Report of Preliminary Subsurface Exploration
and Geotechnical Engineering Evaluation
Brockman Park Sites
Amherst, Virginia
F&R Project No. F62-192G

Prepared For:
Town of Amherst
P.O. Box 280
Amherst, Virginia 24521

By:
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August 2004

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F&R Project No.: F62-192G

27 August 2004

Town of Amherst
P.O. Box 280
Amherst, Virginia 24521

Attention: Mr. Jack Hobbs

Subject: Brockman Park Sites
Amherst, Virginia

Dear Mr. Hobbs:

The purpose of this report is to present the results of the preliminary subsurface exploration program and geotechnical engineering analyses undertaken by Froehling & Robertson, Inc. (F&R) in connection with the above referenced project. Our services were performed in general accordance with our Proposal No. 0562-059G dated 16 June 2004, as authorized by the Town of Amherst. The attached report presents our understanding of the project, reviews our exploration procedures, describes existing site and general subsurface conditions, and presents our preliminary evaluations, conclusions, and recommendations.

We have enjoyed working with you on this project, and we are prepared to assist with appropriate final geotechnical evaluations upon determination of each parcel's development scheme including finished grades and structure locations. We are also available to assist with quality control testing services during construction. Please contact us if you have any questions regarding this report or if we may be of further service.

Sincerely,
FROEHLING & ROBERTSON, INC.

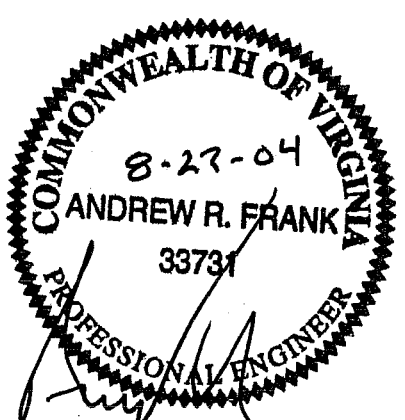

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TABLE OF CONTENTS

APPENDICES

1.0 INTRODUCTION

1.1 Project Information

We have been requested by the Town of Amherst to perform a preliminary geotechnical exploration for parcels No. 1 through 10 at the Brockman Business and Industrial Park in Amherst, Virginia (see Site Vicinity Map, Drawing No. 1, Appendix A). The intent of the preliminary explorations is to provide a brief report of findings and geotechnical recommendations (especially with respect to potential excavation conditions). Our understanding of the project is based on information provided by Mr. Jack Hobbs with the Town of Amherst. Included in the provided information was an AutoCAD topographic site plan and an internet link to both a general site layout and aerial photograph for Brockman Park. We note that the provided site plan reflected topography prior to grading. Based on visual observation, the existing site topography appears to have changed since development of the provided plan.

Parcels 1 through 10 are on the order of 52 total acres in size. No structural load or planned finished grade information has been provided at this time. Since we were requested to perform borings to depths of 20 feet each, we have assumed that potential excavations will not exceed about 15 feet. Based on previous experience, we have assumed that the possible commercial, office, or light industrial buildings that may be constructed at the site will have maximum column and continuous wall loads on the order of 80 kips and 3 kips per linear foot (klf), respectively. We note that depending on soil conditions and the amount of excavation at any one boring location, a depth of 20 feet may or may not extend to the depth of a potential structure's foundation influence.

In addition to the current exploration, F&R has issued two previous preliminary subsurface exploration reports for other sites in the Brockman Business Park. These reports, entitled Brockman Business Park – Site #2 and Brockman Business Park- Right Now Site (Site #1), were issued on 14 October 2003 and 15 October 2003, respectively, to Dewberry & Davis, Inc. under project number E62-203G. The Brockman Business Park – Site #2 exploration included borings in parcels 12 and 14 while the Right Now Site (Site #1) exploration included borings for a conceptualized development of parcel 15.

1.2 Scope of Services

The purpose of this preliminary subsurface exploration was to 1) provide general descriptions of the subsurface soil conditions at the locations explored, 2) evaluate excavation conditions at the locations explored, and 3) as the limited data allows, comment on a preliminary foundation design bearing pressure range. Preliminary design parameters will require further review once definitive construction plans are developed. We envision that this review will require additional subsurface exploration as well as engineering analyses. In order to accomplish the preliminary exploration objectives, we undertook the following scope of services:

1) Visited the site to observe existing surface conditions and features and to mark boring locations.
2) Coordinated with Miss Utility services and the Town of Amherst for utility clearance.
3) Reviewed readily available geologic and subsurface information relative to the project site.
4) Executed a preliminary subsurface exploration consisting of one to three standard penetration test borings per parcel. Each test boring was drilled to a planned termination depth of 20 feet or auger refusal, whichever occurred first.
5) Evaluated the findings of the test borings relative to potential site earthwork, specifically with respect to envisioned excavation conditions, and as the limited data allowed, commented on a preliminary foundation design bearing pressure range.
6) Prepared this written report summarizing our geotechnical engineering work on the project, including comments relative to envisioned excavation conditions, the shrink/swell potential of the on-site soils, and a preliminary foundation design bearing pressure range.

Our scope of services did not include a survey of boring locations or elevations, rock coring, pavement design, quantity estimates, preparation of plans or specifications, detention pond considerations, or the identification and evaluation of environmental aspects of the project site.

2.0 SUBSURFACE EXPLORATION PROCEDURES

Our subsurface exploration program consisted of 21 test borings (designated B-1 through B-21) and one offset boring (designated B-3A). The test borings were performed on 10 through 12 August 2004 at the approximate locations shown on the attached Boring Location Plan (Drawing No. 2, Appendix B). F&R personnel marked the boring locations in the field by estimating distances from existing features indicated on the provided site plan. No claim is made as to the accuracy of the information contained in the provided documents. In consideration of the methods used in their determination, the boring locations shown on the attached Boring Location Plan should be considered approximate.

The test borings were performed in accordance with generally accepted practice using an All-Terrain Vehicle (ATV)-mounted CME-55 rotary drill rig. Hollow-stem augers were advanced to pre-selected depths, the center plug was removed, and representative soil samples were recovered with a standard split-spoon sampler (1 3/8 in. ID, 2 in. OD) in general accordance with ASTM D 1586, the Standard Penetration Test. Utilizing an automatic hammer, the split-spoon sampler was driven into the soil by freely dropping a weight of 140 pounds from a height of 30 inches. The number of blows required to drive the split-spoon sampler three consecutive 6-inch increments is recorded, and the blows of the last two increments are summed to obtain the Standard Penetration Resistance (N-value). The N-value provides a general indication of in-situ soil conditions and has been correlated with certain engineering properties of soils.

In some soils it is not always practical to drive a split-spoon sampler the full three consecutive 6-inch increments. Whenever more than 50 blows are required to drive the sampler over a 6-inch increment the condition is called split-spoon refusal. Split-spoon refusal conditions may occur because of obstructions or because the earth materials being tested are very dense or very hard. When split-spoon refusal occurs, often little or no sample is recovered. The SPT N-value for split-spoon refusal conditions is typically estimated as greater than 100 blows per foot (bpf). Where the sampler is observed not to penetrate after 50 blows, the N-value is reported as 50/0. Otherwise, the depth of penetration after 50 blows is reported in inches, i.e. 50/5, 50/2, etc.

The test borings were advanced through the soil overburden to a planned termination depth or auger refusal, whichever occurred first. Subsurface water level readings were taken in each of the borings immediately upon completion of the drilling process. Upon completion of drilling, the boreholes were backfilled with auger cuttings (soil). Periodic observation and maintenance of the boreholes should be performed due to potential subsidence at the ground surface, as the borehole backfill could settle over time.

Representative portions of the split-spoon soil samples obtained throughout the exploration program were placed in glass jars and transported to our laboratory. In the laboratory, the soil samples were evaluated by a member of our professional staff in general accordance with techniques outlined in the visual-manual identification procedure (ASTM D 2488) and the Unified Soil Classification System. The soil descriptions and classifications discussed in this report and shown on the attached boring logs are based on visual observation and should be considered approximate. Copies of the boring logs are provided and classification procedures are further explained in the attached Appendix B.

Split-spoon soil samples recovered on this project will be stored at F&R's office for a period of sixty days. After sixty days, the samples will be discarded unless prior notification is provided to us in writing.

3.0 SITE AND SUBSURFACE CONDITIONS

3.1 Site Description

The project site is a 52-acre portion of the Brockman Business Park which is located on the north side of Route 60, approximately ¾ of a mile southeast of its intersection with Route 29 in Amherst, Virginia. The 52-acre area has been subdivided into 10 smaller parcels that surround West Commerce Street, East Commerce Street, and a portion of Brockman Park Drive. These three streets are internal roadways within the business park with ingress/egress to Route 60 provided via Brockman Park Drive. In general, West Commerce Street and East Commerce Street run parallel to Route 60 and essentially split the project site into northern parcels and southern parcels. The southern parcels (Lots 1 through 6) are situated between Route 60 and the West and East Commerce Streets, while the remaining parcels (Lots 7 through 10) generally exist north of the West and East Commerce Streets.

We note that adjacent to West and East Commerce Streets, the land generally exists at an elevation ranging from 0 to 15 feet above that of street level. In addition, we note that the site's topography generally slopes downward towards Route 60 from the northeast to the southwest. The 52-acre project site is generally grass-covered, with isolated areas of thick brush and woods. No rock outcrops or surface water were observed during our site reconnaissance; however, we do note that a storm-water detention pond was observed in the northern portion of Lot 8. We understand that the excavated material generated from construction of the storm-water detention pond was stockpiled in an area between Lots 7 and 8 (in the general vicinity of borings B-13 through B-15).

3.2 Regional Geology

The project site lies within the Blue Ridge physiographic province of Virginia. Available geologic references report that the proposed site is underlain by Middle Proterozoic (Early or Pre-Grenville) aged rocks generally consisting of layered quartzofeldspathic augen gneiss and flaser gneiss. The soils resulting from in-situ weathering of the rocks, without significant transportation, are called residual soils.

The residual soil profile generally grades downward gradually from fine-grained plastic soils near the ground surface to coarse-grained soils at greater depth. A transitional zone of partially weathered rock of varying thickness occurs between the coarse-grained residual soils and the underlying bedrock. Partially weathered rock is defined, for engineering purposes, as residual material with standard penetration resistances in excess of 100 blows per foot. Weathering of the parent bedrock is generally more rapid near fracture zones and therefore, the bedrock surface

may be irregular. Irregular patterns of differential weathering may also result in zones of rock and partially weathered rock embedded within the more completely weathered coarse-grained soils.

