density or Consist.	Strata Change Elev./ Depth	SOIL OR ROCK IDENTIFICATION Remarks include color, gradation, type of soil etc. Rock-color, type, condition, hardness, drilling time, seams, etc.	SAMPLE		
				0-6	6-12	12-18				No.	Pen"	Rec."
	18	0.5-2.5	D	10	9	9		0.5	Asphalt	1	24	12
	20					15			Light Brown medium to fine SAND, little gravel & silt -FILL-			
	29											
	48											
	112	4.0-6.0	D	88	53	78		4.0	Light Brown silty fine SAND, some medium sand, gravel -FILL-	2	24	5
	62					93						
	57											
	57											
	54											
	53	9.0-11.0	D	16	16	18		9.0	Light Brown silty coarse to fine SAND, some cobbles -FILL-	3	24	8
	46					12						
	26											
	51											
	155											
	216	14.0-16.0	D	25	51	40		13.5	Light Brown coarse to fine sandy GRAVEL, little silt	4	24	15
	65					42			-GLACIOFLUVIAL DEPOSITS-			
	100											
	93											
	110											
	94	19.0-21.0	D	70	49	38		19.0	Light Brown silty medium to fine SAND, trace gravel	5	24	13
						77			-GLACIOFLUVIAL DEPOSITS-			
		24.0-26.0	D	17	13	15		24.0	Light Brown medium to fine SAND, little coarse sand, trace fine gravel	6	24	12
						23			-GLACIOFLUVIAL DEPOSITS-			
		29.0-31.0	D	16	19	18		26.5	Light Brown silty fine SAND	7	24	16
						20			-GLACIOLACUSTRINE DEPOSITS-			
								31.5	(Roller Bit from 31.5' to 33.5') -BEDROCK-			
								33.5	Refusal - Bottom of Boring 33.5'			
									2 Bags of Peastone 1/4 Bag of Black Top			

OUND SURFACE TO _____ USED _____ CASING: THEN _____

ample Type
=Drive C=Cored W=Washed
P=Fixed Piston UT=Shelby Tube
P=Test Pit A=Auger
E = Open End Rod
300# hammer

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%
and 35 to 50%

140 lb. Wt x 30" fall on 2" O.D. Sampler
Cohesionless Density Cohesive Consistency
0-10 Loose 0-4 Soft 30 + Hard
10-30 Med. Dense 4-8 M./Stiff
30-50 Dense 8-15 Stiff
50+ Very Dense 15-30 V-Stiff

SUMMARY:
Earth Boring 33.5'
Rock Coring _____
Samples 7
HOLE NO. B-7

TO Haley & Aldrich, Inc.
PROJECT NAME Prop. Ambulatory Care Addn.
REPORT SENT TO above

ADDRESS Cambridge, Mass.
LOCATION Jamaica Plain (Boston), Mass.
OUR JOB NO. 94-294

HOLE NO. B-8
PROJ. NO. 11324-001
SURF. ELEV. _____

GROUND WATER OBSERVATIONS			CASING	SAMPLER	CORE BAR.	DATE	
At <u>20.0'</u>	after <u>Comp</u> Hours	Type	<u>NW</u>	<u>S/S</u>		Start	<u>5/3/94</u>
At _____	after _____ Hours	Size I.D.	<u>3"</u>	<u>1-3/8"</u>		Complete	<u>5/4/94</u>
		Hammer Wt.	<u>300#</u>	<u>140#</u>	<u>BIT</u>	Boring Foreman	<u>A. Whitaker</u>
		Hammer Fall	<u>24"</u>	<u>30"</u>		Inspector/Engr.	<u>M. Turner</u>

LOCATION OF BORING

Depth	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler			Moisture Density or Consist.	Strata Change Elev./ Depth	SOIL OR ROCK IDENTIFICATION Remarks include color, gradation, type of soil etc. Rock-color, type, condition, hardness, drilling time, seams, etc.	SAMPLE		
				0-6	6-12	12-18				No.	Pen"	Rec."
5	3	0.0-2.0	D	3	5	16			Sandy LOAM	1	24	24
	4					18		1.0	Brown sandy LOAM & Gravel -FILL-			
	12											
	17											
	17	4.0-6.0	D	17	15	5				2	24	7
10	20					19						
	21											
	19							7.5				
	30											
	31	9.0-11.0	D	3	4	7			Yellow Brown silty fine to medium SAND, little fine to medium gravel -FILL-	3	24	19
15	40					20		10.5				
	60											
	60											
	59											
		14.0-16.0	D	22	37	49			Brown silty fine SAND, little medium sand -GLACIOFLUVIAL DEPOSITS-	4	24	7
20						61						
								17.0				
		19.0-19.5	D	97					Brown silty SAND & Cobbles -GLACIOFLUVIAL DEPOSITS-			
		19.5-21.5		Roller	Bit			19.5	(Refusal on Spoon) - Boulder -TILL-	5	6	4
								20.0	Brown silty fine SAND, some medium to coarse sand & gravel, cobbles - TILL			
25												
		24.0-26.0	D	42	40	46				6	24	12
						41						
30		29.0-30.0	D	57	109				(Refusal on Spoon)	7	12	12
		30.0-32.0		Roller	Bit			30.0	Dark Gray CONGLOMERATE Cuttings -BEDROCK-	-	24	1
								32.0	Bottom of Boring 32'			

GROUND SURFACE TO _____ USED _____		CASING: _____ THEN _____	
Sample Type D=Drive C=Cored W=Washed UP=Fixed Piston UT=Shelby Tube TP=Test Pit A=Auger OE=Open End Rod * 300# hammer	Proportions Used trace 0 to 10% little 10 to 20% some 20 to 35% and 35 to 50%	Cohesionless 0-10 10-30 30-50 50+	Density Loose 0-4 Med. Dense 4-8 Dense 8-15 Very Dense 15-30
			Cohesive Soft 30 + Hard M./Stiff Stiff V Stiff
		SUMMARY: Earth Boring <u>32'</u> Rock Coring _____ Samples <u>7</u> HOLE NO. <u>B-8</u>	

SHEET 1 **OF** 1

SURF. ELEV.

DATE _____

5/4/94

5/4/94

Whitaker

Turner

HOLE NO. B-3 OW

TO Haley & Aldrich, Inc.
PROJECT NAME Prop. Ambulatory Care Addn.
REPORT SENT TO above

ADDRESS Cambridge, Mass.
LOCATION Jamaica Plain (Boston), Mass.
OUR JOB NO. 94-294

HOLE NO. B-10
PROJ. NO. 11324-001
SURF. ELEV. _____

GROUND WATER OBSERVATIONS		CASING	SAMPLER	CORE BAR.	DATE
At <u>None</u> after <u>Comp</u> Hours	Type <u>NW</u>	<u>3"</u>	<u>S/S</u>	<u>NV-II</u>	Start <u>4/28/94</u>
At _____ after _____ Hours	Size I.D. <u>Drilled</u>	<u>140#</u>	<u>30"</u>	<u>BIT</u>	Complete <u>4/28/94</u>
	Hammer Wt. _____			<u>Dia.</u>	Boring Foreman <u>A. Whitaker</u>
	Hammer Fall _____				Inspector/Engr. <u>M. Turner</u>

LOCATION OF BORING

Depth	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler			Moisture Density or Consist.	Strata Change Elev./ Depth	SOIL OR ROCK IDENTIFICATION Remarks include color, gradation, type of soil etc. Rock-color, type, condition, hardness, drilling time, seams, etc.	SAMPLE		
				0-6	6-12	12-18				No.	Pen*	Rec.*
5		1.0-2.5	D	12	24	44		1.0	5" Asphalt - 7" Crushed Stone	1	18	12
									Gray Brown fine to coarse SAND & Gravel, trace rock fragments -FILL-			
		4.0-9.0	C				Min/Ft	4.0	Top of Rock	C1	60	54
							7		Gray CONGLOMERATE			
							6		-BEDROCK-			
							6					
							6					
								9.0	Bottom of Boring 9'			

GROUND SURFACE TO	USED	CASING:	THEN	SUMMARY:
Sample Type	Proportions Used	140 lb. Wt x 30" fall on 2" O.D. Sampler		
D=Drive C=Cored W=Washed	trace 0 to 10%	Cohesionless	Density	Cohesive Consistency
UP=Fixed Piston UT=Shelby Tube	little 10 to 20%	0-10	Loose	Soft 30 + Hard
TP=Test Pit A=Auger	some 20 to 35%	10-30	Med. Dense	M./Stiff
OE = Open End Rod	and 35 to 50%	30-50	Dense	Stiff
* 300# hammer		50+	Very Dense	V-Stiff
				HOLE NO. <u>B-10</u>

GUILD DRILLING CO., INC.
100 WATER STREET • EAST PROVIDENCE, R.I.

