

## REPORT OF GEOTECHNICAL EXPLORATION

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# **GRANDVIEW ESTATES - ANACOSTIA**

**Washington, D.C.**

January 24, 2005

Prepared For:

**ACE DESIGNS & CONSTRUCTION MANAGEMENT**  
3686 King Street, Suite 113  
Alexandria, Virginia 22302

Attn: Mr. Michael Diggs

---

Prepared By:

**GEO-TECHNOLOGY ASSOCIATES, INC.**  
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GTA Job No: 030817

January 24, 2005

Ace Designs & Construction Management  
3686 King Street, Suite 113  
Alexandria, Virginia 22302

Attn: Mr. Michael Diggs

Re: Report of Geotechnical Exploration  
*Grandview Estates - Anacostia*  
Washington, D.C.

Gentlemen:

In accordance with your request, Geo-Technology Associates, Incorporated (GTA) has completed a geotechnical exploration for the above referenced project. Transmitted herein is a report of our findings and conclusions regarding foundation and slab support, site grading, pavement subgrade preparation, lateral earth pressure for below grade walls and utility construction. The work was completed in accordance with GTA's proposal dated September 25, 2003.

Thank you for the opportunity to be of assistance on this project. Should you have any questions or require additional information, please do not hesitate to contact our office.

Very truly yours,  
**GEO-TECHNOLOGY ASSOCIATES, INC.**

Naseer Nayeem, P.E.  
Project Engineer

Amin Rahman, P.E.  
Vice President

Cc: Mr. Victor Chen, P.E., Capitol Development Designs, Inc.

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J.O. #030817.V

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# **REPORT OF GEOTECHNICAL EXPLORATION**

## **GRANDVIEW ESTATES - ANACOSTIA WASHINGTON, D.C. JANUARY 2005**

### **INTRODUCTION**

Ace Designs & Construction Management (ADCM) plans to construct twenty four town-homes in the Anacostia area of Washington, D.C. In conjunction with the proposed improvements, Geo-Technology Associates, Inc. (GTA) was retained to perform a geotechnical exploration of the site. The scope of this study included a field exploration, laboratory testing, and engineering analysis. Included in the field exploration were 12 Standard Penetration Test (SPT) borings located within the proposed building and pavement areas of the site. Limited laboratory testing was performed upon samples recovered during the subsurface exploration. An untitled, facsimile version of the revised site layout plan was provided by ADCM to GTA on January 19, 2005. Conclusions and recommendations regarding site development were derived from engineering analysis of field and laboratory data and review of the site plan.

### **SITE CONDITIONS**

The property is located in the southeastern corner of the intersection of Talbert Street and Talbert Terrace in Anacostia, SW, Washington, D.C. The site is mostly wooded with young trees on the northern and western side of the site. The rest of the area is open and covered with brushes and shrubs. A site location map is included as Figure 1 in Appendix A. Site topography was not included on the revised site layout plan provided to GTA.

### **PROPOSED CONSTRUCTION**

Based on the previously referenced revised site layout plan, the proposed improvements will consist of twenty four town-homes with associated parking areas and utilities. The buildings will be rectangular in shape. The buildings will be four-level, 18 feet wide and 44 feet high. The buildings will be serviced by a roadway that will be accessed from Talbert Street and Talbert Terrace. Two

retaining walls are also planned to be constructed near the eastern and western boundary of the property.

## **SITE GEOLOGY**

According to the *Geologic Map of Maryland* (1968), the site vicinity is geologically mapped as part of the Coastal Plain Physiographic Province. The Coastal Plain soils are sedimentary in nature, generally deposited in an alluvial and marine environment during periods of fluctuating sea levels. Accordingly, these deposits are typically stratified. The formation generally dips toward the southeast and individual geologic formations may be exposed along eroded stream valleys.

More specifically, the site is underlain by the Potomac Formation of Cretaceous Age sediments. The Potomac Formation consists of interbedded quartzite gravels, protoquartzitic to orthoquartzitic argillaceous sands, and white, dark gray and multicolored silts and clays. For a detailed description of the geologic units, please refer to the above publication.

## **SUBSURFACE EXPLORATION**

In order to characterize subsurface conditions, 12 SPT borings were drilled at locations selected by GTA. Test borings were field located by GTA using existing features as shown on the Boring Location Plan, presented as Figure 2 in Appendix A. Therefore, the boring locations should be considered approximate. Ground surface elevations for the borings were not provided. The Boring Location Plan is a reproduction of the revised site layout plan prepared by ADCM, altered to show the boring locations.

The Borings labeled B-1 through B-6 were drilled in the proposed building areas and the Borings labeled W-1 through W-5 and W-10 were drilled in the retaining wall areas. Four attempts, designated W-6 through W-9, were made on the eastern side of the site to drill for the proposed retaining wall. The building area borings were planned to be drilled to depths ranging from 25 to 40 feet below existing surface grades or refusal, and the wall borings were planned to be drilled to a

depth of 25 to 30 feet below existing grades. Auger refusal was not encountered in the borings. Standard Penetration Testing (SPT) was performed, and soil samples were retrieved at 2.5-foot intervals to 10 feet and at 5-foot intervals, thereafter. Samples retrieved from the test borings were returned to GTA's laboratory for visual classification and limited laboratory testing. Unified Soil Classification System (USCS) classifications as provided on the logs are based on visual examination, supplemented by available laboratory test results.

### **SUBSURFACE CONDITIONS**

The test borings generally confirm the description of subsurface conditions presented in the geology section of this report. Topsoil was encountered at the each of the boring locations, with the exception of Boring B-1, ranging from approximately 3 to 6 inches in thickness. In Boring B-1, 3 inches of asphalt was encountered at the ground surface. Below the topsoil and asphalt, the borings generally encountered a stratum of coarse-grained material, designated Stratum I, overlaying a fine-grained stratum, designated Stratum II. Existing fill was encountered in most of the borings.

Existing fill was encountered in Borings B-1 through B-6, W-1, W-5, and W-10. The fill materials consisted of multicolored mixture of silt and clay with varying amounts of sand and organics to multicolored mixture of sand and gravel with varying amounts of silt and clay, organics and bricks. SPT "N" values in the fill materials varied from 4 blows per foot (bpf) to 58 bpf. The fill materials ranged from approximately 2 to 9 feet in thickness in the borings in which it was encountered.

Stratum I, as encountered in the borings, consists of a multi-colored, moist, medium dense to very dense mixture of sand and silt with varying amounts of clay and gravel. SPT "N" values in Stratum I varied from 6 bpf to 58 bpf. Stratum I ranged from approximately 8.5 to 25 feet in thickness in the borings in which it was encountered. Interbedded strata of more fine-grained soils were encountered within Stratum I in Borings W-4, from approximately 2 to 18 feet below existing grades, and in Boring W-5, from approximately 8.5 to 13 feet. Boring B-3 encountered Stratum I at

a depth of 18 feet below the existing surface. Borings W-3 and W-10 did not encounter Stratum I. Borings B-3 and W-4 were terminated within Stratum I.