3.3 Subsurface Conditions

3.3.1 General

The subsurface conditions discussed in the following paragraphs and those shown on the boring logs represent an estimate of the subsurface conditions based on interpretation of the boring data using normally accepted geotechnical engineering judgment. The transitions between different soil strata are usually less distinct than those shown on the boring logs. Although individual test borings are representative of the subsurface conditions at the boring locations on the dates shown, they are not necessarily indicative of subsurface conditions at other locations or at other times. Data from the specific test borings are shown on the attached boring logs in Appendix B.

Below the existing ground surface, the test borings generally encountered surficial soils underlain by fill and/or residual soils, partially weathered rock, and auger refusal materials. These materials are generally discussed in the following paragraphs.

3.3.2 Surficial Soils

Surficial soils typically contain root mat and/or other fibrous organic matter and are generally unsuitable for engineering purposes. Surficial soils were encountered in each test boring to a depth of approximately 2 to 3 inches. Actual surficial soil depths may vary in unexplored areas of the site.

3.3.3 Fill Materials

Fill may be any material that has been transported and deposited by man. Fill materials were encountered in borings B-13, B-14, and B-15 to approximate depths of 8 feet, 15.5 feet, and 5 feet below the existing site grades, respectively. We note that boring B-14, which encountered auger refusal at a depth of 15.5 feet, did not definitively penetrate the existing fill materials, thus indicating that the refusal may have been due to a boulder or similar obstruction within a deeper fill profile.

The sampled fill materials were generally described as clays (CL and CL/CH), clayey sands (SC), silty sands (SM), and clayey gravels (GC). Standard penetration resistances (N-values) ranged from 4 blows per foot (bpf) to 50 blows per 3 inches of split-spoon penetration, with a typical range of 4 to 12 bpf. Based on the standard penetration resistances obtained, it appears that the fill encountered in the borings was likely placed with very little to no compactive effort.

3.3.4 Residual Soils

Residual soils, formed by the in-place weathering of the parent rock, were encountered in each test boring except boring B-14. Residual soils were encountered beneath surficial soils or fill to depths ranging from 3 to 20 feet below existing site grades. Sampled residual soils were generally described as clays (CL and CL/CH), silts (ML and MH), silty sands (SM), and clayey sands (SC). Standard penetration resistance in the sampled residuum ranged from 4 to 61 blows per foot (bpf) with a more typical range of 5 to 25 bpf.

3.3.5 Partially Weathered Rock

Partially weathered rock (PWR) is a transitional material between soil and rock, which retains the relic structure of the rock and has very hard or very dense consistencies. PWR was encountered below residual soil in borings B-1, B-3 through B-12, B-15, and B-18 at depths ranging from 3 to 17 feet below existing site grades. In boring B-1, PWR was encountered as an approximate 5-feet thick lens within the residual soil profile. Sampled PWR, generally described as silty sand (SM) and silty gravel (GM), exhibited penetration resistances ranging from 50 blows per 6 inches of split-spoon penetration to 50 blows with no split-spoon penetration. A table listing the depths at which PWR was encountered is provided in the following section.

3.3.6 Auger Refusal

Auger refusal occurs when materials are encountered that cannot be penetrated by the soil auger and is normally indicative of a hard or very dense material, such as debris within fill, boulders, rock lenses, pinnacles, or the upper surface of bedrock. Refusal was encountered in borings B-3, B-3A, B-5, B-6, B-8, B-9, B-10, B-14, and B-15 at depths ranging from 8 to 18 feet below existing site grades. The depth at which auger refusal was encountered in each test boring is provided in the table on the following page.

Auger refusal discussed herein is based on conditions impenetrable to our drilling equipment (CME 55). Auger refusal conditions with a CME 55 do not necessarily indicate conditions impenetrable to other equipment. Auger refusal conditions may exist intermediate of the boring locations or in unexplored areas of the site.

Encountered PWR and Auger Refusal Depths

Boring Location	Parcel Number	Depth to PWR (ft)	Depth to Auger Refusal Material (ft)
B-1	Parcel No.6	12 to 17*	NE
B-2	Parcel No.6	NE	NE
B-3	Parcel No.6	8	9
B-3A	Parcel No.6	No samples taken	8
B-4	Parcel No.5	5.5	NE
B-5	Parcel No.5	12	15.5
B-6	Parcel No.4	13.5	14
B-7	Parcel No.4	13.5	NE
B-8	Parcel No.3	4.5	18
B-9	Parcel No.3	3	17.5
B-10	Parcel No.2	8	13
B-11	Parcel No.2	13	NE
B-12	Parcel No.1	17	NE
B-13	Parcel No.7	NE	NE
B-14	Parcel No.8	NE	15.5**
B-15	Parcel No.8	12.5	18
B-16	Parcel No.8	NE	NE
B-17	Parcel No.9	NE	NE
B-18	Parcel No.9	17	NE
B-19	Parcel No.10	NE	NE
B-20	Parcel No.10	NE	NE
B-21	Parcel No.10	NE	NE

NE = Not Encountered, i.e. no auger refusal and/or PWR was encountered within the 20-ft depth of test boring

* PWR was encountered as an approximate 5 –feet thick lens within the residual soil profile

** Auger refusal was encountered without definitively penetrating the existing fill

3.3.7 Subsurface Water

Measurable subsurface water was not encountered in any of the test borings immediately upon completion of the soil drilling process. Fluctuations in subsurface water levels and soil moisture can be anticipated with changes in precipitation, run-off, and season.

4.0 PRELIMINARY FINDINGS AND RECOMMENDATIONS

4.1 General

The following evaluations and preliminary recommendations are based on our observations at the site, interpretation of the field data obtained during this exploration, and our experience with similar subsurface conditions and projects. Soil penetration data have been used to estimate an allowable bearing pressure range using established correlations. Subsurface conditions in unexplored locations may vary from those encountered. When final structure type, loadings, and elevations are determined, we request that we be advised so that we may reevaluate our preliminary recommendations.

Determination of an appropriate foundation system for a given structure is dependent on the proposed structural loads, soil conditions, and construction constraints such as proximity to other structures, etc. The subsurface exploration aids the geotechnical engineer in determining the soil stratum appropriate for structural support. This determination includes considerations with regard to both allowable bearing capacity and compressibility of the soil strata. In addition, since the method of construction greatly affects the soils intended for structural support, consideration must be given to the implementation of suitable methods of site preparation, fill compaction, and other aspects of construction.

4.2 Excavation Conditions

We note that no current topographic or proposed grading information was available at the time this report was written. However, we envision that the excavation conditions will vary across the 52-acre site planned for development. As previously noted, PWR was encountered within 3 to 17 feet below the existing ground surface at borings B-1, B-3 through B-12, B-15, and B-18 with auger refusal encountered within 8 to 18 feet in borings B-3, B-3A, B-5, B-6, B-8, B-9, B-10, B-14, and B-15. Where excavations to develop the project site are required beyond the depths of encountered PWR and auger refusal, we anticipate that difficult excavation conditions will be encountered. In addition and as discussed in the geology section of this report, it is not uncommon to encounter lenses or intrusions of rock or weathered rock well within the residual soil profile, and as encountered in boring B-1.

In mass excavations for general sitework, partially weathered rock and dense or hard soils (soils with standard penetration resistances of 30 or more blows per foot) can usually be removed by ripping with a single-tooth ripper attached to a large crawler tractor or by breaking it out with a tracked excavator or large front-end loader. However, we note that while ripping and/or breaking out with large tracked equipment might be possible, it may be time prohibitive for deep mass excavations. Blasting can be performed to facilitate the excavation effort where time is a

controlling factor. In confined excavations such as foundations, utility trenches, elevator pits, etc., removal of partially weathered rock typically requires use of large backhoes, pneumatic spades, or light blasting.

Refusal materials will normally require blasting for removal in all types of excavations. Any blasting in footing excavations must be done carefully to prevent damage to the bearing materials. Blasting should be performed by an experienced and licensed specialty contractor familiar with local practice and regulations. The gradation of the material removed by ripping or blasting will probably be erratic. Excavated rock is generally unsuitable for use as structural fill and should be wasted; however, it is sometimes feasible to use rock material in the deeper parts of architectural or driveway and parking lot fills. Rock placed in non-structural areas should be well choked with soil fill and compacted. Any soil/rock fill should be capped with a minimum of 5 feet of clean soil fill.

The definition of rock can be a source of conflict during construction. The following definitions have been incorporated into specifications on other projects and are provided for your general guidance:

GENERAL EXCAVATION:

Rip Rock - Any material that cannot be removed by scrapers, loaders, pans, dozers, or graders; and requires the use of a single-tooth ripper mounted on a crawler tractor having a minimum draw bar pull rated at not less than 56,000 pounds.

Blast Rock - Any material which cannot be excavated with a single-tooth ripper mounted on a crawler tractor having a minimum draw bar pull rated at not less than 56,000 pounds (Caterpillar D-8K or equivalent) or by a Caterpillar 977 front-end loader or equivalent; and occupying an original volume of at least one (1) cubic yard.

TRENCH EXCAVATION:

Blast Rock - Any material which cannot be excavated with a backhoe having a bucket curling force rated at not less than 25,700 pounds (Caterpillar Model 225 or equivalent), and occupying an original volume of at least one-half (1/2) cubic yard.

With regard to rock excavation budgeting for mass rock excavation, some owners have set a contract price by estimating a quantity with available information and increasing that amount on the order of 10 percent. Subsequently, and in order to establish fair unit rates for rock removal, the owner could require the contractor to credit or receive payments depending on the actual rock quantity measured at the time of construction but based on the same unit rate.

4.3 Existing Fill Materials

Existing fill materials were encountered in borings B-13 through B-15 drilled in the area between Lots 7 and 8. We understand that the fill in this area is associated with the excavation of the storm-water detention pond located in the northern portion of Lot 8. Based on the standard penetration resistances obtained, it appears that the encountered fill material was likely placed in an uncontrolled manner with very little to no compactive effort. Therefore, we do not recommend direct support of future development on the existing fill materials. We envision that future development of these existing fill areas will include removal of the uncontrolled materials prior to placement of controlled compacted fill (see controlled fill recommendations) or other at-grade construction.

4.4 Preliminary Foundation Design

Based on the limited subsurface and structural information, we envision that the anticipated development can be supported on a shallow foundation system bearing on undisturbed residual soils, partially weathered rock, or controlled compacted fill (see controlled fill recommendations). For the anticipated relatively light structures, we envision that an allowable design bearing pressure in the range of 2,000 to 4,000 pounds per square foot (psf) should be suitable for footings bearing on undisturbed residual soils or partially weathered rock, depending on the specifics of the site and proposed project. We typically recommend a maximum design bearing pressure of 2,500 psf for footings bearing on controlled fill materials.

However, the actual appropriate design bearing pressure to be used for each specific project should consider the final structure loads, location, and elevations and underlying soil conditions. We note that the design bearing pressure may vary from site to site. Generally, we anticipate that an appropriately selected design bearing pressure will result in a total settlement of about 1 inch. However, once structure location, loading, and elevations are determined for each site development, a specific design bearing pressure can be provided and settlement estimates can be evaluated.