SHEET 1 OF 1

Haley & Aldrich, Inc.
PROJECT NAME Prop. Ambulatory Care Addn.
PORT SENT TO above

ADDRESS Cambridge, Mass.
LOCATION Jamaica Plain (Boston), Mass.
OUR JOB NO. 94-294

HOLE NO. B-11
PROJ. NO. 11324-001
SURF. ELEV. _____

GROUND WATER OBSERVATIONS	CASING	SAMPLER	CORE BAR.	DATE
<u>12.0'</u> after <u>Comp</u> Hours	Type <u>NW</u>	<u>S/S</u>		Start <u>5/3/94</u>
	Size I.D. <u>3"</u>	<u>1-3/8"</u>		Complete <u>5/3/94</u>
after _____ Hours	Hammer Wt. <u>300#</u>	<u>140#</u>	BIT	Boring Foreman <u>A. Whitaker</u>
	Hammer Fall <u>24"</u>	<u>30"</u>		Inspector/Engr. <u>M. Turner</u>

LOCATION OF BORING

Depth	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler			Moisture Density or Consist.	Strata Change Elev./ Depth	SOIL OR ROCK IDENTIFICATION <small>Remarks include color, gradation, type of soil etc. Rock-color, type, condition, hardness, drilling time, seams, etc.</small>	SAMPLE		
				0-6	6-12	12-18				No.	Pen"	Rec."
	1							0.5	Asphalt			
	1							1.5	Crushed Stone			
	9	2.0-4.0	D	5	10	10			Brown fine SAND, little fine to coarse gravel - FILL	1	24	15
	7					9						
	4	4.0-6.0	D	7	10	4		4.0	Dark Brown Clnders & silty Sand - FILL	2	24	18
5	7					2						
	8											
	56											
	59							8.0				
	17	9.0-11.0	D	46	11	8			Rust Brown fine to coarse Sand, Silt, Gravel & Bricks - FILL	3	24	7
10	10					6						
	119											
		12.0-13.0		Roller	Bit			12.0				
		13.0	D	50/0"				13.0	Bedrock or Boulder			
									Refusal - Bottom of Boring 13'			

GROUND SURFACE TO _____	USED _____	CASING: _____	THEN _____	
Sample Type D=Drive C=Cored W=Washed UP=Fixed Piston UT=Shelby Tube TP=Test Pit A=Auger OE = Open End Rod * 300# hammer	Proportions Used trace 0 to 10% little 10 to 20% some 20 to 35% and 35 to 50%	140 lb. Wt x 30" fall on 2" O.D. Sampler Cohesionless Density Cohesive Consistency 0-10 Loose 0-4 Soft 30 + Hard 10-30 Med. Dense 4-8 M./Stiff 30-50 Dense 8-15 Stiff 50+ Very Dense 15-30 V-Stiff	SUMMARY: Earth Boring <u>13'</u> Rock Coring _____ Samples <u>3</u> HOLE NO. <u>B-11</u>	

TO Haley & Aldrich, Inc.
PROJECT NAME Prop. Ambulatory Care Addn.
REPORT SENT TO above

ADDRESS Cambridge, Mass.
LOCATION Jamaica Plain (Boston), Mass.
OUR JOB NO. 94-294

HOLE NO. B-12 OW
PROJ. NO. 11324-001
SURF. ELEV. _____

GROUND WATER OBSERVATIONS		CASING	SAMPLER	CORE BAR.	DATE	
At <u>12.5'</u>	after <u>Comp</u> Hours	Type <u>HW</u>	<u>S/S</u>	<u>NV-II</u>	Start	<u>4/28/94</u>
At _____	after _____ Hours	Size I.D. <u>4"</u>	<u>1-3/8"</u>	_____	Complete	<u>4/28/94</u>
		Hammer Wt. <u>Drilled</u>	<u>140#</u>	BIT	Boring Foreman	<u>A. Whitaker</u>
		Hammer Fall _____	<u>30"</u>	<u>Dia.</u>	Inspector/Engr.	<u>M. Turner</u>

LOCATION OF BORING													
Depth	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler			Moisture Density or Consist.	Strata Change Elev./ Depth	SOIL OR ROCK IDENTIFICATION Remarks include color, gradation, type of soil etc. Rock-color, type, condition, hardness, drilling time, seams, etc.	SAMPLE			
				From 0-6	6-12	To 12-18				No.	Pen"	Rec."	
5							Min/Ft	0.3	Asphalt				
									Brown fine to coarse SAND & Gravel -FILL-				
		2.0-4.0	D	17	21	24		2.5		1	24	18	
						31							
		4.0-5.0	D	51	102				Light Gray silty fine to medium SAND, little cobbles -FILL-	2	12	12	
		5.3-10.3	C					5.0		C1	60	54	
									Gray CONGLOMERATE				
10													
		10.3-15.5	C							C2	62	60	
15													

GROUND SURFACE TO		USED	CASING:	THEN	SUMMARY:	
Sample Type	Proportions Used	140 lb. Wt x 30" fall on 2" O.D. Sampler			Earth Boring	<u>5.3'</u>
D=Drive C=Cored W=Washed	trace 0 to 10%	Cohesionless	Density	Cohesive	Consistency	Rock Coring
UP=Fixed Piston UT=Shelby Tube	little 10 to 20%	0-10	Loose	0-4	Soft	<u>10.2'</u>
TP=Test Pit A=Auger	some 20 to 35%	10-30	Med. Dense	4-8	M./Stiff	Samples <u>2</u>
OE = Open End Rod	and 35 to 50%	30-50	Dense	8-15	Stiff	
* 300# hammer		50'	Very Dense	15-30	V-Stiff	
				30 + Hard		

HOLE NO. **B-12 OW**

GUILD DRILLING CO., INC.
100 WATER STREET • EAST PROVIDENCE, R.I.

SHEET 1 OF 1

Haley & Aldrich, Inc.

ADDRESS Cambridge, Mass.

HOLE NO. B-13

PROJECT NAME Prop. Ambulatory Care Addn.

LOCATION Jamaica Plain (Boston), Mass.

PROJ. NO. 11324-001

PORT SENT TO above

OUR JOB NO. 94-294

SURF. ELEV. _____

GROUND WATER OBSERVATIONS

CASING SAMPLER CORE BAR.

DATE

None after 0.0 Hours

Type

HW

S/S

Start

4/27/94

Size I.D.

4"

1-3/8"

Complete

4/27/94

_____ after _____ Hours

Hammer Wt.

300#

140#

BIT

Boring Foreman

J. Medeiros

Hammer Fall

30"

30"

Inspector/Engr.

M. Turner

LOCATION OF BORING

Boring No.	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler			Moisture Density or Consist.	Strata Change Elev./ Depth	SOIL OR ROCK IDENTIFICATION Remarks include color, gradation, type of soil etc. Rock-color, type, condition, hardness, drilling time, seams, etc.	SAMPLE		
				0-6	6-12	12-18				No.	Pen*	Rec.*
5		0.5-2.5	D	20	16	11		0.4	Black Top	1	24	4
						11			Brown fine to medium Sand, Silt & Gravel - FILL			
		2.5-4.5	D	5	4	10			trace brick fragments	2	24	10
						12						
		4.5-6.5	D	12	8	13			-FILL-	3	24	9
						51						
		8.8	D	120/0"				8.8	Refusal - Bottom of Boring 8.8'			
									Backfilled One Bag of Hole Plug 2 Bags of Sand			

GROUND SURFACE TO _____

USED _____

CASING: _____

THEN _____

Sample Type

D=Drive C=Cored W=Washed
UP=Fixed Piston UT=Shelby Tube
TP=Test Pit A=Auger
OE = Open End Rod
* 300# hammer

Proportions Used

trace 0 to 10%
little 10 to 20%
some 20 to 35%
and 35 to 50%

Cohesionless
0-10
10-30
30-50
50+

140 lb. Wt x 30" fall on 2" O.D. Sampler

Density
Loose
Med. Dense
Dense
Very Dense

Cohesive
0-4
4-8
8-15
15-30

Consistency
Soft
M./Stiff
Stiff
V-Stiff

30 + Hard

SUMMARY:

Earth Boring 8.8'
Rock Coring _____
Samples 3

HOLE NO. B-13

TO Haley & Aldrich, Inc.
PROJECT NAME Prop. Ambulatory Care Addn.
REPORT SENT TO above

ADDRESS Cambridge, Mass.
LOCATION Jamaica Plain (Boston), Mass.
OUR JOB NO. 94-294

HOLE NO. B-14
PROJ. NO. 11324-001
SURF. ELEV. _____

GROUND WATER OBSERVATIONS			CASING	SAMPLER	CORE BAR.	DATE	
At <u>14.5'</u>	after <u>Comp</u> Hours	Type	<u>HW</u>	<u>S/S</u>		Start	<u>4/28/94</u>
At _____	after _____ Hours	Size I.D.	<u>4"</u>	<u>1-3/8"</u>		Complete	<u>4/28/94</u>
		Hammer Wt.	<u>300#</u>	<u>140#</u>	BIT	Boring Foreman	<u>J. Medeiros</u>
		Hammer Fall	<u>30"</u>	<u>30"</u>		Inspector/Engr.	<u>M. Turner</u>