Stratum II, as encountered in the borings, generally consists of a multi-colored, moist, medium stiff to hard, mixture of silt and clay, with varying amounts of sand and gravel. Stratum II contains medium- to high-plasticity clay in most areas. Medium-plasticity soil is defined by GTA as having a liquid limit between 40 and 50 percent and plasticity index greater than 15 percent. The Unified Soil Classification System (USCS) defines high-plasticity soil as having a liquid limit greater than 50 percent. SPT "N" values in Stratum II varied from 5 bpf to 47 bpf. Interbedded strata of coarse grained soils were encountered within Stratum II in Borings B-4, B-5, B-6, and W-2, from approximately 2.5 to 18 feet below the existing surface. Each of the remaining borings that encountered Stratum II was terminated within Stratum II. Materials so dense as to impede penetration of the auger were not encountered in the borings.

Groundwater was not encountered in any of the borings during drilling, directly after the completion of drilling, or after a period of approximately 24 hours after the completion of drilling.

Please refer to the boring logs provided in Appendix B for further information.

### **LABORATORY TESTING**

Selected samples recovered from the borings were submitted for limited laboratory analysis, including natural moisture determination and testing for mechanical properties for classification in accordance with the USCS, moisture-density relationship (proctor) testing and California Bearing Ratio (CBR) testing.

Soils moisture contents for selected near-surface samples were determined to range from 6.4 to 19.7 percent. Soil moisture contents averaged 14.0 percent.

Six samples were submitted for grain size and index property testing to be classified in accordance with the USCS. The results of the testing are summarized in the following table:

**Table I  
SUMMARY OF LABORATORY TESTING**

| BORING NO. | DEPTH (ft) | USCS CLASSIFICATION      | NATURAL MOISTURE | LL % | PI % |
|------------|------------|--------------------------|------------------|------|------|
| B-1        | 18.5-20.0  | Fat CLAY Trace Sand (CH) | 26.6             | 97   | 78   |
| B-4        | 8.5-10.0   | Fat CLAY with Sand (CH)  | 19.0             | 55   | 36   |
| B-6        | 13.5-15.0  | Silty SAND (SM)          | 16.1             | NP   | NP   |
| W-1        | 18.5-20.0  | Fat CLAY Trace Sand (CH) | 19.5             | 55   | 39   |
| W-3        | 1.0-6.0    | Sandy Lean CLAY (CL)     | 15.8             | 27   | 13   |
| W-4        | 13.5-15.0  | Lean CLAY with Sand (CL) | 13.4             | 33   | 16   |

Note: LL=Liquid Limit PI=Plastic Index NP=Non-plastic

The bulk sample obtained from Boring W-3 was also tested for moisture-density relationship in accordance with the Standard Proctor modified as per *ASTM Test Method A for Laboratory Determination of Theoretical Maximum Density Optimum Moisture Content of Soil, Granular Subbase, and Base Materials* (ASTM D-698). Additionally, a CBR test was performed in accordance with *ASTM Test Method for Conducting California Bearing Ratio Test* (ASTM D-1883) on the same soil sample collected from Boring W-3, compacted to approximately 95 percent of the Standard Proctor (ASTM D-698) maximum dry density for the tested sample. The results of the Standard Proctor and CBR testing are as follows:

**Table II  
Summary of Moisture - Density Relationship**

| <b>Boring No.</b> | <b>Depth (ft.)</b> | <b>Maximum Dry Density (pcf)</b> | <b>Optimum Moisture Content (%)</b> | <b>Natural Moisture Content (%)</b> | <b>CBR (%)</b> |
|-------------------|--------------------|----------------------------------|-------------------------------------|-------------------------------------|----------------|
| W-3               | 1.0 – 6.0          | 118.7                            | 13.4                                | 15.8                                | 5.0            |

Please refer to the laboratory test data provided in Appendix C for further information.

### **CONCLUSIONS AND RECOMMENDATIONS**

Based upon the results of this exploration, it is GTA's opinion that the proposed improvements are feasible, given that the following recommendations are observed, and that the standard level of care is maintained during construction. However, medium- to high-plasticity soils and existing fill will be encountered during foundation excavations, slab, pavement and retaining wall construction that will require removal and replacement. GTA's recommendations for foundation support and other geotechnical considerations are transmitted in the following paragraphs.

#### **Earthwork**

Site topography and proposed grades were not provided to GTA. However, it has been GTA's experience that excavations of approximately 8 feet will likely be required for in-ground basements. The on-site materials and existing fill are generally considered suitable for new fill construction within the building pad and paved areas. However, medium- to high-plasticity soils were encountered in most areas. The medium- to high-plasticity soil should not be used as controlled fill in the building pad area or top 2 feet in pavement areas or behind retaining walls. Generally, the medium- to high-plasticity soil can be used as fill in non-structural areas only. On-site materials having a Liquid Limit of 40 percent or less and Plasticity Index of 15 percent or less can be used as controlled fill. If off-site material is required, materials classified as USCS ML or more

granular having Liquid Limit of 40 percent or less and Plasticity Index of 15 percent should be used. In sloped areas, 5H:1V or steeper, the new fill should be benched into the existing grade. All fills should be constructed in 8-inch loose lifts and compacted to the following specifications:

**Table III  
Compaction Specifications**

| <b>Structure / Fill Location</b>  | <b>Compaction / Moisture Specification</b> |
|---|--|
| Below foundations, floor slabs, slopes steeper than 5H:1V, or below top 1 foot of pavement subgrade | 97% of ASTM D-698 (AASHTO T-99)            |
| Top 1 foot of pavement subgrade   | 100% of ASTM D-698 (AASHTO T-99)           |
| Fills in green areas  | 90% of ASTM D-698 (AASHTO T-99)            |

Prior to the placement of compacted fill, areas receiving fill should be stripped to remove topsoil and other deleterious matter. After removal, fill subgrade should be proof-rolled with a loaded, 10-wheel, tandem-axle dump truck. The proof-rolling shall be performed as directed by a geotechnical engineer or his/her qualified representative. Soft, yielding subgrade will require over-excavation to stable natural soil and replacement with compacted fill. No fill should be placed until the subgrade is approved by the geotechnical engineer. Fill construction should be monitored by a professional engineer or his/her qualified representative. All compaction efforts should be verified by in-place density testing.

**Subsurface Utilities**

The medium dense to very dense and medium stiff to hard natural soils are considered suitable for support of the proposed utilities. GTA recommends that a 6-inch granular bedding be placed beneath the utilities to provide uniform support when the pipes are supported on clayey soil, or when groundwater is encountered. The proposed utility invert elevations were not provided on the

revised site layout plan. However, based on the results of the borings, GTA does not anticipate that difficult excavations will generally be encountered during utility installation.

Groundwater was not encountered in any of the borings either during drilling or after the completion of drilling. However, perched groundwater may be encountered during utility installation. Contractors should provide construction dewatering devices and adequate earth support systems in the utility trench excavations. Utility pipe systems below pavement and structural areas should be backfilled using controlled, compacted fill, constructed in accordance with our site grading recommendations. The contractor should anticipate elevated soil moisture and anticipate substantial drying of backfill to meet compaction specifications.