To reduce the possibility of localized shear failures, spread and strip footings should be a minimum of 3 feet and 2 feet wide, respectively. Exterior spread footings should be constructed at least 2 feet below adjacent grades in order to bear below normal frost depth.

All foundation subgrades should be observed, evaluated, and verified for the design bearing pressure by the geotechnical engineer after excavation and prior to reinforcement steel placement. If low consistency soils are encountered during foundation construction, localized undercutting and/or in-place stabilization of foundation subgrades will be required. The actual need for, and extent of, undercutting should be based on field observations made by the geotechnical engineer at the time of construction.

Excavations for footings should be made in such a way as to provide bearing surfaces that are firm and free of loose, soft, wet, or otherwise disturbed soils. If an excavation is left open for an extended period, a thin mat of lean concrete should be placed over the bottom to minimize damage to the bearing surface from weather or construction activities.

Foundation concrete should not be placed on frozen or saturated subgrades. If such materials are allowed to remain below foundations, settlements will increase. Foundation excavations should be concreted as soon as practical after they are excavated. Water should not be allowed to pond in any excavation.

4.5 General Shrink-Swell Considerations

Our scope of services did not include specific laboratory testing to evaluate variable site soils for shrink-swell potential. Based on our visual-manual classification and our experience with similar soils, it is our opinion that the soils encountered at the site would not typically require special consideration with respect to shrink-swell potential. Therefore, we have not recommended any foundation design modifications relative to the potential for shrink/swell soils at this time. However, we note that if shrink-swell soils had been encountered, our typical recommendation would call for extending exterior shallow foundation elements to a level of 3 to 4 feet below planned exterior grade to reduce the effect of potential surface water migration to the foundation soil support level.

4.6 General Slope Stability

Our preliminary exploration did not include a detailed analysis of slope stability for any temporary or permanent condition. However, within building, pavement, and landscaped areas, we generally recommend temporary slopes no steeper than 1.5(H):1(V) and permanent slopes no steeper than 2(H):1(V) up to a maximum height of 20 feet for construction in undisturbed residual soils or newly compacted structural fill placed in accordance with our recommendations. In addition, in building and pavement areas, minimum top of slope setbacks of 10 feet and 5 feet are recommended, respectively.

During construction, temporary slopes should be regularly evaluated for signs of movement or unsafe conditions. Soil slopes should be covered for protection from rain, and surface runoff should be diverted away from the slopes. For erosion protection, a protective cover of grass or other vegetation should be established on permanent soil slopes as soon as possible.

These general slope recommendations are appropriate for slopes underlain by competent materials. However, the provided recommendations should not be used to deviate from OSHA regulations. Construction should be performed in accordance with applicable OSHA regulations.

4.7 Site Preparation

Before proceeding with construction, any existing surficial soils, existing utilities, and other deleterious non-soil materials should be stripped or removed from the proposed construction area. During the clearing and stripping operations, positive surface drainage should be maintained to prevent the accumulation of water. Underground utilities should be re-routed to locations a minimum of 10 feet outside of the proposed new structure footprint.

After stripping, areas intended to support foundations, pavements, floor slabs, and new fill should be carefully evaluated by a geotechnical engineer. At that time, the engineer may require proofrolling of the subgrade with a 20- to 30-ton loaded truck or other pneumatic-tired vehicle of similar size and weight. Proofrolling should be performed during a time of good weather and not while the site is wet, frozen, or severely desiccated. The purpose of the proofrolling is to locate soft, weak, or excessively wet soils present at the time of construction. Any unsuitable materials observed during the evaluation and proofrolling operations should be undercut and replaced with compacted fill and/or stabilized in-place.

The proofrolling observation is an opportunity for the geotechnical engineer to locate inconsistencies intermediate of our boring locations in the existing subgrade. Any unsuitable materials observed during the evaluation and proofrolling operations should be undercut and replaced with compacted fill or stabilized in-place. The possible need for, and extent of, undercutting and/or in-place stabilization required could best be determined by the geotechnical engineer at the time of construction. Once the site has been properly prepared, at-grade construction may proceed.

4.8 Controlled Structural Fill

Based on the boring data, controlled structural fill may be constructed using the non-organic residual soils encountered on-site soils or an off-site borrow having a classification of CL, ML, or SM as defined by the Unified Soil Classification System. In addition, excavated partially weathered rock should also be acceptable for use as fill material provided that the placement and compactive process adequately pulverizes the material. Other materials may be suitable for use as controlled structural fill material and should be individually evaluated by the geotechnical engineer. We note that the clays (CL/CH) and elastic silts (MH) encountered in the upper portions some of the test borings are not suitable for use as retaining wall backfill. Controlled structural fill should be free of boulders, organic matter, debris, or other deleterious materials and should have a maximum particle size no greater than 3 inches. In addition, we recommend a minimum standard Proctor (ASTM D 698) maximum dry density of approximately 90 pounds per cubic feet (pcf) for fill materials.

Fill materials should be placed in horizontal lifts with a maximum height of 8 inches loose measure. New fill should be adequately keyed into stripped and scarified subgrade soils and should, where applicable, be benched into the existing slopes. During fill operations, positive surface drainage should be maintained to prevent the accumulation of water. We typically recommend that structural fill be compacted to at least 95 percent of the standard Proctor maximum dry density. However, we recommend that this typical compaction criterion be revaluated once the planned construction is determined and laboratory test data becomes available on proposed control structural fill soils. In confined areas such as utility trenches, portable compaction equipment and thin lifts of 3 to 4 inches may be required to achieve specified degrees of compaction.

In general, we recommend that the moisture content of fill soils be maintained within three percentage points of the optimum moisture content as determined from the standard Proctor density test. Excessively wet or excessively dry soils should not be used as fill material without proper drying or wetting. We recommend that the contractor have equipment on site during earthwork for both drying and wetting of fill soils.

Moisture control may be difficult during winter months or extended periods of rain. Attempts to work the soils when wet can be expected to result in deterioration of otherwise suitable soil conditions or of previously placed and properly compacted fill. Where construction traffic or weather has disturbed the subgrade, the upper 8 inches of soils intended for structural support should be scarified and re-compacted.

Each lift of fill should be tested in order to confirm that the recommended degree of compaction is attained. Field density tests to verify fill compaction should be performed for every 5,000 square feet (approximately 70 feet square) of fill area, with a minimum of two tests per lift. In confined areas, a greater frequency may be required.

4.9 Subsurface Water Conditions

Subsurface water for the purposes of this report is defined as water encountered below the existing ground surface. Based on the subsurface water data obtained during our exploration program, we do not generally anticipate that subsurface water will be encountered during anticipated earthwork or shallow foundation excavations at the site. However, the contractor should be prepared to dewater should water levels vary from those encountered during the drilling program. Fluctuations in subsurface water levels and soil moisture can be anticipated with changes in precipitation, runoff, and season.

5.0 CONTINUATION OF SERVICES

As definitive information with respect to structure types, locations, loading, and elevations are determined for each parcel, additional subsurface information will be required to provide final geotechnical design parameters and recommendations. Upon completion of a final geotechnical report for each development and subsequent project design, we recommend that we be given the opportunity to review the foundation plan, grading plan, and project specifications when construction documents approach completion. This review evaluates whether the recommendations and comments provided herein have been understood and properly implemented. We also recommend that Froehling & Robertson, Inc. be retained for professional and construction materials testing services during construction of the project. Our continued involvement on the project helps provide continuity for proper implementation of the recommendations discussed herein. These services are not part of the currently authorized scope of work.

6.0 LIMITATIONS

This preliminary report has been prepared for the exclusive use of the Town of Amherst or their agent, for specific application to the Brockman Park Sites project (Parcels 1 through 10) located in Amherst, Virginia, in accordance with generally accepted soil and foundation engineering practices. No other warranty, express or implied, is made. Our preliminary conclusions and recommendations are based on the limited design information furnished to us, the data obtained from the previously described subsurface exploration program, and generally accepted geotechnical engineering practice. The preliminary conclusions and recommendations do not reflect variations in subsurface conditions which could exist intermediate of the boring locations or in unexplored areas of the site.

Regardless of the thoroughness of a subsurface exploration, there is the possibility that conditions between borings will differ from those at the boring locations, that conditions are not as anticipated by the designers, or that the construction process has altered the soil conditions. Therefore, experienced geotechnical engineers should evaluate earthwork, pavement, and foundation construction to verify that the conditions anticipated in design actually exist. Otherwise, we assume no responsibility for construction compliance with the design concepts, specifications, or recommendations.

In the event that changes are made in the design or location of the proposed structure, the preliminary recommendations presented in the report shall not be considered valid unless the changes are reviewed by our firm and conclusions of this report modified and/or verified in writing. If this report is copied or transmitted to a third party, it must be copied or transmitted in its entirety, including text, attachments, and enclosures. Interpretations based on only a part of this report may not be valid. This report contains 16 pages of text and the attached appendices.

APPENDIX A

IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL ENGINEERING REPORT

As the client of a consulting geotechnical engineer, you should know that site subsurface conditions cause more construction problems than any other factor. ASFE/The Association of Engineering Firms Practicing in the Geosciences offers the following suggestions and observations to help you manage your risks.

A GEOTECHNICAL ENGINEERING REPORT IS BASED ON A UNIQUE SET OF PROJECT-SPECIFIC FACTORS

Your geotechnical engineering report is based on a subsurface exploration plan designed to consider a unique set of project-specific factors. These factors typically include: the general nature of the structure involved, its size, and configuration; the location of the structure on the site; other improvements, such as access roads, parking lots, and underground utilities; and the additional risk created by scope-of-service limitations imposed by the client. To help avoid costly problems, ask your geotechnical engineer to evaluate how factors that change subsequent to the date of the report may affect the report's recommendations.

Unless your geotechnical engineer indicates otherwise, do not use your geotechnical engineering report:

- when the nature of the proposed structure is changed, for example, if an office building will be erected instead of a parking garage, or a refrigerated warehouse will be built instead of an unrefrigerated one;
- when the size, elevation, or configuration of the proposed structure is altered;
- when the location or orientation of the proposed structure is modified;
- when there is a change of ownership; or
- for application to an adjacent site.

Geotechnical engineers cannot accept responsibility for problems that may occur if they are not consulted after factors considered in their report's development have changed.

SUBSURFACE CONDITIONS CAN CHANGE

A geotechnical engineering report is based on conditions that existed at the time of subsurface exploration. Do not base construction decisions on a geotechnical engineering report whose adequacy may have been affected by time. Speak with your geotechnical consultant to learn if additional tests are advisable before construction starts.Note, too, that additional tests may be required when subsurface conditions are affected by construction operations at or adjacent to the site, or by natural events such as floods, earthquakes, or ground water fluctuations. Keep your geotechnical consultant apprised of any such events.