LOCATION OF BORING

Depth	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler			Moisture Density or Consist.	Strata Change Elev./ Depth	SOIL OR ROCK IDENTIFICATION Remarks include color, gradation, type of soil etc. Rock-color, type, condition, hardness, drilling time, seams, etc.	SAMPLE		
				0-6	6-12	12-18				No.	Pen"	Rec."
		0.5-2.5	D	9	12	14		0.3	Asphalt	1	24	12
	40	2.5-4.5	D	14	24	20			Brown fine to medium Sand, Silt & Gravel - FILL	2	24	13
	39					11						
	13	4.5-6.5	D	6	8	7				3	24	5
5	18					5						
	14											
	15											
	27											
	35											
10	37	10.0-12.0	D	18	15	13				4	24	8
	45					19						
	71											
	62											
15		14.5-15.7	D	11	16	120/2"		14.0	Gray fine SAND & Gravel, some silt -FILL-	5	14	14
								15.5	(Roller Bit) -BEDROCK-			
								16.8	Bottom of Boring 16.8'			
									Note: Refusal at 15.7' - Roller Bit one foot - Used 600 Gallons of Water.			
									One Bag of Hole Plug 2 Bags of Sand			

GROUND SURFACE TO _____		USED	CASING:	THEN				SUMMARY:
Sample Type		Proportions Used	140 lb. Wt x 30" fall on 2" O.D. Sampler					Earth Boring <u>16.8'</u>
D=Drive C=Cored W=Washed		trace 0 to 10%	Cohesionless	Density	Cohesive	Consistency	30 + Hard	Rock Coring _____
UP=Fixed Piston UT=Shelby Tube		little 10 to 20%	0-10	Loose	0-4	Soft		Samples <u>5</u>
TP=Test Pit A=Auger		some 20 to 35%	10-30	Med. Dense	4-8	M./Stiff		
OE = Open End Rod		and 35 to 50%	30-50	Dense	8-15	Stiff		
* 300# hammer			50+	Very Dense	15-30	V-Stiff		
								HOLE NO. <u>B-14</u>

Haley & Aldrich, Inc.
OBJECT NAME Prop. Ambulatory Care Addn.
PORT SENT TO above

ADDRESS Cambridge, Mass.
LOCATION Jamaica Plain (Boston), Mass.
OUR JOB NO. 94-294

HOLE NO. B-15
PROJ. NO. 11324-001
SURF. ELEV. _____

GROUND WATER OBSERVATIONS		CASING	SAMPLER	CORE BAR.	DATE
at <u>9.4'</u> after <u>24</u> Hours	Type	<u>HW</u>	<u>S/S</u>	<u>NV-II</u>	Start <u>5/3/94</u>
	Size I.D.	<u>4"</u>	<u>1-3/8"</u>		Complete <u>5/4/94</u>
at _____ after _____ Hours	Hammer Wt.	<u>300#</u>	<u>140#</u>	<u>BIT</u>	Boring Foreman <u>P. Vieira</u>
	Hammer Fall	<u>24"</u>	<u>30"</u>	<u>Dia.</u>	Inspector/Engr. <u>M. Turner</u>

LOCATION OF BORING

LOCATION OF BORING												
Depth	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler			Moisture Density or Consist.	Strata Change Elev./ Depth	SOIL OR ROCK IDENTIFICATION Remarks include color, gradation, type of soil etc. Rock-color, type, condition, hardness, drilling time, seams, etc.	SAMPLE		
				0-6	6-12	12-18				No.	Pen"	Rec.
5	10	0.5-2.5	D	16	10	5		0.5	Asphalt	1	24	9
	10					Brown medium to fine SAND, some gravel - FILL						
	10											
	17											
	29	4.5-6.5	D	12	6			6	Dark Brown silty medium to fine SAND, some gravel - FILL	2	24	8
	17											
	10											
	53											
10	62	9.0-11.0	D	16	24	32	▽	Brown Red medium to fine SAND, some gravel, Brick Fragments - FILL	3	24	12	
	41											
	42										11	
	34											
	51											
	62	14.0-15.3	D	36	110	122/3"		14.0	Dark Gray silty fine to medium SAND & Gravel	4	16	10
15							15.0	BEDROCK (Refusal at 15.3' - Roller Bit for 2')				
								Bottom of Boring 17.3'				

GROUND SURFACE TO _____ USED _____ CASING: _____ THEN _____

Sample Type	Proportions Used	140 lb. Wt x 30" fall on 2" O.D. Sampler			
D=Drive C=Cored W=Washed	trace 0 to 10%	Cohesionless	Density	Cohesive	Consistency
UP=Fixed Piston UT=Shelby Tube	little 10 to 20%	0-10	Loose	0-4	Soft 30 + Hard
TP=Test Pit A=Auger	some 20 to 35%	10-30	Med. Dense	4-8	M./Stiff
OE = Open End Rod	and 35 to 50%	30-50	Dense	8-15	Stiff
* 300# hammer		50+	Very Dense	15-30	V-Stiff

SUMMARY:

Earth Boring 17.3'
Rock Coring _____
Samples 4
HOLE NO. B-15

TO Haley & Aldrich, Inc.
PROJECT NAME Prop. Ambulatory Care Addn.
REPORT SENT TO above

ADDRESS Cambridge, Mass.
LOCATION Jamalca Plain (Boston), Mass.
OUR JOB NO. 94-294

HOLE NO. B-16 OW
PROJ. NO. 11324-001
SURF. ELEV. _____

GROUND WATER OBSERVATIONS			CASING	SAMPLER	CORE BAR.	DATE	
At <u>14.0'</u>	after <u>15.0</u>	Hours	Type <u>HW-NW</u>	<u>S/S</u>	<u>NV-II</u>	Start	<u>4/29/94</u>
			Size I.D. <u>4" 3"</u>	<u>1-3/8"</u>		Complete	<u>5/3/94</u>
At _____	after _____	Hours	Hammer Wt. <u>300#</u>	<u>140#</u>	<u>BIT</u>	Boring Foreman	<u>P. Vieira</u>
			Hammer Fall <u>24"</u>	<u>30"</u>	<u>Dia.</u>	Inspector/Engr.	<u>M. Turner</u>

LOCATION OF BORING													
Depth	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler			Moisture Density or Consist.	Strata Change Elev./ Depth	SOIL OR ROCK IDENTIFICATION Remarks include color, gradation, type of soil etc. Rock-color, type, condition, hardness, drilling time, seams, etc.	SAMPLE			
				From 0-6	6-12	To 12-18				No.	Pen*	Rec.	
		1.0-3.0	D	16	15	19		0.3	Asphalt	1	24	14	
						120			Brown Gray fine to medium Sand, Silt & Gravel - FILL				
5	8	4.5-6.5	D	25	5	12				2	24	10	
	17					11							
	15												
	23												
	25												
10	10	9.5-11.5	D	11	5	2			9.5	Gray Brown fine to medium SAND & Gravel, some silt, asphalt fragments -FILL-	3	24	12
	34					6							
	36												
	29												
	29												
15		14.5-16.3	D	45	20	25			14.0	Gray Brown silty medium to fine SAND, some gravel -TILL-	4	21	14
						120/3	Min/Ft			4A			
		16.5-21.5	C				4		16.5	Gray CONGLOMERATE	C1	60	60
							5						
							4						
							4			-BEDROCK-			
20							7						
									21.5	Bottom of Boring 21.5'			
										Installed 2" PVC Well 11' Screen - 10' Solid 2 Bags of Ottawa sand 1/4 Bag of Bentonite 1/4 Bag of Cement One Road Box			

GROUND SURFACE TO _____ USED _____ CASING: _____ THEN _____							SUMMARY:	
Sample Type	Proportions Used	140 lb. Wt x 30" fall on 2" O.D. Sampler	Density	Cohesive	Consistency		Earth Boring	<u>16.5</u>
D=Drive C=Cored W=Washed	trace 0 to 10%	Cohesionless	Loose	0-4	Soft	30 + Hard	Rock Coring	<u>5'</u>
UP=Fixed Piston UT=Shelby Tube	little 10 to 20%	0-10	Med. Dense	4-8	M./Stiff		Samples	<u>4</u>
TP=Test Pit A=Auger	some 20 to 35%	10-30	Dense	8-15	Stiff			
OE = Open End Rod	and 35 to 50%	30-50	Very Dense	15-30	V-Stiff			
* 300# hammer		50+						

HOLE NO. B-16 OW

GUILD DRILLING CO., INC.
100 WATER STREET • EAST PROVIDENCE, R.I.