Compaction of the soils to the degree specified in the *Earthwork* section of this report may require that the soils be moisture conditioned prior to placement and compaction within the trench. If the excavated materials are wet of the optimum moisture content, they should be spread in thin layers and aerated by discing to within 2 to 4 percentage points of the optimum moisture. If soils are not dried, suitable borrow material will need to be imported from other areas of the site for utility trench backfill. If the excavated materials are dry of the optimum moisture content, they should be carefully hydrated prior to reuse. Settlement and instability are likely if the on-site soils are used as backfill at moisture levels more than 4 percentage points above or below optimum

## **Foundations**

The town-houses may be supported on shallow spread footings designed for a net allowable bearing pressure of 2,000 pounds per square foot (psf). Minimum widths for wall footings of 16 inches and column footings of 30 inches are recommended when design based on 2,000 psf results in a more narrow footing. Settlement on the order of 1 inch total and ½ inch differential can be anticipated based upon this design. Exterior footings should be founded a minimum of 30 inches below the final exterior grades to provide protection from frost action, unless otherwise required by local code.

Footings should be supported on the medium dense to very dense, coarse-grained soils of Stratum I, or stiff to very stiff, low plasticity, fine-grained soils of Stratum II, or on controlled, compacted fill, below any soft or loose near-surface soils or deleterious existing fill materials. Loose/soft near surface soils are not considered adequate for direct foundation support. The near surface loose/soft layers should be compacted in-place in accordance with the earthwork recommendation or excavated to a stable stratum and backfilled with controlled, compacted fill.

Existing fill was encountered in most of the borings. Generally, existing fill is not considered adequate for direct foundation support. If existing fill is encountered at footing elevation, the existing fill should be completely removed and grade should be reestablished in accordance with the earthwork recommendations. If existing foundations, pavements, and abandoned utilities are encountered they should be completely removed and grade should be reestablished in accordance with GTA's site grading recommendations.

Medium-to high-plasticity soils were encountered in most areas. Therefore, it is likely that these types of soils will be encountered during foundation excavations. These soils are not considered adequate for direct foundation support. If medium- to high-plasticity soils are encountered at footing elevations they should be overexcavated an additional 2 feet below proposed footing bottom and backfilled with controlled, compacted fill. Under foundations, the top of the medium- to high-plasticity soil should be at least 4 foot below the final exterior grades.

Footing excavations should be reviewed by GTA prior to concrete placement. Penetration testing should be performed upon exposed footing subgrades to confirm the allowable bearing capacity. Particular care should be taken during the foundation inspection to determine if medium- to high-plasticity soils or existing fill are present that require removal and replacement. Footings should be concreted on the same day they are excavated.

## **Floor Slabs**

Floor slabs should be designed as concrete slab-on-grade. The typical slab consists of 4 to 6-inches of concrete reinforced with welded wire mesh. We recommend that the concrete floor slabs supported on grade be founded on a four-inch open graded washed gravel or stone layer covered with a polyethylene vapor barrier to interrupt the rise of moisture through the slab.

Medium- to high-plasticity soils are likely to be encountered at the slab subgrade. In addition, existing fill may be encountered at slab subgrade. When slab subgrade consists of medium- to high-plasticity soil or existing fill, overexcavation will be required. The medium- to high-plasticity soil or existing fill should be overexcavated by at least 2 feet and replaced with controlled, compacted fill.

If floor slabs are to be placed upon uncompacted fills, they should be reinforced to span unsupported lengths. Structural slabs and grade beams should be designed by a professional engineer. GTA can provide structural design services and prepare standard structural details upon request.

Floor slabs should not be rigidly connected to foundation walls so that slight movements of the wall will not affect the slab. Control joints should be provided to control shrinkage cracks of the concrete floor system.

## **Lateral Earth Pressure**

GTA understands that in-ground basements are planned for the proposed buildings. The foundation walls for the buildings will restrict the lateral movement of soil backfill, and as a result, the full internal resistance of the soil will not be mobilized. We therefore, recommend the use of "at-rest" lateral earth pressure criteria, which assumes a non-yielding wall.

For computation of design pressures, we recommend the following design parameters for below grade foundation walls:

GRANULAR BACKFILL - Behind foundation wall  
Angle of Internal Friction = 28 Degrees  
Bulk (wet) Density = 120 PCF  
Coefficient of At-Rest Earth Pressure = 0.53  
Equivalent At-Rest Pressure = 63.7 PSF/FT

GTA understands that two retaining walls are also planned at the eastern and western portions of the site. Based upon site reconnaissance, it appears that most of the proposed walls will be located in area that requires controlled, compacted fill to reach proposed grades. Bearing capacity for the natural coarse-grained natural soils or controlled, compacted fill material should be at least 3,000 psf for the proposed retaining walls. Retaining wall foundation soils should be examined by the Engineer or his qualified representative to assure that the actual foundation soil strength meets or exceeds assumed design strength. Soils not meeting required strength should be removed and replaced with controlled, compacted material. Over-excavated areas should be filled with select material and compacted to 95 percent of maximum dry density in accordance with ASTM-698 (AASHTO T-99).

The proposed retaining walls will not restrict the lateral movement of soil backfill, and as a result, the full internal resistance of the soil will be mobilized. We therefore, recommend the use of "active" lateral earth pressure criteria, which assumes a yielding wall. For computation of design pressures, we recommend the following design parameters for the retaining walls:

GRANULAR BACKFILL - Behind retaining wall  
Angle of Internal Friction = 28 Degrees  
Bulk (wet) Density = 115 PCF  
Coefficient of Active Earth Pressure = 0.36  
Equivalent Active Pressure = 42 PSF/FT

Based on the borings, groundwater will not likely be encountered during excavations for installation of the retaining walls. However, if perched groundwater is encountered, GTA recommends that dewatering be implemented to facilitate the excavation and construction. GTA recommends that adequate subsurface drainage should be provided to prevent hydrostatic pressure from impacting the walls. The drainage fill should be a minimum of 12 inches wrapped in filter fabric (Mirafi 140N or equal). The drainage fill should consist of ASTM #57 stone. Positive drainage should be maintained during and after construction. Soils within the backfill zone that become wet during construction should be dried to optimum moisture or removed.

The parameters recommended above are based upon: 1) adequate drainage of backfill to prevent the accumulation of free water against the wall or within any part of the backfill, 2) exterior granular backfill capped with a 12 inch thick layer of impervious soil, and 3) surcharge loadings from vehicles and other sources must be added to the stated lateral earth pressures. Care should be exercised so that heavy compaction equipment does not damage the walls during backfill operations. The lateral earth pressure diagram for a typical foundation wall is attached as Figure 3.

Surcharge loads at the surface should be multiplied by 0.5 and superimposed on the recommended lateral loading. We recommend a friction factor of 0.34 to resist against sliding for the walls that are founded on fine-grained soils. A friction factor of 0.53 should be used if the walls are founded on more coarse-grained soils.