MOST GEOTECHNICAL FINDINGS ARE PROFESSIONAL JUDGMENTS

Site exploration identifies actual subsurface conditions only at those points where samples are taken. The data were extrapolated by your geotechnical engineer who then applied judgment to render an opinion about overall subsurface conditions. The actual interface between materials may be far more gradual or abrupt than your report indicates. Actual conditions in areas not sampled may differ from those predicted in your report. While nothing can be done to prevent such situations, you and your geotechnical engineer can work together to help minimize their impact. Retaining your geotechnical engineer to observe construction can be particularly beneficial in this respect.

A REPORT'S RECOMMENDATIONS CAN ONLY BE PRELIMINARY

The construction recommendations included in your geotechnical engineer's report are preliminary, because they must be based on the assumption that conditions revealed through selective exploratory sampling are indicative of actual conditions throughout a site. Because actual subsurface conditions can be discerned only during earthwork, you should retain your geotechnical engineer to observe actual conditions and to finalize recommendations. Only the geotechnical engineer who prepared the report is fully familiar with the background information needed to determine whether or not the report's recommendations are valid and whether or not the contractor is abiding by applicable recommendations. The geotechnical engineer who developed your report cannot assume responsibility or liability for the adequacy of the report's recommendations if another party is retained to observe construction.

GEOTECHNICAL SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND PERSONS

Consulting geotechnical engineers prepare reports to meet the specific needs of specific individuals. A report prepared for a civil engineer may not be adequate for a construction contractor or even another civil engineer. Unless indicated otherwise, your geotechnical engineer prepared your report expressly for you and expressly for purposes you indicated. No one other than you should apply this report for its intended purpose without first conferring with the geotechnical engineer. No party should apply this report for any purpose other than that originally contemplated without first conferring with the geotechnical engineer.

GEOENVIRONMENTAL CONCERNS ARE NOT AT ISSUE

Your geotechnical engineering report is not likely to relate any findings, conclusions, or recommendations

about the potential for hazardous materials existing at the site. The equipment, techniques, and personnel used to perform a geoenvironmental exploration differ substantially from those applied in geotechnical engineering. Contamination can create major risks. If you have no information about the potential for your site being contaminated, you are advised to speak with your geotechnical consultant for information relating to geoenvironmental issues.

A GEOTECHNICAL ENGINEERING REPORT IS SUBJECT TO MISINTERPRETATION

Costly problems can occur when other design professionals develop their plans based on misinterpretations of a geotechnical engineering report. To help avoid misinterpretations, retain your geotechnical engineer to work with other project design professionals who are affected by the geotechnical report. Have your geotechnical engineer explain report implications to design professionals affected by them, and then review those design professionals' plans and specifications to see how they have incorporated geotechnical factors. Although certain other design professionals may be familiar with geotechnical concerns, none knows as much about them as a competent geotechnical engineer.

BORING LOGS SHOULD NOT BE SEPARATED FROM THE REPORT

Geotechnical engineers develop final boring logs based upon their interpretation of the field logs (assembled by site personnel) and laboratory evaluation of field samples. Geotechnical engineers customarily include only final boring logs in their reports. Final boring logs should not under any circumstances be redrawn for inclusion in architectural or other design drawings, because drafters may commit errors or omissions in the transfer process. Although photographic reproduction eliminates this problem, it does nothing to minimize the possibility of contractors misinterpreting the logs during bid preparation. When this occurs, delays, disputes, and unanticipated costs are the all-too-frequent result.

To minimize the likelihood of boring log misinterpretation, give contractors ready access to the complete geotechnical engineering report prepared or authorized for their use. (If access is provided only to the report prepared for you, you should advise contractors of the report's limitations, assuming that a contractor was not one of the specific persons for whom the report was prepared and that developing construction cost estimates was not one of the specific purposes for which it was prepared. In other words, while a contractor may gain important knowledge from a report prepared for another party, the contractor would be well-advised to discuss the report with your geotechnical engineer and to perform the additional or alternative work that the contractor believes may be needed to obtain the data specifically appropriate for construction cost estimating purposes.) Some clients believe that it is unwise or unnecessary to give contractors access to their geotechnical engineering reports because they hold the mistaken impression that simply disclaiming responsibility for the accuracy of subsurface information always insulates them from attendant liability. Providing the best available information to contractors helps prevent costly construction problems. It also helps reduce the adversarial attitudes that can aggravate problems to disproportionate scale.

READ RESPONSIBILITY CLAUSES CLOSELY

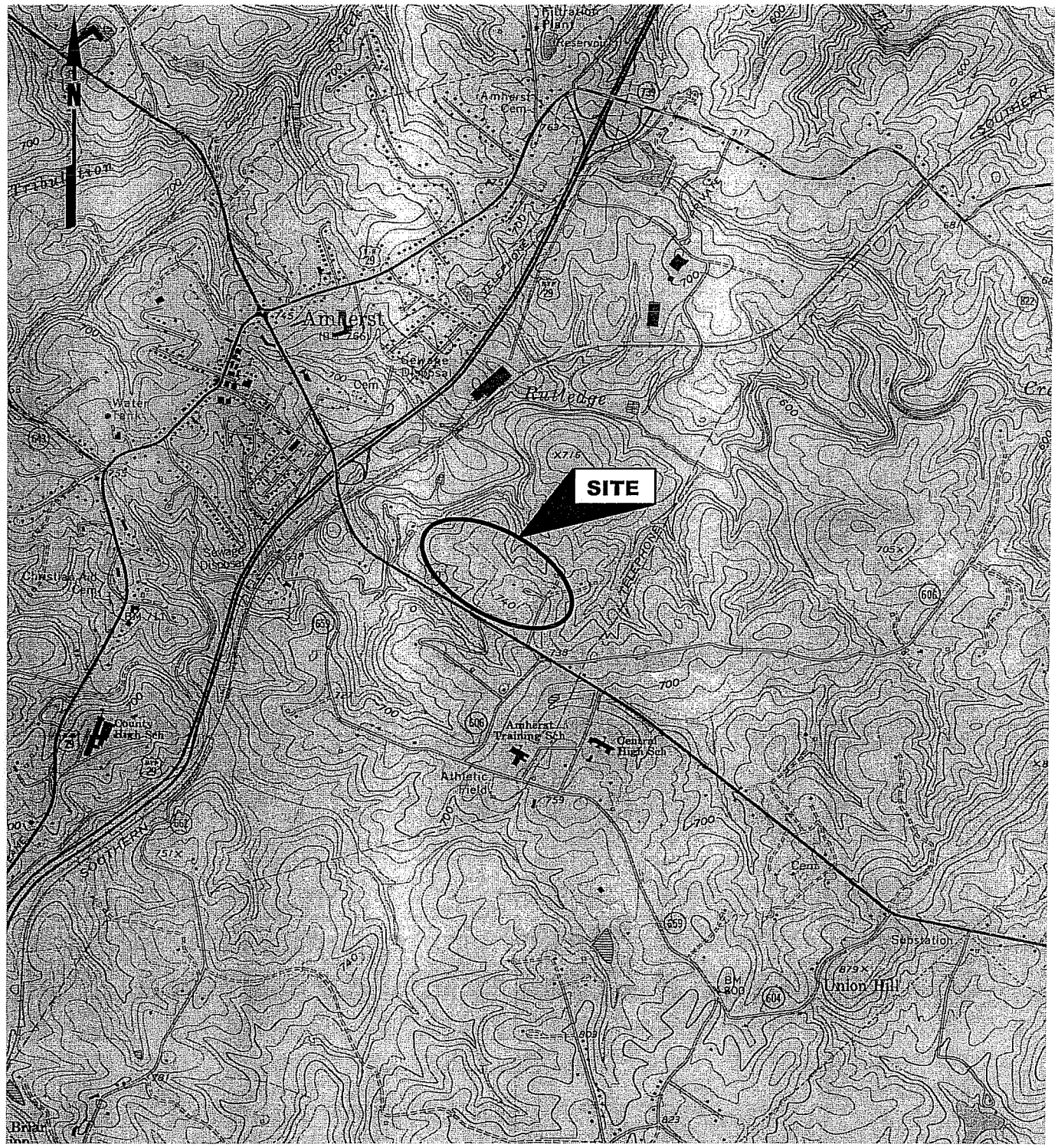
Because geotechnical engineering is based extensively on judgment and opinion, it is far less exact than other design disciplines. This situation has resulted in wholly unwarranted claims being lodged against geotechnical engineers. To help prevent this problem, geotechnical engineers have developed a number of clauses for use in their contracts, reports, and other documents. Responsibility clauses are not exculpatory clauses designed to transfer geotechnical engineers' liabilities to other parties. Instead, they are definitive clauses that identify where geotechnical engineers' responsibilities begin and end. Their use helps all parties involved recognize their individual responsibilities and take appropriate action. Some of these definitive clauses are likely to appear in your geotechnical engineering report. Read them closely. Your geotechnical engineer will be pleased to give full and frank answers to any questions.

RELY ON THE GEOTECHNICAL ENGINEER FOR ADDITIONAL ASSISTANCE

Most ASFE-member consulting geotechnical engineering firms are familiar with a variety of techniques and approaches that can be used to help reduce risks for all parties to a construction project, from design through construction. Speak with your geotechnical engineer not only about geotechnical issues, but others as well, to learn about approaches that may be of genuine benefit. You may also wish to obtain certain ASFE publications. Contact a member of ASFE of ASFE for a complimentary directory of ASFE publications.