SHEET 1 OF 1

Haley & Aldrich, Inc.
PROJECT NAME Prop. Ambulatory Care Addn.
PORT SENT TO above

ADDRESS Cambridge, Mass.
LOCATION Jamaica Plain (Boston), Mass.
OUR JOB NO. 94-294

HOLE NO. B-17 OW
PROJ. NO. 11324-001
SURF. ELEV. _____

GROUND WATER OBSERVATIONS		CASING	SAMPLER	CORE BAR.	DATE
<u>19.0'</u>	after <u>Comp</u> Hours	Type <u>NW</u>	<u>S/S</u>	<u>NV-II</u>	Start <u>4/27/94</u>
		Size I.D. <u>3"</u>	<u>1-3/8"</u>		Complete <u>4/27/94</u>
	after _____ Hours	Hammer Wt. <u>Drilled</u>	<u>140#</u>	BIT	Boring Foreman <u>A. Whitaker</u>
		Hammer Fall _____	<u>30"</u>	Dia. _____	Inspector/Engr. <u>M. Turner</u>

LOCATION OF BORING

pth	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler			Moisture Density or Consist.	Strata Change Elev./ Depth	SOIL OR ROCK IDENTIFICATION Remarks include color, gradation, type of soil etc. Rock-color, type, condition, hardness, drilling time, seams, etc.	SAMPLE		
				0-6	6-12	12-18				No.	Pen*	Rec.*
	1								4" Asphalt - 8" Crushed Stone			
	4	1.0-3.0	D	10	9	4		1.0	Brown Sand, Gravel, Brick & Cinders - FILL	1	24	8
	4					2				2	24	10
	5	3.0-5.0	D	3	3	2				3	24	11
	6					3				4	24	13
5	5	5.0-7.0	D	10	9	10				5	24	4
	6					6				6	24	17
	7	7.0-9.0	D	9	6	7				7	24	6
	8					8				8	24	0
	9	9.0-11.0	D	6	19	4			9.0 Gray silty fine to coarse SAND, trace brick, asphalt & cobbles - FILL	9	24	5
10	11					5				10A	6	6
	11	11.0-13.0	D	4	5	9				C1	60	54
	10					12						
	11											
	2	14.0-16.0	D	9	10	13						
15	4					13						
	6	16.0-18.0	D	8	9	5						
	10					5						
	16	18.0-20.0	D	5	6	7						
	9					7						
20	10											
	7								21.0 (Note: Black Cinders in Wash - 21' to 23')			
	8								-FILL-			
	15								Black SILT, trace fibers & cinders	10	12	12
25	100	24.0-25.0	D	3	7		Min/Ft	25.0	Light Gray fine SAND, Silt & Rock Fragments	10A	6	6
		25.0-25.5	D			124	9	25.5	Gray CONGLOMERATE	C1	60	54
		25.5-30.5	C				6		-BEDROCK-			
							6					
							7					
							6					
30									30.5 Bottom of Boring 30.5'			
									Installed 2" PVC Well at 25' 10' Slotted - 15' Solid 2 Bags of Ottawa Sand 10 lbs. of Bentonite Chips One small Road Box			

GROUND SURFACE TO _____ USED _____ CASING: _____ THEN _____

Sample Type
D=Drive C=Cored W=Washed
JP=Fixed Piston UT=Shelby Tube
TP=Test Pit A=Auger
OE = Open End Rod
* 300# hammer

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%
and 35 to 50%

Cohesionless
0-10
10-30
30-50
50+

140 lb. Wt x 30" fall on 2" O.D. Sampler
Density
Loose
Med. Dense
Dense
Very Dense

Cohesive
0-4
4-8
8-15
15-30

Consistency
Soft
M./Stiff
Stiff
V-Stiff

SUMMARY:

Earth Boring 25.5'
Rock Coring 5'
Samples 10

HOLE NO. B-17 OW

TO Haley & Aldrich, Inc.
PROJECT NAME Prop. Ambulatory Care Addn.
REPORT SENT TO above

ADDRESS Cambridge, Mass.
LOCATION Jamaica Plain (Boston), Mass.
OUR JOB NO. 94-294

HOLE NO. B-18
PROJ. NO. 11324-001
SURF. ELEV. _____

GROUND WATER OBSERVATIONS		CASING	SAMPLER	CORE BAR.	DATE
At <u>None</u> after <u>0.0</u> Hours	Type <u>HW</u>	<u>HW</u>	<u>S/S</u>		Start <u>4/28/94</u>
At _____ after _____ Hours	Size I.D. <u>4"</u>	<u>4"</u>	<u>1-3/8"</u>		Complete <u>4/28/94</u>
	Hammer Wt. <u>300#</u>	<u>300#</u>	<u>140#</u>	BIT	Boring Foreman <u>J. Medeiros</u>
	Hammer Fall <u>30"</u>	<u>30"</u>	<u>30"</u>		Inspector/Engr. <u>M. Turner</u>

LOCATION OF BORING

Depth	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler			Moisture Density or Consist.	Strata Change Elev./ Depth	SOIL OR ROCK IDENTIFICATION <small>Remarks include color, gradation, type of soil etc. Rock-color, type, condition, hardness, drilling time, seams, etc.</small>	SAMPLE		
				0-6	6-12	12-18				No.	Pen"	Rec."
		0.5-2.5	D	16	15	23		0.5	Asphalt	1	24	7
						12			Brown Sand & Gravel - FILL			
		2.5-3.1	D	15	120/1"			3.0	Brown fine to coarse SAND, some fine to medium gravel, silt, trace coarse gravel -FILL-	2	7	4
								4.8	-BEDROCK-			
									Bottom of Boring 4.8'			
									Refusal at 3.1' Roller Bit to 4.8' One Bag of Sand			

GROUND SURFACE TO _____		USED _____		CASING: _____		THEN _____	
Sample Type D=Drive C=Cored W=Washed UP=Fixed Piston UT=Shelby Tube TP=Test Pit A=Auger OE = Open End Rod * 300# hammer		Proportions Used trace 0 to 10% little 10 to 20% some 20 to 35% and 35 to 50%		Cohesionless 0-10 10-30 30-50 50+		140 lb. Wt x 30" fall on 2" O.D. Sampler Density Loose 0-4 Med. Dense 4-8 Dense 8-15 Very Dense 15-30	
				Cohesive 0-4 Soft 4-8 M./Stiff 8-15 Stiff 15-30 V-Stiff		Consistency 30 + Hard	
SUMMARY: Earth Boring <u>4.8'</u> Rock Coring _____ Samples <u>2</u>							
HOLE NO. <u>B-18</u>							



OBSERVATION WELL INSTALLATION REPORT

Observation Well **B-2(OW)**

Test Boring **B-2**

Installation Date **2 May 1994**

Location **See Plan**

H&A File No. **11324-000**

H&A Rep. **M. Turner**

Project **PROPOSED AMBULATORY CARE ADDITION AND PARKING GARAGE**

City/State **ROXBURY, MASSACHUSETTS**

Client **PAYETTE ASSOCIATES, INC.**

Contractor **GUILD DRILLING CO.**

Foreman **A. WHITEAKER**

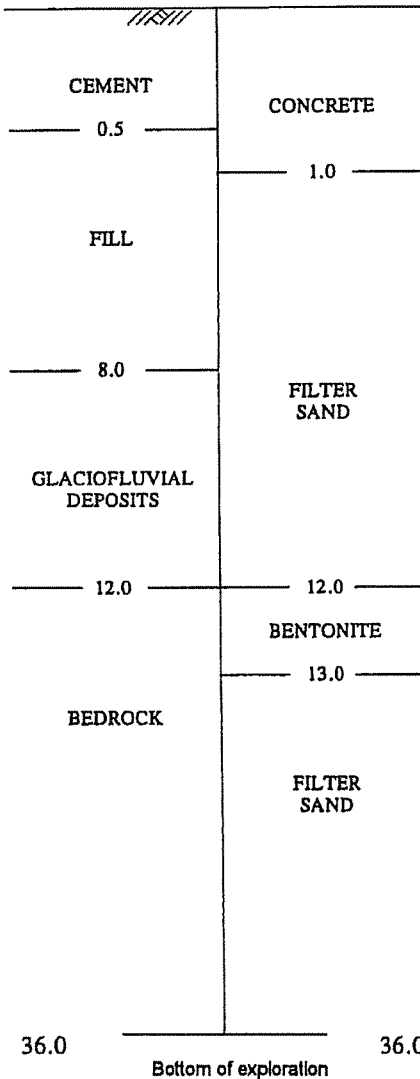
Ground El. **74.0**

El. Datum

SOIL/ROCK CONDITIONS

(Numbers refer to depth from ground surface in feet)
(not to scale)

BOREHOLE BACKFILL



Type of protective cover/lock: **Roadway Box**

Depth of top of roadway box below ground surface **0.0** ft

Depth of top of riser pipe below ground surface **0.4** ft

Type of protective casing: **Roadway Box**

Length **0.8** ft

Inside diameter **4.0** in

Depth of bottom of roadway box **0.8** ft

Seals:	Type	Depth to top (ft)	Thickness (ft)
Bentonite		12.0	1.0

Type of riser pipe: **Sch 40 PVC**

Inside diameter of riser pipe **2.0** in

Type of backfill around riser: **Filter Sand**

Diameter of borehole **4.5** in

Depth of top of wellpoint **14.8** ft

Type of point or manufacturer: **Sch 40 PVC machine slotted**

Screen gauge or size of openings **0.010** in

Diameter of wellpoint **2.0** in

Type of backfill around point: **Filter Sand**

Depth of bottom of wellpoint **24.8** ft

Silt trap

Depth of bottom of borehole **36.0** ft

(Depths refer to ground surface)

Remarks:

27 May 1994

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OW1066

OBSERVATION WELL MONITORING REPORT

Observation Well B-2(OW)

Test Boring **B-2**

Installation Date 2 May 1994

File No. 11324-000

Ground El.	74.0
------------	------

El. Datum

Project **PROPOSED AMBULATORY CARE ADDITION AND PARKING GARAGE**

City/State **ROXBURY, MASSACHUSETTS**

Client **PAYETTE ASSOCIATES, INC.**

Depths to water are measured from ground surface, which is at El. 74.0.