The foundation and retaining walls may be backfilled with on-site granular material, which meet the following requirements:

- 20 percent maximum passing a U.S. Standard #200 sieve
- 60 percent minimum passing a U.S. Standard #40 sieve
- Angle of Internal Friction = 28 degrees (minimum)

Bulk (wet) Density = 120 pcf (maximum)  
Plasticity = Non-Plastic

All fills behind the walls should be constructed in 6-inch loose lifts and compacted to 95 percent of ASTM D-698 (AASHTO T-99) maximum dry density.

## **Pavements**

Proposed pavement grades were not provided to GTA. However, it is likely that excavations and controlled compacted fill will be required to achieve proposed grades for the roadways.

A CBR (ASTM D-1883) test was performed on the bulk sample obtained from Boring W-3 to evaluate the on-site material. The results of this testing indicates a CBR value of 5 percent for the bulk sample. This value is considered to be poor with respect to support of pavements, referencing the *Handbook of Highway Engineering*, edited by Robert P. Baker. In addition, medium- to high-plasticity fine-grained soils were encountered, which typically have potential for shrink/swell and poor support characteristics for pavement. The occurrence of low-strength soils will require a thicker pavement section, undercut and replacement, or improvement by chemical stabilization. A CBR value less than 8 is considered to be poor with respect to support of pavements referencing the same source. The occurrence of these low-strength soils will require an undercut and replacement or improvement by chemical stabilization.

GTA recommends that the upper 12 inches of roadway subgrade be constructed with soils meeting the following characteristics:

|  |              |
|--|--------------|
| Liquid Limit (AASHTO T-89)             | 35 or less   |
| Plastic Index (AASHTO T-89, T-90)      | or less      |
| California Bearing Ratio (ASTM D-1883) | 8 or greater |

GTA recommends that materials in cut areas not meeting these guidelines be removed from the top 12 inches of road subgrade and replaced with suitable materials compacted in accordance

with the site grading recommendations. Alternatively, the materials can be improved by chemical stabilization.

If medium- to high-plasticity soil or existing fill is encountered at subgrade level, at least 2 feet should be excavated from design subgrade. The overexcavation area should be backfilled with controlled, compacted granular fill in accordance with GTA's earthwork recommendations.

Grain size, plasticity testing, and CBR testing should be performed on subgrade material before placement of graded aggregate base. Additional testing will be required on subgrade material if chemical stabilization is performed.

### **ADDITIONAL SERVICES**

We recommended that during construction of the subject project, a geotechnical engineer be retained to provide observation and testing services for the following items.

- Review final site and architectural plans to evaluate if they conform with the intent of this report.
- Provide testing observation and services during fill placement to evaluate if the work is being performed in accordance with the project specifications and intent of this report.
- Observe the proof-rolling of fill and roadway subgrades prior to placing fill or base course to evaluate stability.
- Review excavated footings for compliance with the project drawings and the intent of this geotechnical report.
- Others as necessary.

### **LIMITATIONS**

This report, including all supporting boring logs, field data, field notes, laboratory test data, calculations, estimates and other documents prepared by GTA in connection with this project have

been prepared for the exclusive use of Ace Designs & Construction Management pursuant to agreements between GTA and Ace Designs & Construction Management in accordance with generally accepted engineering practice. All terms and conditions set forth in the Agreement and the General Provisions attached thereto are incorporated herein by reference. No warranty, express or implied, is made herein. Use and reproduction of this report by any other person without the expressed written permission of GTA and Ace Designs & Construction Management is unauthorized and such use is at the sole risk of the user.

The analysis and recommendations contained in this report are based on the data obtained from limited observation and testing of the encountered materials. Test borings indicate soil conditions only at specific location and time, and only at the depths penetrated. They do not necessarily reflect strata or variations that may exist between test boring locations. Consequently, the analysis and recommendations must be considered preliminary until the subsurface conditions can be verified by direct observation at the time of construction. If variations of subsurface conditions from those described in this report are noted during construction, recommendations in this report may need to be re-evaluated.

In the event that any changes in the nature, design, or location of the facilities are planned, the conclusions and recommendations contained in this report should not be considered valid unless the changes are reviewed and conclusions of this report are verified in writing. Geo-Technology Associates, Inc. is not responsible for any claims, damages, or liability associated with interpretation of subsurface data or reuse of the subsurface data or engineering analysis without the expressed written authorization of Geo-Technology Associates, Inc.

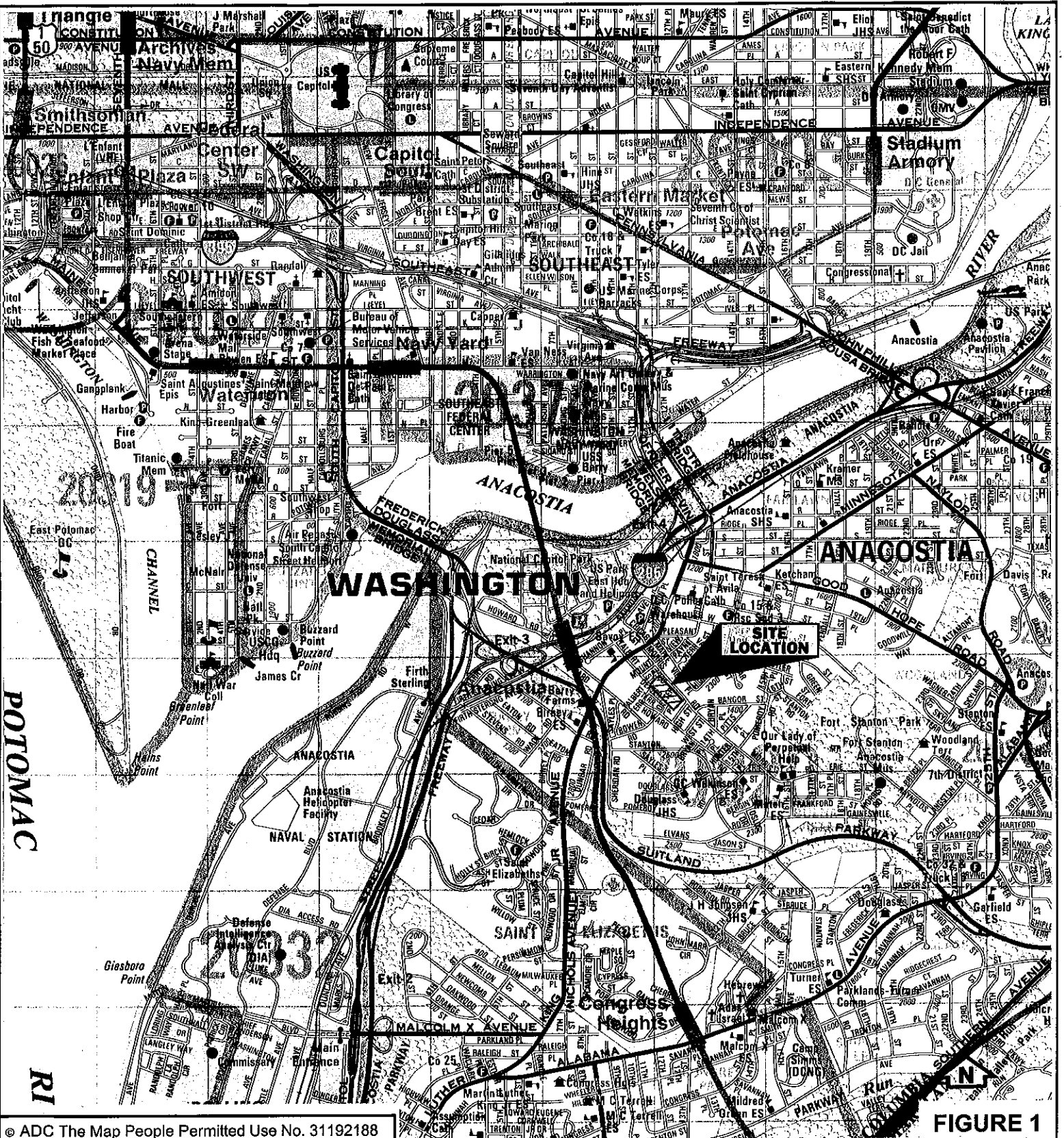
The scope of our services for this geotechnical exploration did not include any environmental assessment or investigation for the presence or absence of wetlands, or hazardous or toxic materials in the soil, surface water, groundwater or air, on or below or around this site. Any statements in this report or on the logs regarding odors or unusual or suspicious items or conditions observed are strictly for the information of our Client.