ASFE THE ASSOCIATION OF ENGINEERING FIRMS PRACTICING IN THE GEOSCIENCES
8811 COLESVILLE ROAD/SUITE G106/SILVER SPRING, MD 20910
TELEPHONE: 301/565-2733 FACSIMILE: 301/589-2017

BPC0592A/3.5M



Note: Adapted from the USGS 7.5 minute series topographic map: Amherst, Virginia, Quadrangle, 1963 (photorevised 1978)

SINCE F&R 1881	**FROEHLING & ROBERTSON, INC.** GEOTECHNICAL • ENVIRONMENTAL • MATERIALS ENGINEERS • LABORATORIES *"OVER ONE HUNDRED YEARS OF SERVICE"*	**DATE:** August 2004 **SCALE:** 1 : 24,000 **DRAWN:** JTM | F62-192G

Town of Amherst Brockman Park Sites Amherst, Virginia	SITE VICINITY MAP	**DRAWING NO.** 1

APPENDIX B

SINCE F&R 1881

CLASSIFICATION OF SOILS FOR ENGINEERING PURPOSES
ASTM Designation: D 2487
(Based on Unified Soil Classification System)

SOIL ENGINEERING

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests[A]				Soil Classification	
				Group Symbol	Group Name[B]
COARSE-GRAINED SOILS More than 50% retained on No. 200 sieve	Gravels More than 50% coarse fraction retaining on No. 4 sieve	Clean Gravels Less than 5% fines[C]	Cu≥ 4 and 1≤Cc≤3[E]	GW	Well graded gravel[F]
			Cu<4 and/or 1>Cc>3[E]	GP	Poorly graded gravel[F]
		Gravels with Fines More than 12% fines[C]	Fines classify as ML or MH	GM	Silty gravel[F,G,H]
			Fines classify as CL or CH	GC	Clayey gravel[F,G,H]
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean Sands Less than 5% fines[D]	Cu≥6 and 1≤Cc≤3[E]	SW	Well-graded sand[I]
			Cu<6 and/or 1>Cc>3[E]	SP	Poorly graded sand[I]
		Sands with Fines, More than 12% fines[D]	Fines classify as ML or MH	SM	Silty sand[G,H,I]
			Fines classify as CL or CH	SC	Clayey sand[G,H,I]
FINE-GRAINED SOILS 50% or more passes the No. 200 sieve	Silts and Clays Liquid Limit less than 50	Inorganic	PI>7 and plots on or above "A" line[J]	CL	Lean clay[K,L,M]
			PI<4 or plots below "A" line[J]	ML	Silt[K,L,M]
		Organic	$\frac{\text{Liquid limit–oven dried}}{\text{Liquid limit–not dried}}$ <0.75	OL	Organic clay[K,L,M,N]
					Organic silt[K,L,M,O]
	Silts and Clays Liquid limit 50 or more	Inorganic	PI plots on or above "A" line	CH	Fat clay[K,L,M]
			PI plots below "A" line	MH	Elastic silt[K,L,M]
		Organic	$\frac{\text{Liquid limit–oven dried}}{\text{Liquid limit–not dried}}$ <0.75	OH	Organic clay[K,L,M,P]
					Organic silt[K,L,M,Q]
HIGHLY ORGANIC SOILS	Primarily organic matter, dark in color, and organic odor			PT	Peat

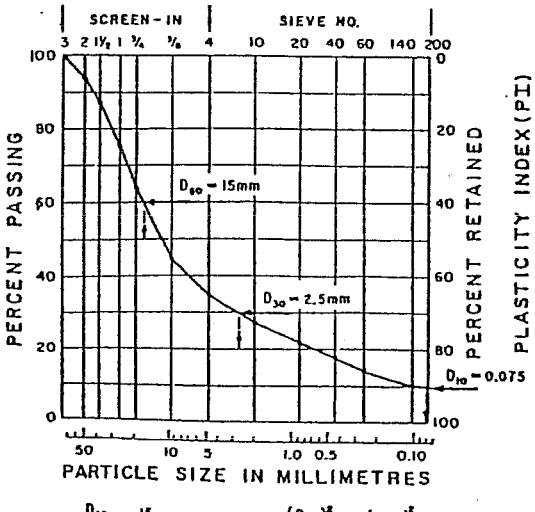
[A]Based on the material passing the 3-in. (75-mm) sieve
[B]If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
[C]Gravels with 5 to 12% fines require dual symbols:
GW-GM well-graded gravel with silt
GW-GC well-graded gravel with clay
GP-GM poorly graded gravel with silt
GP-GC poorly graded gravel with clay
[D]Sands with 5 to 12% fines require dual symbols:
SW-SM well-graded sand with silt
SW-SC well-graded sand with clay
SP-SM poorly graded sand with silt
SP-SC poorly graded sand with clay

$E\ Cu = D_{60}/D_{10},\quad Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$

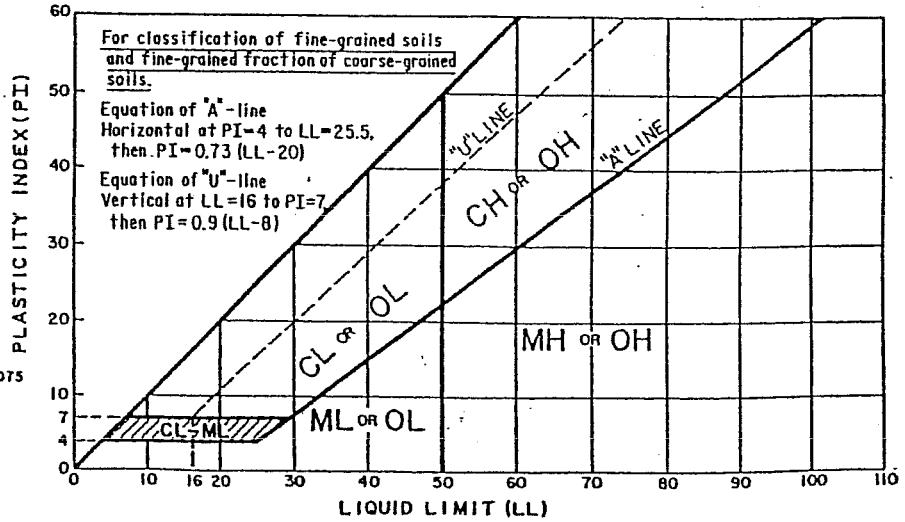
[F]If soil contains ≥ 15% sand, add "with sand" to group name.
[G]If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.
[H]If fines are organic, add "with organic fines" to group name.
[I]If soil contains ≥ 15% gravel, add "with gravel" to group name.

[J]If Atterberg limits plot in hatched area, soil is a CL-ML, silty clay.
[K]If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.
[L]If soil contains ≥ 30% plus No. 200, predominantly sand, add "sandy" to group name.
[M]If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.
[N]PI ≥ 4 and plots on or above "A" line.
[O]PI < 4 or plots below "A" line.
[P]PI plots on or above "A" line
[Q]PI plots below "A" line.

SIEVE ANALYSIS



$Cu = \frac{D_{60}}{D_{10}} = \frac{15}{0.075} = 200$ $Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}} = \frac{(2.5)^2}{0.075 \times 15} = 5.6$



KEY TO BORING LOG SOIL CLASSIFICATION

Particle Size and Proportion

Visual descriptions are assigned to each soil sample or stratum based on estimates of the particle size of each component of the soil and the percentage of each component of the soil.

Particle Size Descriptive Terms		Proportion Descriptive Terms		
Soil Component	Particle Size	Component	Term	Percentage
Boulder	> 12 inch	Major	Uppercase Letters (e.g., SAND, CLAY)	> 50%
Cobble	3 - 12 inch			
Gravel-Coarse	3/4 - 3 inch			
-Fine	#4 - 3/4 inch	Secondary	Adjective (e.g., sandy, clayey)	20% - 50%
Sand-Coarse	#10 - #4			
-Medium	#40 - #10			
-Fine	#200 - #40	Minor	Some	15% - 25%
Silt (non-cohesive)	< #200		Little	5% - 15%
Clay (cohesive)	< #200		Trace	0% - 5%

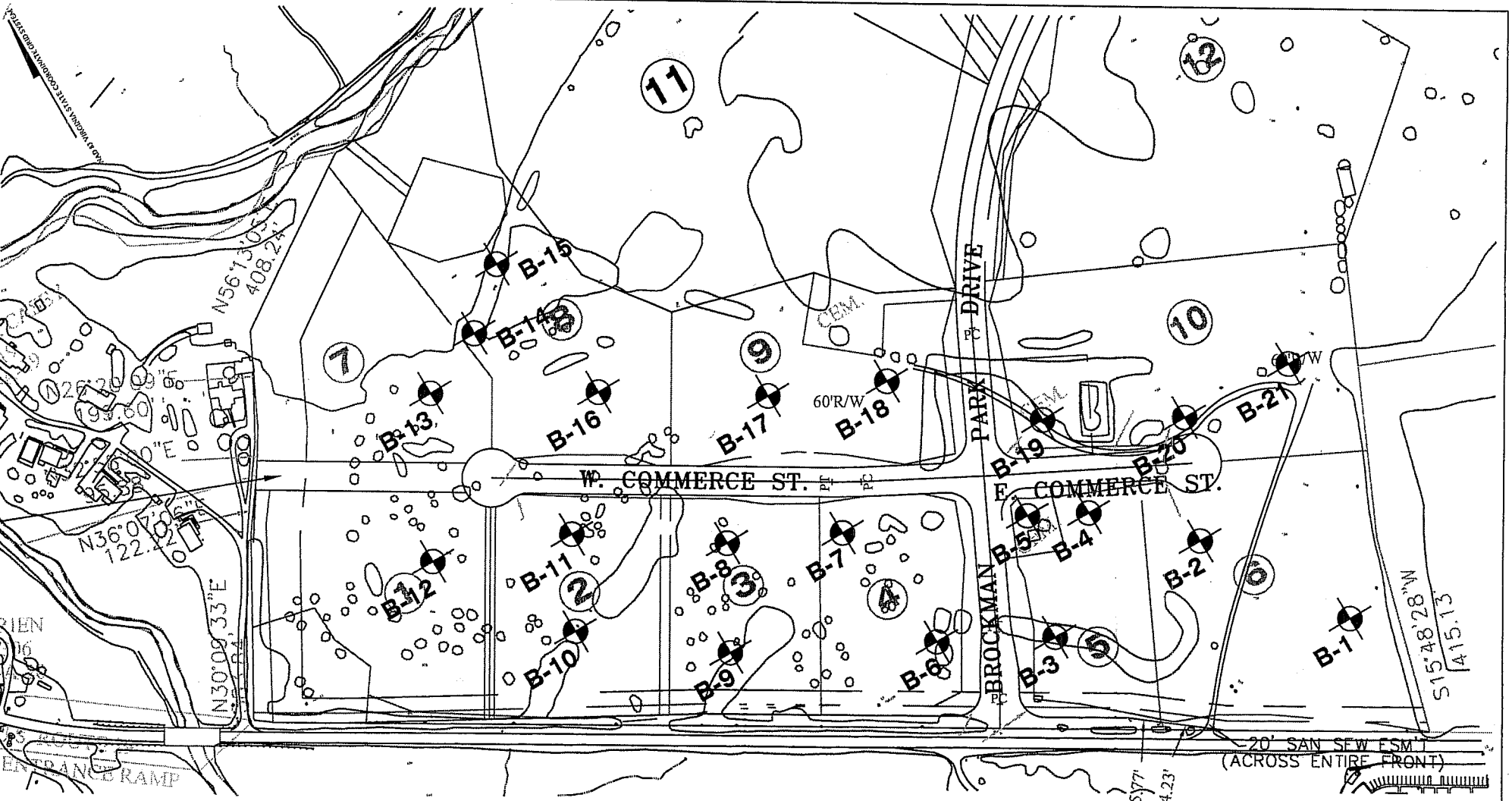
Notes:
1. Particle size is designated by U.S. Standard Sieve Sizes
2. Because of the small size of the split-spoon sampler relative to the size of gravel, the true percentage of gravel may not be accurately estimated.