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OBSERVATION WELL INSTALLATION REPORT

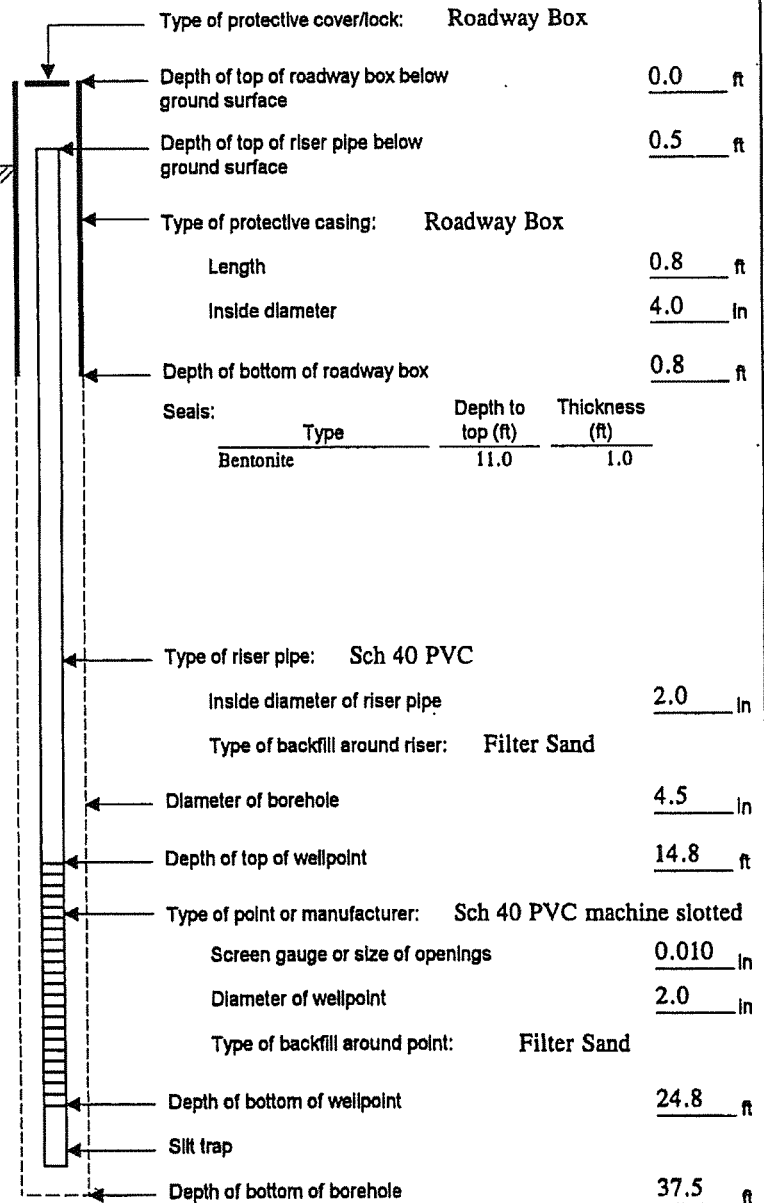
Observation Well **B-3(OW)**
Test Boring **B-3**
Installation Date **6 May 1994**
Location **See Plan**
H&A File No. **11324-000**
H&A Rep. **M. Turner**

Project **PROPOSED AMBULATORY CARE ADDITION AND PARKING GARAGE**
City/State **ROXBURY, MASSACHUSETTS**
Client **PAYETTE ASSOCIATES, INC.**
Contractor **GUILD DRILLING CO.**
Foreman **P. VIEIRA**

Ground El. **68.5**
El. Datum _____

SOIL/ROCK
CONDITIONS
(Numbers refer to depth from ground surface in feet)
(not to scale)

SOIL/ROCK CONDITIONS	BOREHOLE BACKFILL
ASPHALT	CEMENT
0.5	1.0
FILL	FILTER SAND
5.5	
ALLUVIAL DEPOSITS	
10.5	11.0
GLACIOFLUVIAL DEPOSITS	BENTONITE
	12.0
19.0	FILTER SAND
BEDROCK	
37.5	37.5
Bottom of exploration	



(Depths refer to ground surface)

Remarks:

OBSERVATION WELL MONITORING REPORT

Observation Well B-3(OW)

Test Boring **B-3**

Installation Date 6 May 1994

File No. 11324-000

Ground El.	68.5
------------	------

El. Datum

Project	PROPOSED AMBULATORY CARE ADDITION AND PARKING GARAGE
City/State	ROXBURY, MASSACHUSETTS
Client	PAYETTE ASSOCIATES, INC.

Depths to water are measured from ground surface, which is at El. 68.5.

[illegible]

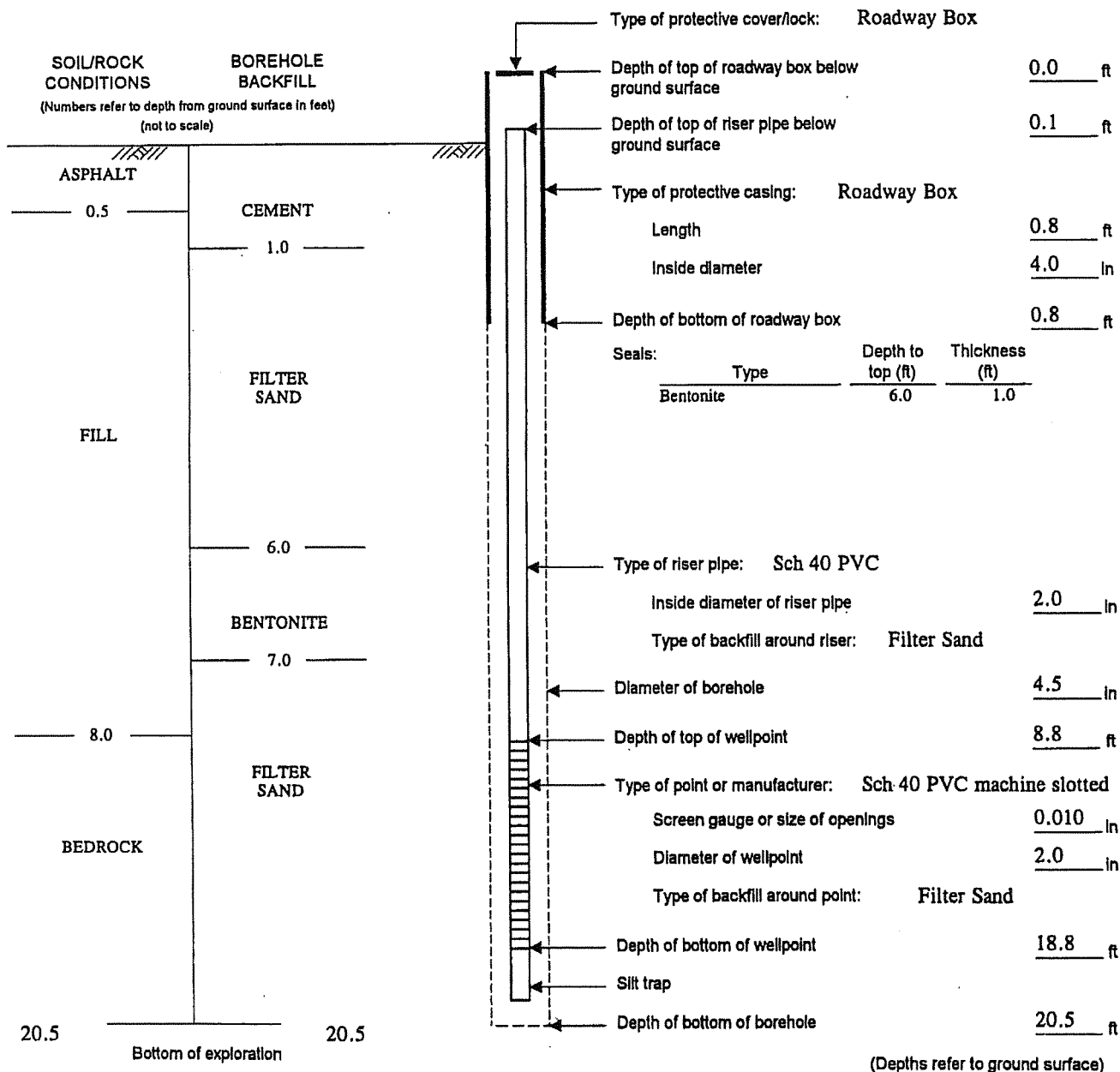


OBSERVATION WELL INSTALLATION REPORT

Project **PROPOSED AMBULATORY CARE ADDITION AND PARKING GARAGE**
City/State **ROXBURY, MASSACHUSETTS**
Client **PAYETTE ASSOCIATES, INC.**
Contractor **GUILD DRILLING CO.**
Foreman **A. WHITEAKER**