This report and the attached logs are instruments of service. The subject matter of this report is limited to the facts and matters stated herein. Absence of a reference to any other conditions or subject matter shall not be construed by the reader to imply approval by the writer.

**030817**

**GEO-TECHNOLOGY ASSOCIATES, INC.**

**APPENDIX A**  
**FIGURES**



© ADC The Map People Permitted Use No. 31192188

**FIGURE 1**

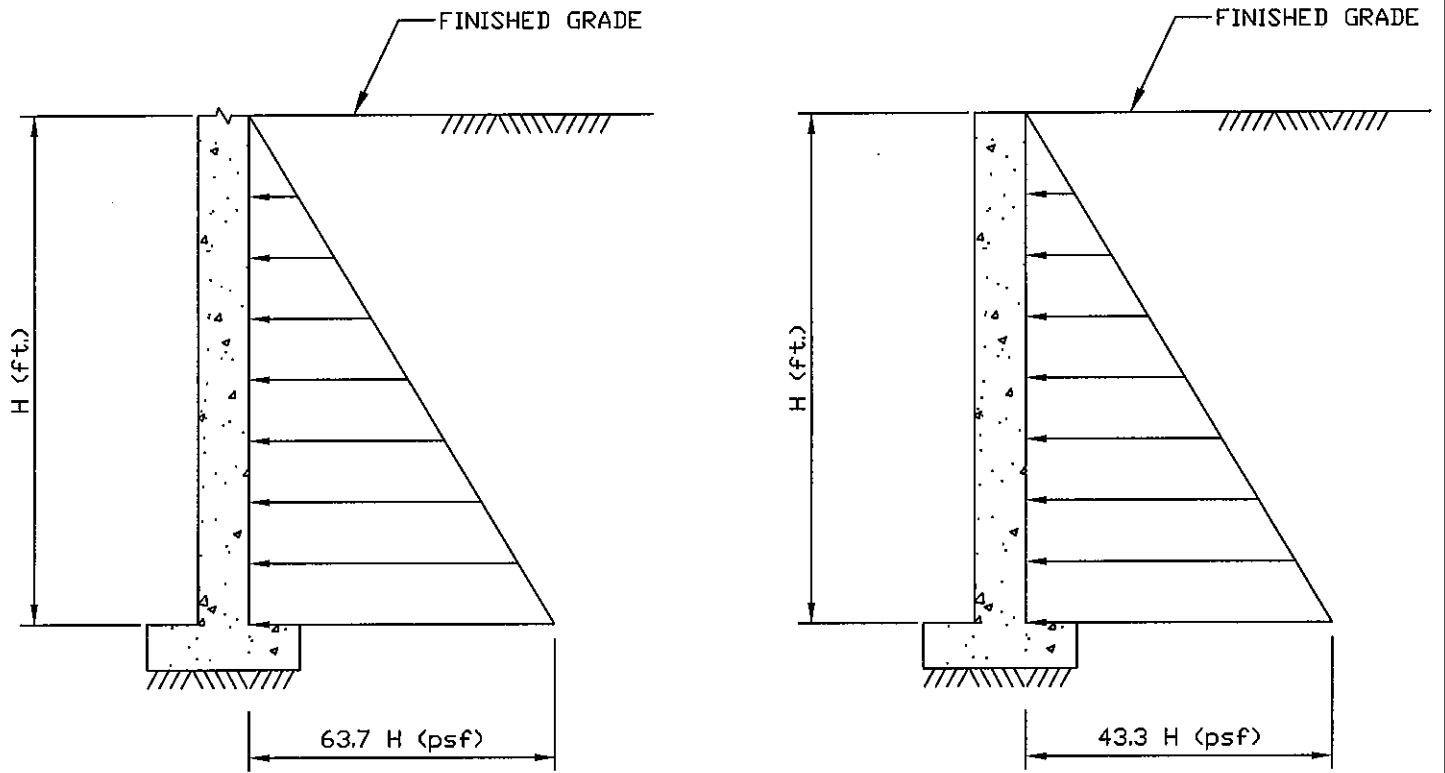


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**Anacostia**  
**SITE LOCATION MAP**  
**Washington, D.C.**

|                     |           |        |             |             |
|---------------------|-----------|--------|-------------|-------------|
| SCALE               | DATE      | SOURCE | REVIEWED BY | PROJECT NO. |
| Approx. 1" = 2,000' | Jan. 2005 | ADC    | AR          | 030817.V    |



AT-REST CASE FOR RESTRAINED WALLS

ACTIVE CASE FOR UNRESTRAINED WALLS

NOTES:

- 1) FOR HORIZONTAL BACKFILL ONLY
- 2) COHESION IS NEGLECTED FOR ALL MATERIAL
- 3) ASSUMES NO HYDROSTATIC PRESSURE

FIGURE 3



**GEO-TECHNOLOGY ASSOCIATES, INC.**  
*Geotechnical and Environmental Consultants*

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**Anacostia**  
**LATERAL EARTH PRESSURE FOR**  
**BELOW GRADE WALL**  
**Washington, D.C.**

|       |           |        |             |             |
|-------|-----------|--------|-------------|-------------|
| SCALE | DATE      | SOURCE | REVIEWED BY | PROJECT NO. |
| NTS   | Jan. 2005 | GTA    | AR          | 030817.V    |