Density or Consistency

The standard penetration resistance values (N-values) are used to describe the density of coarse-grained soils (GRAVEL, SAND) or the consistency of fine-grained soils (SILT, CLAY). Sandy silts of very low plasticity may be assigned a density instead of a consistency.

DENSITY		CONSISTENCY	
Term	N-Value	Term	N-Value
Very Loose	0 - 4	Very Soft	0 - 1
Loose	5 - 10	Soft	2 - 4
Medium-Dense	11 - 30	Medium Stiff	5 - 8
Dense	31 - 50	Stiff	9 - 15
Very Dense	> 50	Very Stiff	16 - 30
		Hard	> 30

Notes:
1. The N-value is the number of blows of a 140 lb. Hammer freely falling 30 inches required to drive a standard split-spoon sampler (2.0 in. O.D., 1-3/8 in. I.D.) 12 inches into the soil after properly seating the sampler 6 inches.
2. When encountered, gravel may increase the N-value of the standard penetration test and may not accurately represent the in-situ density or consistency of the soil sampled.



U. S. ROUTE 60 (EXISTING 60' R/W)

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DATE:	August 2004	
SCALE:	1" = 300'	
DRAWN:	JTM	F62-192G

Town of Amherst
Brockman Park Sites
Amherst, Virginia

BORING LOCATION PLAN

DRAWING NO. 2

NOTE: Adapted from a site plan provided by the Town of Amherst

BORING LOG

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"OVER ONE HUNDRED YEARS OF SERVICE"

Report No.: **F62-192G** Date: **August 2004**

Client: **Town of Amherst**

Project: **Brockman Park Sites, Amherst, Virginia**

Boring No.: **B-1** **(1 of 1)** | Total Depth **20.0'** | Elev: | Location: **See boring location plan**

Type of Boring: **2.25" ID HSA CME 55** | Started: **8/10/04** | Completed: **8/10/04** | Driller: **B. Maxson**

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	* Sample Blows	Sample Depth (feet)	N Value (blows/ ft)	REMARKS
	0.3	SURFICIAL SOIL				Subsurface water was not encountered immediately upon completion of drilling.
		RESIDUUM: Stiff, red brown, moist CLAY (CL) with some fine to medium sand and trace mica	4-4-8	1.0 2.5	12	
	3.0	Loose, orange brown, moist, silty fine SAND (SM) with trace mica	3-4-6	3.5 5.0	10	
	5.0	Medium stiff, orange brown, moist, fine sandy SILT (ML) with trace mica	3-3-5	6.0 7.5	8	
	8.0	Medium dense, brown, moist, silty fine to medium SAND (SM) with trace mica	3-6-8	8.5 10.0	14	
	12.0	**PARTIALLY WEATHERED ROCK:** Sampled as very dense, brown gray, moist, silty fine to coarse SAND (SM)	14-50/3	13.5 14.3		
	17.0	**RESIDUUM:** Dense, brown and tan, moist, silty fine to medium SAND (SM)	7-11-27	18.5	38	
	20.0	Boring terminated at 20 feet		20.0		

BORING_LOG F62-192G.GPJ F&R.GDT 8/19/04

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N.

BORING LOG

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"OVER ONE HUNDRED YEARS OF SERVICE"

Report No.: **F62-192G** Date: **August 2004**

Client: **Town of Amherst**

Project: **Brockman Park Sites, Amherst, Virginia**

Boring No.: **B-2** **(1 of 1)** Total Depth **20.0'** Elev: Location: **See boring location plan**

Type of Boring: **2.25" ID HSA CME 55** Started: **8/10/04** Completed: **8/10/04** Driller: **B. Maxson**

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	* Sample Blows	Sample Depth (feet)	N Value (blows/ ft)	REMARKS
	0.3	SURFICIAL SOIL				Subsurface water was not encountered immediately upon completion of drilling.
		RESIDUUM: Stiff, red brown, moist CLAY (CL/CH) with little fine sand, trace mica and trace root fragments	3-6-9	1.0 2.5	15	
	3.0	Stiff, red brown, moist CLAY (CL/CH) with little fine sand and trace mica	3-5-7	3.5 5.0	12	
	5.0	Loose, orange brown, moist, silty fine SAND (SM) with trace mica	2-3-4	6.0 7.5	7	
			2-3-3	8.5 10.0	6	
	12.0	Loose, orange brown and red brown, moist, silty fine to coarse SAND (SM) with trace mica	3-4-6	13.5 15.0	10	
	17.0	Medium dense, tan and gray, moist, silty fine SAND (SM)	4-7-8	18.5	15	
	20.0	Boring terminated at 20 feet		20.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N.

BORING_LOG F62-192G.GPJ F&R.GDT 8/19/04

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Report No.: **F62-192G** Date: **August 2004**

Client: **Town of Amherst**

Project: **Brockman Park Sites, Amherst, Virginia**

Boring No.: **B-3** **(1 of 1)** Total Depth **9.0'** Elev: Location: **See boring location plan**

Type of Boring: **2.25" ID HSA CME 55** Started: **8/10/04** Completed: **8/10/04** Driller: **B. Maxson**

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	* Sample Blows	Sample Depth (feet)	N Value (blows/ ft)	REMARKS
	0.3	SURFICIAL SOIL				Subsurface water was not encountered immediately upon completion of drilling.
		RESIDUUM: Medium stiff, orange brown, moist, fine sandy CLAY (CL) with trace organics	2-3-4	1.0 2.5	7	
	3.0	Stiff, red brown, moist CLAY (CL) with little fine sand and trace mica	3-6-6	3.5 5.0	12	
	5.0	Stiff, red brown, moist, fine sandy SILT (ML) with trace mica	3-4-6	6.0 7.5	10	
	8.0	**PARTIALLY WEATHERED ROCK:** Sampled as orange brown and gray, moist, silty fine to coarse SAND (SM) with some fine gravel	50/0	8.5		
	9.0	Auger refusal at 9 feet				

BORING_LOG F62-192G.GPJ F&R.GDT 8/26/04

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N.

BORING LOG

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"OVER ONE HUNDRED YEARS OF SERVICE"

Report No.: **F62-192G** Date: **August 2004**

Client: **Town of Amherst**

Project: **Brockman Park Sites, Amherst, Virginia**

Boring No.: **B-3A** **(1 of 1)** Total Depth **8.0'** Elev: Location: **Offset 10 feet W. of boring B-3**

Type of Boring: **2.25" ID HSA CME 55** Started: **8/10/04** Completed: **8/10/04** Driller: **B. Maxson**

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	* Sample Blows	Sample Depth (feet)	N Value (blows/ ft)	REMARKS
		Auger Probe				Subsurface water was not encountered immediately upon completion of drilling.
	8.0	Auger refusal at 8 feet				

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N.

BORING_LOG F62-192G.GPJ F&R.GDT 8/19/04

BORING LOG

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Report No.: **F62-192G** Date: **August 2004**

Client: **Town of Amherst**

Project: **Brockman Park Sites, Amherst, Virginia**

Boring No.: **B-4** **(1 of 1)** | Total Depth **20.0'** | Elev: | Location: **See boring location plan**

Type of Boring: **2.25" ID HSA CME 55** | Started: **8/10/04** | Completed: **8/10/04** | Driller: **B. Maxson**

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	* Sample Blows	Sample Depth (feet)	N Value (blows/ ft)	REMARKS
	0.3	SURFICIAL SOIL				Subsurface water was not encountered immediately upon completion of drilling.
		RESIDUUM: Very stiff, red brown, moist CLAY (CL/CH) with little fine sand, trace mica and trace root fragments	5-8-11	1.0	19	
	3.0	Medium dense, red brown, moist, silty fine to medium SAND (SM) with trace mica	6-9-11	2.5 3.5	20	
	5.5	**PARTIALLY WEATHERED ROCK:** Sampled as very dense, light gray, moist, silty fine to coarse SAND (SM) with some fine to coarse gravel	50/4	5.0 6.0		
	8.0	Sampled as very dense, tan and gray, miost, silty fine to medium SAND (SM)	7-22-50/4	8.5 9.8		
	13.0	Sampled as very dense, light gray, dry, silty fine to coarse GRAVEL (GM) with some fine to coarse sand	50/2	13.5		
		- No sample recovered at 18.5 feet	50/0	18.5		
	20.0	Boring terminated at 20 feet				

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N.

BORING_LOG F62-192G.GPJ F&R.GDT 8/19/04

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Report No.: **F62-192G** Date: **August 2004**

Client: **Town of Amherst**

Project: **Brockman Park Sites, Amherst, Virginia**

Boring No.: **B-5** **(1 of 1)** Total Depth **15.5'** Elev: Location: **See boring location plan**

Type of Boring: **2.25" ID HSA CME 55** Started: **8/10/04** Completed: **8/10/04** Driller: **B. Maxson**

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	* Sample Blows	Sample Depth (feet)	N Value (blows/ ft)	REMARKS
	0.3	SURFICIAL SOIL				Subsurface water was not encountered immediately upon completion of drilling.
		RESIDUUM: Medium dense, red brown, moist, clayey fine to medium SAND (SC) with trace mica	5-8-12	1.0 2.5	20	
	3.0	Medium dense, brown, moist, silty fine SAND (SM)	3-5-8	3.5 5.0	13	
	6.0	Dense, gray, moist, silty fine SAND (SM)	7-14-21	6.0 7.5	35	
	8.0	Medium dense, orange brown, moist, silty fine SAND (SM) with trace mica	11-9-7	8.5 10.0	16	
	12.0	**PARTIALLY WEATHERED ROCK:** Sampled as very dense, orange brown, moist, silty fine SAND (SM)	5-8-50/3	13.5 14.8		
	15.5	Auger refusal at 15.5 feet				

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N.

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Report No.: **F62-192G** Date: **August 2004**

Client: **Town of Amherst**

Project: **Brockman Park Sites, Amherst, Virginia**

Boring No.: **B-6** **(1 of 1)** Total Depth **14.0'** Elev: Location: **See boring location plan**

Type of Boring: **2.25" ID HSA CME 55** Started: **8/11/04** Completed: **8/11/04** Driller: **B. Maxson**

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	* Sample Blows	Sample Depth (feet)	N Value (blows/ ft)	REMARKS
	0.3	SURFICIAL SOIL				Subsurface water was not encountered immediately upon completion of drilling.
		RESIDUUM: Stiff, red brown, moist SILT (ML/MH) with little fine sand and trace mica	4-7-8	1.0 2.5	15	
	3.0	Dense, tan gray, moist, silty fine to coarse SAND (SM)	12-16-21	3.5 5.0	37	
	5.0	Medium dense, orange brown, moist, silty fine SAND (SM) with trace mica	3-5-6	6.0 7.5	11	
	8.0	Loose, red brown, moist, silty fine SAND (SM)	3-3-7	8.5 10.0	10	
	13.5			13.5		
	14.0	**PARTIALLY WEATHERED ROCK:** No sample recovered	50/0			
		Auger refusal at 14 feet				

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*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N.