Observation Well **B-9(OW)**
Test Boring **B-9**
Installation Date **4 May 1994**
Location **See Plan**
H&A File No. **11324-000**
H&A Rep. **M. Turner**

Ground El. **72.5**
El. Datum _____



Remarks:

OBSERVATION WELL MONITORING REPORT

Observation Well B-9(OW)

Test Boring B-9

Installation Date 4 May 1994

File No. 11324-000

Ground El.	72.5
------------	------

El. Datum

Project **PROPOSED AMBULATORY CARE ADDITION AND PARKING GARAGE**

City/State ROXBURY, MASSACHUSETTS

Client **PAYETTE ASSOCIATES, INC.**

Depths to water are measured from ground surface, which is at El. 72.5.

[illegible]

1997 SUBSURFACE INFORMATION

CARR-DEE CORP.

37 LINDEN STREET P.O. BOX 67 MEDFORD, MA 02155-0001 Telephone (617) 391-4500
 To HALEY & ALDRICH, INC., 58 CHARLES ST., CAMBRIDGE, MA Date Feb. 7, 1997 Job No. 97015
 Location V.A HOSPITAL MEDICAL CENTER ,SOUTH HUNTINGTON AVE.,ROXBURY,MA Scale 1" = 3'

BORING 201

Ground Surface

0'3"	ASPHALT		
	FILL	10	S#1, FROM 1'0" TO 3'0"
		15	RECOVERED 9"
		27	
	SAND, GRAVEL, LOAM,	60	
	TRACE CINDERS,	9	S#2, FROM 3'0" TO 5'0"
	BRICK	17	RECOVERED 7"
		11	
		7	
		2	S#3, FROM 5'0" TO 7'0"
		4	RECOVERED 7"
		3	
6'6"		10	
		29	S#4, FROM 7'0" TO 9'0"
		16	RECOVERED 10"
		12	
		14	
	MEDIUM DENSE TO VERY		
	DENSE, COARSE TO FINE		
		28	S#5, FROM 15'0" TO 17'0"
	SAND, LITTLE GRAVEL, TRACE	61	RECOVERED 6"
		65	
		48	
	INORGANIC SILT		
19'6"			

CONTINUED ON SHEET NUMBER 2

7 LINDEN STREET P.O. BOX 67 MEDFORD, MA 02155-0001 Telephone (617) 391-4500
 by HALEY & ALDRICH, INC., 58 CHARLES ST., CAMBRIDGE, MA Date Feb. 7, 1997 Job No. 97015
 Location V.A HOSPITAL MEDICAL CENTER, SOUTH HUNTINGTON AVE., ROXBURY, MA Scale 1" = 3'

19'6"	MEDIUM DENSE TO VERY DENSE, COARSE TO FINE SAND, LITTLE GRAVEL, TRACE INORGANIC SILT
28'6"	

NO WATER ENCOUNTERED
SIZE OF AUGERS 3-3/4" I.D., DEPTH 28'6"
DRILLER: RENE' DESIMONE, INSPECTOR: SCOTT SHAY
DATE STARTED & COMPLETED: 2-3-97

Sheet 2 of 2

CARR-DEE CORP.

37 LINDEN STREET P.O. BOX 67 MEDFORD, MA 02155-0001 Telephone (617) 391-4500
 To HALEY & ALDRICH, INC., 58 CHARLES ST., CAMBRIDGE, MA Date Feb. 7, 1997 Job No. 97015
 Location V.A HOSPITAL MEDICAL CENTER, SOUTH HUNTINGTON AVE., ROXBURY, MA Scale 1" = 3'

BORING 202

Ground Surface

8'0"	F I L L	6	S#1, FROM 0'0" TO 2'0"
		10	RECOVERED 8"
		13	
		15	
		10	S#2, FROM 2'0" TO 4'0"
		11	RECOVERED 9"
		9	
		8	
		7	S#3, FROM 4'0" TO 6'0"
		8	RECOVERED 1"
		12	
		14	
		6	S#4, FROM 6'0" TO 8'0"
		11	RECOVERED 1"
		9	
		10	
10'0"	LOOSE FINE SAND, TRACE OF GRAVEL, INORGANIC SILT	7	S#5, FROM 8'0" TO 10'0"
		5	RECOVERED 13"
		3	
		4	
19'6"	MEDIUM DENSE TO VERY DENSE COARSE TO FINE SAND, LITTLE TO SOME GRAVEL, COBBLES, TRACE TO LITTLE INORGANIC SILT	5	S#6, FROM 10'0" TO 12'0"
		7	RECOVERED 9"
		7	
		12	

CONTINUED ON SHEET NUMBER 2

CARR-DEE CORP.

LINDEN STREET P.O. BOX 67 MEDFORD, MA 02155-0001 Telephone (617) 391-4500
HALEY & ALDRICH, INC., 58 CHARLES ST., CAMBRIDGE, MA Date Feb. 7, 1997 Job No. 97015
Location V.A HOSPITAL MEDICAL CENTER, SOUTH HUNTINGTON AVE., ROXBURY, MA Scale 1" = 3'

BORING 202

19'6"		77 S#7, FROM 20'0" TO 20'9" 120/3" RECOVERED 8"
	MEDIUM DENSE TO VERY	
	DENSE, COARSE TO FINE SAND,	
	LITTLE TO SOME GRAVEL,	
	COBBLES, TRACE TO LITTLE	
	INORGANIC SILT	
33'0"		

- R E F U S A L -
(100 BLOWS, S.S., 140-LB., WGT., NO PENETRATION)

WATER LEVEL 28'0"
SIZE OF AUGERS 3-3/4" I.D., DEPTH 33'0"
DRILLER: RENE' DESIMONE, INSPECTOR: SCOTT SHAY
DATE STARTED & COMPLETED: 2-3-97

samples have been visually classified by Driller. Unless otherwise specified, water levels noted were observed at completion borings, and do not necessarily represent permanent ground water levels. Figures in right hand column indicate number of blows required to drive Two-Inch Split Sampler 6 inches using 140 lb. weight falling 30 inches(+/-). Figures in column to left (noted) indicate number of blows to drive casing one foot, using 300 lb. weight falling 24 inches(+/-).

Sheet 2 of 2

CARR-DEE CORP.

37 LINDEN STREET P.O. BOX 67 MEDFORD, MA 02155-0001 Telephone (617) 391-4500
 To HALEY & ALDRICH, INC., 58 CHARLES ST., CAMBRIDGE, MA Date Feb. 10, 1997 Job No. 97015
 Location V.A HOSPITAL MEDICAL CENTER, SOUTH HUNTINGTON AVE., ROXBURY, MA Scale 1" = 3'

BORING 203

Ground Surface

0'3"	ASPHALT		
		6	S#1, FROM 1'0" TO 3'0"
		23	RECOVERED 9"
	FILL	28	
		12	
		7	S#2, FROM 3'0" TO 5'0"
	SAND, GRAVEL, COBBLES,	4	RECOVERED 1"
		8	
		27	
	TRACE SILT, WOOD, BRICK,	25	S#3, FROM 5'0" TO 7'0"
		15	RECOVERED 9"
		9	
	CINDERS	7	
		8	S#4, FROM 7'0" TO 9'0"
		9	RECOVERED 8"
		6	
8'6"		41	
		17	S#5, FROM 9'0" TO 11'0"
		24	RECOVERED 6"
	VERY DENSE COARSE TO	35	
		39	
	FINE SAND, SOME TO LITTLE		
	GRAVEL, COBBLES, TRACE OF		
	INORGANIC SILT		
15'6"			

- R E F U S A L -
 (100 BLOWS, S.S., 140-LB. WGT., NO PENETRATION)

NO WATER ENCOUNTERED
 SIZE OF AUGERS 3-3/4" I.D., DEPTH 15'6"
 DRILLER: RENE' DESIMONE, INSPECTOR: SCOTT SHAY
 DATE STARTED & COMPLETED: 2-7-97

All samples have been visually classified by Driller. Unless otherwise specified, water levels noted were observed at completion of borings, and do not necessarily represent permanent ground water levels. Figures in right hand column indicate number of blows required to drive Two-Inch Split Sampler 6 inches using 140 lb. weight falling 30 inches(+/-). Figures in column to left (noted) indicate number of blows to drive casing one foot, using 300 lb. weight falling 24 inches(+/-).

Sheet 1 of 1

CARR-DEE CORP.