**APPENDIX B**  
**SOIL BORING LOGS**

# NOTES FOR EXPLORATION LOGS

## KEY TO USCS TERMINOLOGY AND GRAPHIC SYMBOLS

| MAJOR DIVISIONS<br>(BASED UPON ASTM D2487-00)   |  |  | SYMBOLS  |                |    |
|---|--|--|--|----------------|----|
|   |  |  | GRAPHIC  | LETTER         |    |
| COARSE GRAINED SOILS<br><br>MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE | GRAVEL AND GRAVELLY SOILS<br><br>MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE  | CLEAN GRAVELS<br><small>(LESS THAN 15% PASSING THE NO. 200 SIEVE)</small>      |  | GW             |    |
|   |  | GRAVELS WITH FINES<br><small>(MORE THAN 15% PASSING THE NO. 200 SIEVE)</small> |  | GP<br>GM<br>GC |    |
|   | SAND AND SANDY SOILS<br><br>MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE        | CLEAN SANDS<br><small>(LESS THAN 15% PASSING THE NO. 200 SIEVE)</small>        |  | SW             |    |
|   |  | SANDS WITH FINES<br><small>(MORE THAN 15% PASSING THE NO. 200 SIEVE)</small>   |  | SP<br>SM<br>SC |    |
|   | FINE GRAINED SOILS<br><br>MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE     | SILTS AND CLAYS<br><br>LIQUID LIMIT LESS THAN 50                               | SILT OR CLAY<br><small>(&lt;15% RETAINED THE NO. 200 SIEVE)</small>                        |                | ML |
|   |  |  | SILT OR CLAY WITH SAND OR GRAVEL<br><small>(15% TO 30% RETAINED THE NO. 200 SIEVE)</small> |                | CL |
| SANDY OR GRAVELLY SILT OR CLAY<br><small>(&gt;30% RETAINED THE NO. 200 SIEVE)</small>   |  |  |  | OL             |    |
| SILTS AND CLAYS<br><br>LIQUID LIMIT GREATER THAN 50                                     |  | SILT OR CLAY<br><small>(&lt;15% RETAINED THE NO. 200 SIEVE)</small>            |  | MH             |    |
|   | SILT OR CLAY WITH SAND OR GRAVEL<br><small>(15% TO 30% RETAINED THE NO. 200 SIEVE)</small> |  | CH   |                |    |
|   | SANDY OR GRAVELLY SILT OR CLAY<br><small>(&gt;30% RETAINED THE NO. 200 SIEVE)</small>      |  | OH   |                |    |
| HIGHLY ORGANIC SOILS  |  |  |  | PT             |    |

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

## ADDITIONAL TERMINOLOGY AND GRAPHIC SYMBOLS

| ADDITIONAL DESIGNATION    | DESCRIPTION              |                                  | GRAPHIC SYMBOLS |
|---------------------------|--------------------------|----------------------------------|-----------------|
|                           | DESCRIPTION              | "N" VALUE                        |                 |
|                           | TOPSOIL                  |                                  |                 |
|                           | MAN MADE FILL            |                                  |                 |
|                           | GLACIAL TILL             |                                  |                 |
|                           | COBBLES AND BOULDERS     |                                  |                 |
| RESIDUAL SOIL DESIGNATION | DESCRIPTION              | "N" VALUE                        |                 |
|                           | HIGHLY WEATHERED ROCK    | 50 TO 50/1"                      |                 |
|                           | PARTIALLY WEATHERED ROCK | LESS THAN 50/1" AUGER PENETRABLE |                 |

### COARSE GRAINED SOILS (GRAVEL AND SAND)

| DESIGNATION  | BLOWS PER FOOT (BPF) "N" |
|--------------|--------------------------|
| VERY LOOSE   | 0 - 4                    |
| LOOSE        | 5 - 10                   |
| MEDIUM DENSE | 11 - 30                  |
| DENSE        | 31 - 50                  |
| VERY DENSE   | >50                      |

NOTE: "N" VALUE DETERMINED AS PER ASTM D1586

### FINE GRAINED SOILS (SILT AND CLAY)

| CONSISTENCY  | BPF     |
|--------------|---------|
| VERY SOFT    | <2      |
| SOFT         | 2 - 4   |
| MEDIUM STIFF | 5 - 8   |
| STIFF        | 9 - 15  |
| VERY STIFF   | 16 - 30 |
| HARD         | >30     |

NOTE: ADDITIONAL DESIGNATIONS TO ADVANCE SAMPLER INDICATED IN BLOW COUNT COLUMN:  
WOH = WEIGHT OF HAMMER  
WOR = WEIGHT OR ROD(S)

### SAMPLE TYPE

| DESIGNATION | SYMBOL |
|-------------|--------|
| SPLIT-SPOON | S-     |
| SHELBY TUBE | U-     |
| ROCK CORE   | R-     |

### WATER DESIGNATION

| DESCRIPTION                 | SYMBOL |
|-----------------------------|--------|
| ENCOUNTERED DURING DRILLING |        |
| UPON COMPLETION OF DRILLING |        |
| 24 HOURS AFTER COMPLETION   |        |

NOTE: WATER OBSERVATIONS WERE MADE AT THE TIME INDICATED. POROSITY OF SOIL STRATA, WEATHER CONDITIONS, SITE TOPOGRAPHY, ETC. MAY CAUSE WATER LEVEL CHANGES.




# LOG OF BORING NO. B-1

PROJECT: **Anacostia**  
 PROJECT NO: **030817.V**  
 PROJECT LOCATION: **Washington D.C.**

WATER LEVEL:  $\nabla$  Dry  $\nabla$  Dry  $\nabla$  \_\_\_\_\_  
 DATE: **10/28/2003** **10/29/2003** \_\_\_\_\_  
 CAVED (ft): 12.3 12.0 \_\_\_\_\_

DATE STARTED: **October 28, 2003**  
 DATE COMPLETED: **October 28, 2003**  
 DRILLING CONTRACTOR: **GTA**  
 DRILLER: **GTA**  
 DRILLING METHOD: **HSA**  
 SAMPLING METHOD: **Split Spoon**

GROUND SURFACE ELEVATION: \_\_\_\_\_  
 DATUM: \_\_\_\_\_  
 EQUIPMENT: **CME 45**  
 LOGGED BY: **SG**  
 CHECKED BY: **AR**

| SAMPLE NUMBER | SAMPLE DEPTH (ft) | SAMPLE RECOVERY (in) | SAMPLE BLOWS/6 inches | N (blows/ft) | ELEVATION (ft) | DEPTH (ft) | USCS | GRAPHIC SYMBOL  | DESCRIPTION  |                |
|---------------|-------------------|----------------------|-----------------------|--------------|----------------|------------|------|---|--|----------------|
|               |                   |                      |                       |              |                |            |      |   | DESCRIPTION  | REMARKS        |
| S1            | 0.0               | 8                    | 10-10-11              | 21           |                | 0          |      |    | Red brown, moist, very stiff, SILT, trace clay, trace medium grained sand. (ML-Fill) | Asphalt: 3 in. |
| S2            | 2.5               | 16                   | 19-27-31              | 58           |                |            |      | ---, pale brown, dry, very dense, Silty SAND, trace gravel                          |  |                |
| S3            | 5.0               | 16                   | 11-19-26              | 45           |                | 5          |      | ---, brown, dense, trace clay, trace black micaceous rock fragments                 |  |                |
| S4            | 8.5               | 8                    | 27-32-25              | 57           |                | 10         | SM   |   | Pale gray, yellow brown, moist, medium dense to very dense, Silty SAND. (SM)         |                |
| S5            | 13.5              | 18                   | 10-9-9                | 18           |                | 15         |      |   |  |                |
| S6            | 18.5              | 18                   | 7-10-8                | 18           |                | 20         | CH   |  | Multicolor, moist, very stiff, Fat CLAY. (CH)  |                |
| S7            | 23.5              | 18                   | 11-13-19              | 32           |                | 25         |      |   |  |                |
|               |                   |                      |                       |              |                |            |      |   | End of Boring @ 25.0 ft.   |                |