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Report No.: **F62-192G** Date: **August 2004**

Client: **Town of Amherst**

Project: **Brockman Park Sites, Amherst, Virginia**

Boring No.: **B-7** **(1 of 1)** Total Depth **20.0'** Elev: Location: **See boring location plan**

Type of Boring: **2.25" ID HSA CME 55** Started: **8/11/04** Completed: **8/11/04** Driller: **B. Maxson**

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	* Sample Blows	Sample Depth (feet)	N Value (blows/ ft)	REMARKS
	0.3	SURFICIAL SOIL				Subsurface water was not encountered immediately upon completion of drilling.
		RESIDUUM: Stiff, red brown, moist SILT (ML) with little fine to medium sand, clay and trace root fragments	2-3-6	1.0 2.5	9	
	3.0	Medium dense, orange brown, moist, silty fine SAND (SM)	4-7-10	3.5 5.0	17	
	5.0	Medium dense, dark brown gray, moist, silty fine to medium SAND (SM)	5-9-12	6.0 7.5	21	
	8.0	Medium dense, dark orange brown, moist, silty fine SAND (SM) with trace mica	5-6-8	8.5 10.0	14	
	13.5	**PARTIALLY WEATHERED ROCK:** Sampled as very dense, gray, moist, silty fine to coarse SAND (SM)	50/1	13.5		
	17.0	Sampled as very dense, gray brown, moist, silty fine to medium SAND (SM)	50/4	18.5		
	20.0	Boring terminated at 20 feet				

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N.

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Report No.: **F62-192G** Date: **August 2004**

Client: **Town of Amherst**

Project: **Brockman Park Sites, Amherst, Virginia**

Boring No.: **B-8** **(1 of 1)** Total Depth **18.0'** Elev: Location: **See boring location plan**

Type of Boring: **2.25" ID HSA CME 55** Started: **8/11/04** Completed: **8/11/04** Driller: **B. Maxson**

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	* Sample Blows	Sample Depth (feet)	N Value (blows/ ft)	REMARKS
	0.3	SURFICIAL SOIL				Subsurface water was not encountered immediately upon completion of drilling.
		RESIDUUM: Stiff, red brown, moist CLAY (CL) with little fine sand, trace mica and trace root fragments	3-4-7	1.0 2.5	11	
	3.0	Dense, orange brown and gray, moist, silty fine to coarse SAND (SM) with little fine gravel	6-9-31	3.5		
	4.5	**PARTIALLY WEATHERED ROCK:** Sampled as very dense, brown and gray, moist, silty fine to coarse SAND (SM) with little fine gravel	50/6	5.0 6.0	40	
	8.5	Sampled as very dense, light gray, dry, silty fine to coarse SAND (SM) with little fine gravel	50/1	8.5		
	13.5	Sampled as very dense dark orange brown and tan gray, moist, silty fine to medium SAND (SM)	8-10-50/3	13.5 14.8		
	18.0	Auger refusal at 18 feet				

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N.

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Report No.: **F62-192G**

Date: **August 2004**

Client: **Town of Amherst**

Project: **Brockman Park Sites, Amherst, Virginia**

Boring No.: **B-9** **(1 of 1)** | Total Depth **17.5'** | Elev: | Location: **See boring location plan**

Type of Boring: **2.25" ID HSA CME 55** | Started: **8/11/04** | Completed: **8/11/04** | Driller: **B. Maxson**

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	* Sample Blows	Sample Depth (feet)	N Value (blows/ ft)	REMARKS
	0.3	SURFICIAL SOIL				Subsurface water was not encountered immediately upon completion of drilling.
		RESIDUUM: Dense, red brown and brown, moist, silty fine to coarse SAND (SM) with trace mica	20-18-14	1.0	32	
				2.5		
	3.0	**PARTIALLY WEATHERED ROCK:** Sampled as very dense, orange brown and gray, moist, silty fine to coarse SAND (SM) with trace fine gravel	11-50/4	3.5		
				4.3		
			22-45-50/5	6.0		
				7.4		
	8.0	Sampled as very dense, gray, dry, silty fine to coarse SAND (SM)	50/3	8.5		
				13.5		
	17.5	Auger refusal at 17.5 feet	50/3			

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N.

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Report No.: **F62-192G** Date: **August 2004**

Client: **Town of Amherst**

Project: **Brockman Park Sites, Amherst, Virginia**

Boring No.: **B-10** **(1 of 1)** Total Depth **13.0'** Elev: Location: **See boring location plan**

Type of Boring: **2.25" ID HSA CME 55** Started: **8/11/04** Completed: **8/11/04** Driller: **B. Maxson**

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	* Sample Blows	Sample Depth (feet)	N Value (blows/ ft)	REMARKS
	0.3	SURFICIAL SOIL				Subsurface water was not encountered immediately upon completion of drilling.
		RESIDUUM: Stiff, red brown and brown, moist CLAY (CL) with some fine to coarse sand and trace mica	11-8-5	1.0 2.5	13	
	3.0	Medium stiff, dark red brown, moist CLAY (CL) with little fine to medium sand	3-4-4	3.5 5.0	8	
	5.0	Very stiff, red brown, moist CLAY (CL) with little fine to coarse sand and trace fine gravel	3-6-12	6.0 7.5	18	
	8.0	**PARTIALLY WEATHERED ROCK:** Sampled as very dense, gray, moist, silty fine to coarse GRAVEL (GM) with some fine to coarse sand	50/1	8.5		
	13.0	Auger refusal at 13 feet				

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N.

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Report No.: **F62-192G** Date: **August 2004**

Client: **Town of Amherst**

Project: **Brockman Park Sites, Amherst, Virginia**

Boring No.: **B-11** **(1 of 1)** Total Depth **20.0'** Elev: Location: **See boring location plan**

Type of Boring: **2.25" ID HSA CME 55** Started: **8/11/04** Completed: **8/11/04** Driller: **B. Maxson**

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	* Sample Blows	Sample Depth (feet)	N Value (blows/ ft)	REMARKS
	0.3	SURFICIAL SOIL				Subsurface water was not encountered immediately upon completion of drilling.
		RESIDUUM: Stiff, red brown, moist SILT (ML) with little fine sand and trace root fragments from 0 to 3 feet	5-5-8	1.0 2.5	13	
			3-5-6	3.5 5.0	11	
	5.0	Medium dense, red brown, gray and tan, moist, silty fine to coarse SAND (SM) with trace mica	10-13-11	6.0 7.5	24	
			4-6-13	8.5 10.0	19	
	13.0	**PARTIALLY WEATHERED ROCK:** Sampled as very dense, gray brown, moist, sitly fine to medium SAND (SM)	50/5	13.5		
			50/2	18.5		
	20.0	Boring terminated at 20 feet				

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N.

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Report No.: **F62-192G** Date: **August 2004**

Client: **Town of Amherst**

Project: **Brockman Park Sites, Amherst, Virginia**

Boring No.: **B-12** **(1 of 1)** Total Depth **20.0'** Elev: Location: **See boring location plan**

Type of Boring: **2.25" ID HSA CME 55** Started: **8/11/04** Completed: **8/11/04** Driller: **B. Maxson**

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	* Sample Blows	Sample Depth (feet)	N Value (blows/ ft)	REMARKS
	0.3	SURFICIAL SOIL				Subsurface water was not encountered immediately upon completion of drilling.
		RESIDUUM: Medium stiff, red brown, moist SILT (ML/MH) with little fine to medium sand	3-4-4	1.0 2.5	8	
	3.0	Medium stiff, red brown, moist SILT (ML/MH) with some fine to medium sand	3-3-3	3.5 5.0	6	
	5.0	Medium stiff, orange brown, moist, fine sandy SILT (ML)	2-2-3	6.0 7.5	5	
	8.0	Very loose, orange brown, moist, silty fine to medium SAND (SM)	2-2-2	8.5 10.0	4	
	12.0	Loose, gray brown, moist, silty fine to medium SAND (SM)	3-4-6	13.5 15.0	10	
	17.0	**PARTIALLY WEATHERED ROCK:** Sampled as very dense, dark gray and tan, moist, silty fine to coarse SAND (SM)	8-14-50/5	18.5 19.9		
	20.0	Boring terminated at 20 feet				

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N.

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Report No.: **F62-192G** Date: **August 2004**

Client: **Town of Amherst**

Project: **Brockman Park Sites, Amherst, Virginia**

Boring No.: **B-13** **(1 of 1)** Total Depth **20.0'** Elev: Location: **See boring location plan**

Type of Boring: **2.25" ID HSA CME 55** Started: **8/11/04** Completed: **8/11/04** Driller: **B. Maxson**

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	* Sample Blows	Sample Depth (feet)	N Value (blows/ ft)	REMARKS
	0.3	SURFICIAL SOIL				Subsurface water was not encountered immediately upon completion of drilling.
		FILL: Loose, red brown and gray, moist, clayey fine to coarse SAND (SC) with little fine gravel	6-4-6	1.0		
				2.5	10	
	3.0	Soft, red brown, moist, fine to coarse sandy CLAY (CL) with trace root fragments	2-1-3	3.5		
				5.0	4	
			WOH-2-2	6.0		WOH = weight of hammer
				7.5	4	
	8.0	**RESIDUUM:** Stiff, dark red brown, moist CLAY (CL/CH) with little fine sand and trace silt	3-6-7	8.5		
				10.0	13	
	12.0	Very stiff, orange brown, moist SILT (ML) with little fine sand	8-11-13	13.5		
				15.0	24	
	17.0	Very stiff, orange brown, moist SILT (ML) with some fine sand	7-8-10	18.5		
	20.0	Boring terminated at 20 feet		20.0	18	

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N.