7 LINDEN STREET P.O. BOX 67 MEDFORD, MA 02155-0001 Telephone (617) 391-4500
 by HALEY & ALDRICH, INC., 58 CHARLES ST., CAMBRIDGE, MA Date Feb. 10, 1997 Job No. 97015
 Location V.A HOSPITAL MEDICAL CENTER, SOUTH HUNTINGTON AVE., ROXBURY, MA Scale 1" = 3'

BORING 204

Ground Surface

0'6"	ASPHALT		
		22	S#1, FROM 1'0" TO 3'0"
		23	RECOVERED 4"
		18	
		10	
		11	S#2, FROM 3'0" TO 5'0"
	FILL	5	RECOVERED 12"
		35	
		22	
		8	S#3, FROM 5'0" TO 7'0"
		10	RECOVERED 6"
		9	
	SAND, GRAVEL, LOAM, TRACE	10	
		21	S#4, FROM 7'0" TO 9'0"
		16	RECOVERED 7"
		8	
		5	
		4	S#5, FROM 9'0" TO 11'0"
		4	RECOVERED 7"
		3	
		3	
	SILT, CINDERS ASHES, BRICK	12	S#6, FROM 11'0" TO 12'6"
		16	RECOVERED 14"
		78	
12'9"			

- R E F U S A L -

(100 BLOWS, S.S., 140-LB. WGT., NO PENETRATION)

NO WATER ENCOUNTERED

SIZE OF AUGERS 3-3/4" I.D., DEPTH 12'9"

DRILLER: RENE' DESIMONE, INSPECTOR: SCOTT SHAY

DATE STARTED & COMPLETED: 2-6-97

samples have been visually classified by Driller. Unless otherwise specified, water levels noted were observed at completion borings, and do not necessarily represent permanent ground water levels. Figures in right hand column indicate number of blows required to drive Two-Inch Split Sampler 6 inches using 140 lb. weight falling 30 inches(+/-). Figures in column to left (noted) indicate number of blows to drive casing one foot, using 300 lb. weight falling 24 inches(+/-).

Sheet 1 of 1

CARR-DEE CORP.

37 LINDEN STREET P.O. BOX 67 MEDFORD, MA 02155-0001 Telephone (617) 391-4500
 To HALEY & ALDRICH, INC., 58 CHARLES ST., CAMBRIDGE, MA Date Feb. 10, 1997 Job No. 97015
 Location V.A HOSPITAL MEDICAL CENTER ,SOUTH HUNTINGTON AVE.,ROXBURY,MA Scale 1" = 3'

BORING 205

Ground Surface

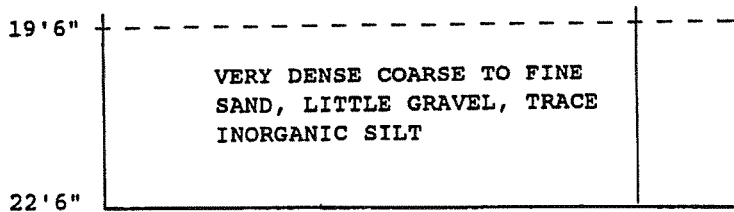
0'5"	ASPHALT		
		8	S#1, FROM 1'0" TO 3'0"
		8	RECOVERED 15"
	FILL	12	
		28	
		35	S#2, FROM 3'0" TO 5'0"
	SAND, GRAVEL, TRACE SILT,	26	RECOVERED 3"
		8	
	CINDERS, WOOD, CONCRETE,	4	
		5	S#3, FROM 5'0" TO 7'0"
	GLASS	15	RECOVERED 6"
		20	
7'0"		14	
		8	S#4, FROM 7'0" TO 9'0"
	MEDIUM DENSE FINE SAND,	10	RECOVERED 12"
		18	
	LITTLE GRAVEL, TRACE OF	18	
		5	S#5, FROM 9'0" TO 11'0"
	INORG. SILT, COBBLES	9	RECOVERED 24"
		21	
		22	
12'0"			
	VERY DENSE COARSE TO FINE		
	SAND, LITTLE GRAVEL, TRACE	34	S#6, FROM 15'0" TO 17'0"
		39	RECOVERED 20"
		26	
	INORGANIC SILT	18	
19'6"			

CONTINUED ON SHEET NUMBER 2

CARR-DEE CORP.

LINDEN STREET P.O. BOX 67 MEDFORD, MA 02155-0001 Telephone (617) 391-4500
HALEY & ALDRICH, INC., 58 CHARLES ST., CAMBRIDGE, MA Date Feb. 10, 1997 Job No. 97015
Location V.A HOSPITAL MEDICAL CENTER, SOUTH HUNTINGTON AVE., ROXBURY, MA Scale 1" = 3'

BORING 205



- R E F U S A L -
(100 BLOWS, S.S., 140-LB. WGT., NO PENETRATION)

NO WATER ENCOUNTERED
SIZE OF AUGERS 3-3/4" I.D., DEPTH 22'6"
DRILLER: RENE' DESIMONE, INSPECTOR: SCOTT SHAY
DATE STARTED & COMPLETED: 2-6-97

samples have been visually classified by Driller. Unless otherwise specified, water levels noted were observed at completion of borings, and do not necessarily represent permanent ground water levels. Figures in right hand column indicate number of blows required to drive Two-Inch Split Sampler 6 inches using 140 lb. weight falling 30 inches(+/-). Figures in column to left (noted) indicate number of blows to drive casing one foot, using 300 lb. weight falling 24 inches(+/-).

Sheet 2 of 2

CARR-DEE CORP.

37 LINDEN STREET P.O. BOX 67 MEDFORD, MA 02155-0001 Telephone (617) 391-4500
 To HALEY & ALDRICH, INC., 58 CHARLES ST., CAMBRIDGE, MA Date Feb. 7, 1997 Job No. 97015
 Location V.A HOSPITAL MEDICAL CENTER, SOUTH HUNTINGTON AVE., ROXBURY, MA Scale 1" = 3'

BORING 206

Ground Surface

	VERY DENSE TO MEDIUM	6	S#1, FROM 1'0" TO 2'0" RECOVERED 6"
		10	
		25/0"	
7'0"	DENSE COARSE TO FINE SAND, LITTLE GRAVEL, TRACE OF INORGANIC SILT, (FILL ?)	17	S#2, FROM 3'0" TO 5'0" RECOVERED 19"
		15	
		18	
		18	
9'0"	LOOSE FINE SAND, LITTLE TO SOME GRAVEL, COBBLES, TRACE INORGANIC SILT	11	S#3, FROM 5'0" TO 7'0" RECOVERED 4"
		11	
		9	
		9	
		6	S#4, FROM 7'0" TO 9'0" RECOVERED 6"
		4	
		4	
		12	
	VERY DENSE COARSE TO FINE SAND, LITTLE TO SOME GRAVEL, COBBLES, TRACE INORGANIC SILT	45	S#5, FROM 10'0" TO 11'3" RECOVERED 9"
		66	
		120/3"	
19'6"		127	S#6, FROM 15'0" TO 15'6" RECOVERED 5"

CONTINUED ON SHEET NUMBER 2

CARR-DEE CORP.

7 LINDEN STREET P.O. BOX 67 MEDFORD, MA 02155-0001 Telephone (617) 391-4500
HALEY & ALDRICH, INC., 58 CHARLES ST., CAMBRIDGE, MA Date Feb. 7, 1997 Job No. 97015
Location V.A HOSPITAL MEDICAL CENTER, SOUTH HUNTINGTON AVE., ROXBURY, MA Scale 1" = 3'

BORING 206

19'6"	VERY DENSE COARSE TO FINE SAND, LITTLE TO SOME GRAVEL, COBBLES, TRACE INORGANIC SILT	120/1" #7,	FROM 22'0" TO 22'1" RECOVERED 0.5"
22'1"			

NO WATER ENCOUNTERED
SIZE OF AUGERS 3-3/4" I.D., DEPTH 22'0"
DRILLER: RENE' DESIMONE, INSPECTOR: SCOTT SHAY
DATE STARTED & COMPLETED: 2-4-97

samples have been visually classified by Driller. Unless otherwise specified, water levels noted were observed at completion borings, and do not necessarily represent permanent ground water levels. Figures in right hand column indicate number of blows required to drive Two-Inch Split Sampler 6 inches using 140 lb. weight falling 30 inches(+/-). Figures in column to left (noted) indicate number of blows to drive casing one foot, using 300 lb. weight falling 24 inches(+/-).

Sheet 2 of 2

CARR-DEE CORP.