NOTES:



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 Sterling, Virginia 20166

**LOG OF BORING NO. B-1**

# LOG OF BORING NO. B-2

PROJECT: **Anacostia**  
 PROJECT NO: **030817.V**  
 PROJECT LOCATION: **Washington D.C.**

WATER LEVEL:  $\nabla$  Dry  $\nabla$  Dry  $\nabla$  \_\_\_\_\_  
 DATE: **10/28/2003** **10/29/2003** \_\_\_\_\_  
 CAVED (ft): 15.2 14.6 \_\_\_\_\_

DATE STARTED: **October 28, 2003**  
 DATE COMPLETED: **October 28, 2003**  
 DRILLING CONTRACTOR: **GTA**  
 DRILLER: **GTA**  
 DRILLING METHOD: **HSA**  
 SAMPLING METHOD: **Split Spoon**

GROUND SURFACE ELEVATION: \_\_\_\_\_  
 DATUM: \_\_\_\_\_  
 EQUIPMENT: **CME 45**  
 LOGGED BY: **SG**  
 CHECKED BY: **AR**

| SAMPLE NUMBER | SAMPLE DEPTH (ft) | SAMPLE RECOVERY (in) | SAMPLE BLOWS/6 inches | N (blows/ft) | ELEVATION (ft) | DEPTH (ft) | USCS | GRAPHIC SYMBOL  | DESCRIPTION   | REMARKS               |
|---------------|-------------------|----------------------|-----------------------|--------------|----------------|------------|------|---|---|-----------------------|
| S1            | 0.0               | 7                    | 2-4-4                 | 8            |                | 0          |      |   | Red brown, moist, stiff, Silty CLAY, trace medium grained sand. (CL-Fill) | Topsoil: 4 in.        |
| S2            | 2.5               | 16                   | 7-8-8                 | 16           |                |            |      | Brown, moist, medium dense, Silty SAND, trace clay. (SM-Fill) |   |                       |
| S3            | 5.0               | 18                   | 19-24-27              | 51           |                | 5          | CL   |   | Multicolor, moist, hard, Silty Clay. (CL)                                 | Hard Drilling @ 7 ft. |
| S4            | 8.5               | 18                   | 7-19-26               | 45           |                | 10         |      |   |   |                       |
| S5            | 13.5              | 18                   | 16-19-19              | 38           |                | 15         |      |   | ---, brown, some medium grained sand                                      |                       |
| S6            | 18.5              | 18                   | 7-6-22                | 28           |                | 20         |      |   | ---, gray   |                       |
| S7            | 23.5              | 18                   | 10-12-14              | 26           |                | 25         | CH   |   | Multicolor, moist, very stiff, Fat Clay. (CH)                             |                       |
|               |                   |                      |                       |              |                | 25         |      |   | End of Boring @ 25.0 ft.  |                       |

NOTES:

LOG# 030817.GPJ 1/20/05



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**LOG OF BORING NO. B-2**


# LOG OF BORING NO. B-3

PROJECT: **Anacostia**  
 PROJECT NO: **030817.V**  
 PROJECT LOCATION: **Washington D.C.**

WATER LEVEL:  $\nabla$  Dry  $\nabla$  Dry  $\nabla$  \_\_\_\_\_  
 DATE: **10/29/2003** **10/30/2003** \_\_\_\_\_  
 CAVED (ft): 14.5 14.3 \_\_\_\_\_

DATE STARTED: **October 29, 2003**  
 DATE COMPLETED: **October 29, 2003**  
 DRILLING CONTRACTOR: **GTA**  
 DRILLER: **GTA**  
 DRILLING METHOD: **HSA**  
 SAMPLING METHOD: **Split Spoon**

GROUND SURFACE ELEVATION: \_\_\_\_\_  
 DATUM: \_\_\_\_\_  
 EQUIPMENT: **CME 45**  
 LOGGED BY: **SG**  
 CHECKED BY: **AR**

| SAMPLE NUMBER            | SAMPLE DEPTH (ft) | SAMPLE RECOVERY (in) | SAMPLE BLOWS/6 inches | N (blows/ft) | ELEVATION (ft) | DEPTH (ft) | USCS | GRAPHIC SYMBOL  | DESCRIPTION   | REMARKS  |
|--------------------------|-------------------|----------------------|-----------------------|--------------|----------------|------------|------|---|---|--|
| S1                       | 0.0               | 15                   | 2-5-3                 | 8            |                | 0          |      |  | Brown, moist, medium stiff, Silty Clay, some medium grained sand. (CL-Fill) | Topsoil: 6 in.<br><br><br><br><br><br>Hard Drilling @ 10 ft. |
| S2                       | 2.5               | 18                   | 8-9-12                | 21           |                | 2.5        | CL   | Red brown, brown, moist, very stiff, Silty Clay. (CL)                             |   |  |
| S3                       | 5.0               | 18                   | 12-22-25              | 47           |                | 5.0        |      | ---, hard, trace quartz fragments   |   |  |
| S4                       | 8.5               | 18                   | 15-17-22              | 39           |                | 8.5        |      | ---, multicolored   |   |  |
| S5                       | 13.5              | 18                   | 11-19-26              | 45           |                | 13.5       |      | ---, little fine to medium grained sand   |   |  |
| S6                       | 18.5              | 18                   | 8-10-12               | 22           |                | 18.5       | SC   | Brown, moist, medium dense, Clayey SAND. (SC)                                     |   |  |
| S7                       | 23.5              | 18                   | 11-8-8                | 16           |                | 23.5       |      |   |   |  |
| End of Boring @ 25.0 ft. |                   |                      |                       |              |                |            |      |   |   |  |

NOTES:



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**LOG OF BORING NO. B-3**

LOG 030817.GPJ 1/20/05











# LOG OF BORING NO. B-4

PROJECT: **Anacostia**  
 PROJECT NO: **030817.V**  
 PROJECT LOCATION: **Washington D.C.**

WATER LEVEL:  $\nabla$  Dry  $\nabla$  Dry  $\nabla$  \_\_\_\_\_  
 DATE: 10/29/2003 10/30/2003 \_\_\_\_\_  
 CAVED (ft): 26.2 26.7 \_\_\_\_\_