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Report No.: **F62-192G** Date: **August 2004**

Client: **Town of Amherst**

Project: **Brockman Park Sites, Amherst, Virginia**

Boring No.: **B-14** **(1 of 1)** | Total Depth **15.5'** | Elev: | Location: **See boring location plan**

Type of Boring: **2.25" ID HSA CME 55** | Started: **8/11/04** | Completed: **8/11/04** | Driller: **B. Maxson**

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	* Sample Blows	Sample Depth (feet)	N Value (blows/ ft)	REMARKS
	0.3	SURFICIAL SOIL				Subsurface water was not encountered immediately upon completion of drilling.
		FILL: Medium dense, brown and gray, moist, silty fine to coarse SAND (SM) with little fine gravel	4-5-6	1.0 2.5	11	
	3.0	Loose, orange brown and gray, moist, clayey fine to coarse GRAVEL (GC) with some fine to coarse sand and trace organics	4-5-5	3.5 5.0	10	
		- No sample recovered from 6 to 7.5 feet	8-11-12	6.0 7.5	23	
	8.0	Loose, brown, moist, silty fine to coase SAND (SM) with some fine gravel	5-5-5	8.5 10.0	10	
		- No sample recovered from 13.5 to 15 feet	50/3	13.5		Driller noted encountering obstructions from 13.5 to 15 feet.
	15.5	Auger refusal at 15.5 feet				

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N

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Report No.: **F62-192G** Date: **August 2004**

Client: **Town of Amherst**

Project: **Brockman Park Sites, Amherst, Virginia**

Boring No.: **B-15** **(1 of 1)** Total Depth **18.0'** Elev: Location: **See boring location plan**

Type of Boring: **2.25" ID HSA CME 55** Started: **8/11/04** Completed: **8/11/04** Driller: **B. Maxson**

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	* Sample Blows	Sample Depth (feet)	N Value (blows/ ft)	REMARKS
	0.2	SURFICIAL SOIL				Subsurface water was not encountered immediately upon completion of drilling.
		FILL: Stiff, red brown and brown, moist CLAY (CL/CH) with little fine to coarse sand	7-5-7	1.0	12	
				2.5		
	3.0	Medium stiff, dark brown, moist CLAY (CL) with some fine to coarse sand and trace wood debris	3-3-4	3.5	7	Driller noted encountering an obstruction at 4 feet.
	5.0	**RESIDUUM:** Stiff, red brown, moist SILT (ML) with some fine to medium sand	3-4-5	5.0		
				6.0	9	
	8.0	Medium dense, orange brown and dark brown, moist, silty fine to coarse SAND (SM)	5-6-10	7.5		
				8.5		
				10.0	16	
	12.5	**PARTIALLY WEATHERED ROCK:** Sampled as very dense, light gray, dry, silty fine to coarse SAND (SM) with some fine gravel	50/1	13.5		
	18.0	Auger refusal at 18 feet				

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N.

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Report No.: **F62-192G** Date: **August 2004**

Client: **Town of Amherst**

Project: **Brockman Park Sites, Amherst, Virginia**

Boring No.: **B-16** **(1 of 1)** Total Depth **20.0'** Elev: Location: **See boring location plan**

Type of Boring: **2.25" ID HSA CME 55** Started: **8/12/04** Completed: **8/12/04** Driller: **B. Maxson**

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	* Sample Blows	Sample Depth (feet)	N Value (blows/ ft)	REMARKS
	0.3	SURFICIAL SOIL				Subsurface water was not encountered immediately upon completion of drilling.
		RESIDUUM: Stiff to very stiff, red brown, moist SILT (ML) with little fine sand, trace clay and trace root fragments	4-4-8	1.0 2.5	12	
			4-5-11	3.5 5.0	16	
	5.0	Very stiff, orange brown, moist CLAY (CL) with some fine sand	6-8-14	6.0 7.5	22	
			5-8-11	8.5 10.0	19	
	12.0	Stiff, orange brown, moist SILT (ML) with some fine to medium sand and trace clay	3-6-8	13.5 15.0	14	
	17.0	Dense, dark gray and tan, moist, silty fine to coarse SAND (SM) with little fine gravel	8-13-20	18.5 20.0	33	
	20.0	Boring terminated at 20 feet				

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N.

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Report No.: **F62-192G** Date: **August 2004**

Client: **Town of Amherst**

Project: **Brockman Park Sites, Amherst, Virginia**

Boring No.: **B-17** **(1 of 1)** Total Depth **20.0'** Elev: Location: **See boring location plan**

Type of Boring: **2.25" ID HSA CME 55** Started: **8/12/04** Completed: **8/12/04** Driller: **B. Maxson**

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	* Sample Blows	Sample Depth (feet)	N Value (blows/ ft)	REMARKS
	0.3	SURFICIAL SOIL				Subsurface water was not encountered immediately upon completion of drilling.
		RESIDUUM: Medium dense, red brown, gray and tan, moist, clayey fine to medium SAND (SC) with trace silt and trace root fragments	6-6-7	1.0 2.5	13	
	3.0	Stiff, red brown, moist, fine sandy SILT (ML) with trace mica	4-5-7	3.5 5.0	12	
	5.0	Medium dense, red brown and orange brown, moist, silty fine SAND (SM) with trace mica	5-6-6	6.0 7.5	12	
	8.0	Loose, orange brown, moist, silty fine SAND (SM) with trace mica	3-4-4	8.5 10.0	8	
	12.0	Medium dense, orange brown and brown, moist, silty fine to medium SAND (SM)	4-6-6	13.5 15.0	12	
	17.0	Dense, gray and tan, moist, silty fine to coarse SAND (SM)	11-21-21	18.5 20.0	42	
	20.0	Boring terminated at 20 feet				

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N.

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Report No.: **F62-192G** Date: **August 2004**

Client: **Town of Amherst**

Project: **Brockman Park Sites, Amherst, Virginia**

Boring No.: **B-18** **(1 of 1)** Total Depth **20.0'** Elev: Location: **See boring location plan**

Type of Boring: **2.25" ID HSA CME 55** Started: **8/12/04** Completed: **8/12/04** Driller: **B. Maxson**

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	* Sample Blows	Sample Depth (feet)	N Value (blows/ ft)	REMARKS
	0.3	SURFICIAL SOIL				Subsurface water was not encountered immediately upon completion of drilling.
		RESIDUUM: Stiff, red brown, moist CLAY (CL) with little fine sand and trace mica	3-5-5	1.0		
				2.5	10	
	3.0	Stiff, red brown, moist, fine sandy SILT (ML) with trace mica		3.5		
			3-6-9			
				5.0	15	
				6.0		
			3-4-5			
				7.5	9	
				8.5		
			3-3-6			
				10.0	9	
	12.0	Loose, orange brown, moist, silty fine SAND (SM) with trace mica				
			3-4-6	13.5		
				15.0	10	
	17.0	**PARTIALLY WEATHERED ROCK:** Sampled as very dense, orange brown and gray brown, moist, silty fine to coarse SAND (SM)	3-23-50/3	18.5		
	20.0	Boring terminated at 20 feet		19.8		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N.

BORING_LOG F62-192G.GPJ F&R.GDT 8/19/04

BORING LOG

SINCE 1881

FROEHLING & ROBERTSON, INC.
GEOTECHNICAL • ENVIRONMENTAL • MATERIALS
ENGINEERS • LABORATORIES
"OVER ONE HUNDRED YEARS OF SERVICE"

Report No.: **F62-192G** Date: **August 2004**

Client: **Town of Amherst**

Project: **Brockman Park Sites, Amherst, Virginia**

Boring No.: **B-19** **(1 of 1)** Total Depth **20.0'** Elev: Location: **See boring location plan**

Type of Boring: **2.25" ID HSA CME 55** Started: **8/12/04** Completed: **8/12/04** Driller: **B. Maxson**

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	* Sample Blows	Sample Depth (feet)	N Value (blows/ ft)	REMARKS
	0.3	SURFICIAL SOIL				Subsurface water was not encountered immediately upon completion of drilling.
		RESIDUUM: Very stiff, red brown and brown, moist, fine to coarse sandy CLAY (CL) with trace root fragments	3-6-10	1.0 2.5	16	
	3.0	Medium dense, orange brown, moist, clayey fine to medium SAND (SC) with trace mica	4-11-8	3.5 5.0	19	
	6.0	Dense, orange brown and tan gray, moist, clayey fine to coarse SAND (SC) with little fine gravel	23-27-19	6.0 7.5	46	
	8.0	Dense, orange brown, light gray, moist, silty fine to coarse SAND (SM) with little fine to coarse gravel	46-20-12	8.5 10.0	32	
	12.0	Loose, light orange brown, moist, silty fine SAND (SM)	3-2-3	13.5 15.0	5	
	17.0	Very dense, gray and light gray, moist, silty fine to coarse SAND (SM)	12-14-47	18.5 20.0	61	
	20.0	Boring terminated at 20 feet				

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N.

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Report No.: **F62-192G** Date: **August 2004**

Client: **Town of Amherst**

Project: **Brockman Park Sites, Amherst, Virginia**

Boring No.: **B-20** **(1 of 1)** Total Depth **20.0'** Elev: Location: **See boring location plan**

Type of Boring: **2.25" ID HSA CME 55** Started: **8/12/04** Completed: **8/12/04** Driller: **B. Maxson**

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	* Sample Blows	Sample Depth (feet)	N Value (blows/ ft)	REMARKS
	0.3	SURFICIAL SOIL				Subsurface water was not encountered immediately upon completion of drilling.
		RESIDUUM: Stiff, red brown, moist CLAY (CL) with little fine sand and trace root fragments	4-5-7	1.0	12	
	3.0	Stiff, red brown, moist, fine to coarse sandy SILT (ML) with trace fine quartz gravel	3-6-8	2.5 3.5		
			4-6-7	5.0 6.0	14	
			4-6-6	7.5 8.5	13	
	13.0	Loose, orange brown and white, moist, silty fine to coarse SAND (SM)	4-3-5	10.0 13.5	12	
	17.0	Loose, orange brown, moist, silty fine to coarse SAND (SM) with little fine gravel	3-4-5	15.0 18.5	8	
	20.0	Boring terminated at 20 feet		20.0	9	

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N.

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Report No.: **F62-192G** Date: **August 2004**

Client: **Town of Amherst**

Project: **Brockman Park Sites, Amherst, Virginia**

Boring No.: **B-21** **(1 of 1)** Total Depth **20.0'** Elev: Location: **See boring location plan**

Type of Boring: **2.25" ID HSA CME 55** Started: **8/12/04** Completed: **8/12/04** Driller: **B. Maxson**

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	* Sample Blows	Sample Depth (feet)	N Value (blows/ ft)	REMARKS
	0.3	SURFICIAL SOIL				Subsurface water was not encountered immediately upon completion of drilling.
		RESIDUUM: Very stiff, red brown, moist CLAY (CL/CH) with little fine to medium sand and trace root fragments	5-6-11	1.0 2.5	17	
	3.0	Stiff, red brown, moist CLAY (CL) with some fine sand, little silt, and trace mica	4-6-7	3.5 5.0	13	
	5.0	Loose, orange brown, moist, silty fine SAND (SM) with trace mica	3-3-4	6.0 7.5	7	
			2-2-3	8.5 10.0	5	
	12.0	Loose, red brown and brown, moist, silty fine SAND (SM) with trace mica	3-3-5	13.5 15.0	8	
	17.0	Medium dense, brown and white, moist, silty fine to coarse SAND (SM) with some fine to coarse quartz gravel	3-6-13	18.5	19	
	20.0	Boring terminated at 20 feet		20.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N.