37 LINDEN STREET P.O. BOX 67 MEDFORD, MA 02155-0001 Telephone (617) 391-4500
 To HALEY & ALDRICH, INC., 58 CHARLES ST., CAMBRIDGE, MA Date Feb. 10, 1997 Job No. 97015
 Location V.A HOSPITAL MEDICAL CENTER ,SOUTH HUNTINGTON AVE.,ROXBURY,MA Scale 1" = 3'

BORING 207

Ground Surface

0'3"	ASPHALT		
		8	S#1, FROM 1'0" TO 3'0"
		12	RECOVERED 8"
		12	
	FILL	20	
		9	S#2, FROM 3'0" TO 5'0"
		5	RECOVERED 8"
		6	
	SAND, GRAVEL, COBBLES,	4	
		143	S#3, FROM 5'0" TO 5'6"
			RECOVERED 2"
	TRACE OF SILT, CINDERS		
		6	S#4, FROM 7'0" TO 9'0"
		7	RECOVERED 7"
		10	
9'0"		14	
		26	S#5, FROM 9'0" TO 10'6"
		46	RECOVERED 8"
	VERY DENSE COARSE TO FINE	87	
	SAND, SOME TO LITTLE GRAVEL		
	COBBLES, TRACE OF INORGANIC		
	SILT		
13'10"			

- R E F U S A L -
 (100 BLOWS, S.S., 140-LB. WGT., NO PENETRATION)

NO WATER ENCOUNTERED
 SIZE OF AUGERS 3-3/4" I.D., DEPTH 13'10"
 DRILLER: RENE' DESIMONE, INSPECTOR: SCOTT SHAY
 DATE STARTED & COMPLETED: 2-4-97

All samples have been visually classified by Driller. Unless otherwise specified, water levels noted were observed at completion of borings, and do not necessarily represent permanent ground water levels. Figures in right hand column indicate number of blows required to drive Two-Inch Split Sampler 6 inches using 140 lb. weight falling 30 inches(+/-). Figures in column to left (noted) indicate number of blows to drive casing one foot, using 300 lb. weight falling 24 inches(+/-).

Sheet 1 of 1

CARR-DEE CORP.

LINDEN STREET P.O. BOX 67 MEDFORD, MA 02155-0001 Telephone (617) 391-4500
 HALEY & ALDRICH, INC., 58 CHARLES ST., CAMBRIDGE, MA Date Feb. 10, 1997 Job No. 97015
 Location V.A HOSPITAL MEDICAL CENTER, SOUTH HUNTINGTON AVE., ROXBURY, MA Scale 1" = 3'

BORING 208

Ground Surface

0'4"	ASPHALT		
		6	S#1, FROM 1'0" TO 3'0"
		11	RECOVERED 6"
		28	
		40	
		11	S#2, FROM 3'0" TO 5'0"
		5	RECOVERED 8"
		2	
		2	
		2	S#3, FROM 5'0" TO 7'0"
		4	RECOVERED 10"
		10	
		10	
	SAND, GRAVEL, TRACE OF	6	S#4, FROM 7'0" TO 9'0"
		4	RECOVERED 10"
		3	
		3	
		3	S#5, FROM 9'0" TO 12'0"
		2	RECOVERED 6"
		2	
		1/18"	
		2	S#6, FROM 12'0" TO 14'0"
		3	RECOVERED 15"
		49	
		63	S#7, FROM 14'0" TO 14'3"
		120/3"	RECOVERED 0"
14'3"			

- R E F U S A L -

(100 BLOWS, S.S., 140-LB. WGT., NO PENETRATION)

NO WATER ENCOUNTERED

SIZE OF AUGERS 3-3/4" I.D., DEPTH 14'3"

DRILLER: RENE' DESIMONE, INSPECTOR: SCOTT SHAY

DATE STARTED & COMPLETED: 2-7-97

samples have been visually classified by Driller. Unless otherwise specified, water levels noted were observed at completion borings, and do not necessarily represent permanent ground water levels. Figures in right hand column indicate number of blows required to drive Two-Inch Split Sampler 6 inches using 140 lb. weight falling 30 inches(+/-). Figures in column to left (noted) indicate number of blows to drive casing one foot, using 300 lb. weight falling 24 inches(+/-).

Sheet 1 of 1

CARR-DEE CORP.

37 LINDEN STREET P.O. BOX 67 MEDFORD, MA 02155-0001 Telephone (617) 391-4500
 To HALEY & ALDRICH, INC. 58 CHARLES ST., CAMBRIDGE, MA Date Feb. 10, 1997 Job No. 97015
 Location V.A HOSPITAL MEDICAL CENTER, SOUTH HUNTINGTON AVE., ROXBURY, MA Scale 1" = 3'

BORING 209

Ground Surface

0'4"	ASPHALT		
		6	S#1, FROM 1'0" TO 3'0"
		6	RECOVERED 9"
		8	
		8	
		3	S#2, FROM 3'0" TO 5'0"
		3	RECOVERED 15"
		2	
	FILL	2	
		10	S#3, FROM 5'0" TO 7'0"
		3	RECOVERED 8"
		1	
		1	
		1	S#4, FROM 7'0" TO 9'0"
		2	RECOVERED 16"
		3	
	SAND, GRAVEL, TRACE	2	
		3	S#5, FROM 9'0" TO 11'0"
		5	RECOVERED 6"
		4	
		5	
		2	S#6, FROM 11'0" TO 13'0"
		2	RECOVERED 6"
		2	
	SILT, CINDERS, ASHES, GLASS	3	
		1	S#7, FROM 13'0" TO 15'0"
		2	RECOVERED 8"
		2	
		5	
		3	S#8, FROM 15'0" TO 17'0"
		3	RECOVERED 12"
		3	
		12	S#9, FROM 17'0" TO 17'2"
17'2"		100/2"	RECOVERED 2"

- R E F U S A L -

(100 BLOWS, S.S., 140-LB. WGT., NO PENETRATION)

WATER LEVEL 17'0"

SIZE OF AUGERS 3-3/4" I.D., DEPTH 17'2"

DRILLER: RENE' DESIMONE, INSPECTOR: SCOTT SHAY

DATE STARTED & COMPLETED: 2-7-97

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Sheet 1 of 1

CARR-DEE CORP.

LINDEN STREET P.O. BOX 67 MEDFORD, MA 02155-0001 Telephone (617) 391-4500
 HALEY & ALDRICH, INC. 58 CHARLES ST., CAMBRIDGE, MA Date Feb. 10, 1997 Job No. 97015
 Location V.A HOSPITAL MEDICAL CENTER, SOUTH HUNTINGTON AVE., ROXBURY, MA Scale 1" = 3'

BORING 210

Ground Surface

10'0"	F I L L	15	S#1, FROM 0'0" TO 2'0"
		65	RECOVERED 14"
		16	
		20	
	SAND, GRAVEL, TRACE OF	12	S#2, FROM 2'0" TO 4'0"
		10	RECOVERED 16"
		9	
		6	
	COBBLES, SILT, ASPHALT,	10	S#3, FROM 4'0" TO 6'0"
		8	RECOVERED 9"
		10	
		10	
	CINDERS	8	S#4, FROM 6'0" TO 8'0"
		6	RECOVERED 15"
		8	
		7	
15'0"	VERY DENSE COARSE TO	4	S#5, FROM 8'0" TO 10'0"
		4	RECOVERED 12"
		5	
		8	
	FINE SAND, SOME TO LITTLE	21	S#6, FROM 10'0" TO 12'0"
		23	RECOVERED 14"
		66	
		88	
	GRAVEL, TRACE OF INORGANIC	120/3"	S#7, FROM 12'0" TO 12'3"
			RECOVERED 1"
18'6"	SILT, COBBLES		
	DENSE FINE SAND, LITTLE INORGANIC SILT, GRAVEL	22	S#8, FROM 15'0" TO 17'0"
		20	RECOVERED 13"
		16	
		17	

CONTINUED ON SHEET NUMBER 2

CARR-DEE CORP.

37 LINDEN STREET P.O. BOX 67 MEDFORD, MA 02155-0001 Telephone (617) 391-4500
To HALEY & ALDRICH, INC. 58 CHARLES ST., CAMBRIDGE, MA Date Feb. 10, 1997 Job No. 97015
Location V.A HOSPITAL MEDICAL CENTER ,SOUTH HUNTINGTON AVE.,ROXBURY,MA Scale 1" = 3'

BORING 210

18'6"					
			15	S#9,	FROM 20'0" TO 22'0"
			19		RECOVERED 12"
	DENSE COARSE TO FINE		16		
			18		
	SAND, TRACE GRAVEL,				
	INORGANIC SILT, COBBLES				
28'8"					

- R E F U S A L -
(100 BLOWS, S.S., 140-LB. WGT., NO PENETRATION)

NO WATER ENCOUNTERED
SIZE OF AUGERS 3-3/4" I.D., DEPTH 28'8"
DRILLER: RENE' DESIMONE, INSPECTOR: SCOTT SHAY
DATE STARTED & COMPLETED: 2-6-97, 2-7-97

All samples have been visually classified by Driller. Unless otherwise specified, water levels noted were observed at completion of borings, and do not necessarily represent permanent ground water levels. Figures in right hand column indicate number of blows required to drive Two-Inch Split Sampler 6 inches using 140 lb. weight falling 30 inches(+/-). Figures in column to left (noted) indicate number of blows to drive casing one foot, using 300 lb. weight falling 24 inches(+/-).

Sheet 2 of 2