DATE STARTED: **October 29, 2003**  
 DATE COMPLETED: **October 29, 2003**  
 DRILLING CONTRACTOR: **GTA**  
 DRILLER: **GTA**  
 DRILLING METHOD: **HSA**  
 SAMPLING METHOD: **Split Spoon**

GROUND SURFACE ELEVATION: \_\_\_\_\_  
 DATUM: \_\_\_\_\_  
 EQUIPMENT: **CME 45**  
 LOGGED BY: **SG**  
 CHECKED BY: **AR**

| SAMPLE NUMBER            | SAMPLE DEPTH (ft) | SAMPLE RECOVERY (in) | SAMPLE BLOWS/6 inches | N (blows/ft) | ELEVATION (ft) | DEPTH (ft) | USCS  | GRAPHIC SYMBOL  | DESCRIPTION  | REMARKS        |
|--------------------------|-------------------|----------------------|-----------------------|--------------|----------------|------------|---|---|--|----------------|
| S1                       | 0.0               | 8                    | 5-7-7                 | 14           |                | 0          |   |    | Dark brown, moist, medium dense, Silty SAND, trace gravel, brick. (SM-Fill)      | Topsoil: 3 in. |
| S2                       | 2.5               | 18                   | 4-5-7                 | 12           |                |            |  | Brown, moist, stiff, Sandy SILT, trace organics, trace clay. (ML-Fill)              |  |                |
| S3                       | 5.0               | 18                   | 7-7-10                | 17           |                | 5          | SM  |    | Pale brown, moist, medium dense, Silty SAND. (SM)                                |                |
| S4                       | 8.5               | 18                   | 5-10-15               | 25           |                | 10         | CH  |    | Multicolor, moist, very stiff, fat CLAY, trace fine to medium grained sand. (CH) |                |
| S5                       | 13.5              | 18                   | 10-13-17              | 30           |                | 15         |   |   | ---, trace coarse grained sand   |                |
| S6                       | 18.5              | 18                   | 7-10-8                | 18           |                | 20         | SM  |  | Red brown, moist, medium dense, Silty SAND, some gravel. (SM)                    |                |
| S7                       | 23.5              | 18                   | 5-7-8                 | 15           |                | 25         | CL  |  | Gray, moist, stiff to very stiff, Silty CLAY, trace medium grained sand. (CL)    |                |
| S8                       | 28.5              | 18                   | 4-5-6                 | 11           |                | 30         |   |  |  |                |
| S9                       | 33.5              | 18                   | 3-4-4                 | 8            |                | 35         | SC  |  | Pale brown, wet, loose, Clayey SAND. (SC)  |                |
| S10                      | 38.5              | 18                   | 7-10-11               | 21           |                | 40         | CH  |  | Multicolor, moist, very stiff, Fat CLAY. (CH)                                    |                |
| End of Boring @ 40.0 ft. |                   |                      |                       |              |                |            |   |   |  |                |

NOTES:

LOG# 030817.GPJ 1/20/05



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 Sterling, Virginia 20166

**LOG OF BORING NO. B-4**





# LOG OF BORING NO. B-5

PROJECT: **Anacostia**  
 PROJECT NO: **030817.V**  
 PROJECT LOCATION: **Washington D.C.**

WATER LEVEL:  $\nabla$  Dry  $\nabla$  Dry  $\nabla$  \_\_\_\_\_  
 DATE: **10/31/2003** **11/01/2003** \_\_\_\_\_  
 CAVED (ft): 14.7 15.0 \_\_\_\_\_

DATE STARTED: **October 31, 2003**  
 DATE COMPLETED: **October 31, 2003**  
 DRILLING CONTRACTOR: **GTA**  
 DRILLER: **GTA**  
 DRILLING METHOD: **HSA**  
 SAMPLING METHOD: **Split Spoon**

GROUND SURFACE ELEVATION: \_\_\_\_\_  
 DATUM: \_\_\_\_\_  
 EQUIPMENT: **CME 45**  
 LOGGED BY: **SG**  
 CHECKED BY: **AR**

| SAMPLE NUMBER            | SAMPLE DEPTH (ft) | SAMPLE RECOVERY (in) | SAMPLE BLOWS/6 inches | N (blows/ft) | ELEVATION (ft) | DEPTH (ft) | USCS | GRAPHIC SYMBOL  | DESCRIPTION   | REMARKS        |
|--------------------------|-------------------|----------------------|-----------------------|--------------|----------------|------------|------|---|---|----------------|
| S1                       | 0.0               | 12                   | 4-5-8                 | 13           |                | 0          |      |    | Gray, moist, medium dense, gravelly sand. (GP-Fill)                   | Topsoil: 3 in. |
| S2                       | 2.5               | 14                   | 7-10-12               | 22           |                | 2.5        | CL   |    | Brown, moist, very stiff, Silty Clay, trace medium grained sand. (CL) |                |
| S3                       | 5.0               | 16                   | 10-13-19              | 32           |                | 5.0        | SM   |    | Gray, moist, dense, Silty Sand. (SM)                                  |                |
| S4                       | 8.5               | 18                   | 8-7-7                 | 14           |                | 8.5        |      |   |   |                |
| S5                       | 13.5              | 18                   | 6-7-7                 | 14           |                | 13.5       |      |   |   |                |
| S6                       | 18.5              | 18                   | 8-6-7                 | 13           |                | 18.5       |      |   |   |                |
| S7                       | 23.5              | 18                   | 4-6-6                 | 12           |                | 23.5       | CL   |  | Pale brown, gray, moist, stiff, Sandy Clay. (CL)                      |                |
| End of Boring @ 25.0 ft. |                   |                      |                       |              |                |            |      |   |   |                |

NOTES:



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 Sterling, Virginia 20166

**LOG OF BORING NO. B-5**






# LOG OF BORING NO. B-6

PROJECT: **Anacostia**  
 PROJECT NO: **030817.V**  
 PROJECT LOCATION: **Washington D.C.**

WATER LEVEL:  $\nabla$  Dry  $\nabla$  Dry  $\nabla$  \_\_\_\_\_  
 DATE: 10/30/2003 11/01/2003 \_\_\_\_\_  
 CAVED (ft): 6.0 7.7 \_\_\_\_\_

DATE STARTED: **October 30, 2003**  
 DATE COMPLETED: **October 30, 2003**  
 DRILLING CONTRACTOR: **GTA**  
 DRILLER: **GTA**  
 DRILLING METHOD: **HSA**  
 SAMPLING METHOD: **Split Spoon**

GROUND SURFACE ELEVATION: \_\_\_\_\_  
 DATUM: \_\_\_\_\_  
 EQUIPMENT: **CME 45**  
 LOGGED BY: **SG**  
 CHECKED BY: **AR**

| SAMPLE NUMBER            | SAMPLE DEPTH (ft) | SAMPLE RECOVERY (in) | SAMPLE BLOWS/6 inches | N (blows/ft) | ELEVATION (ft) | DEPTH (ft) | USCS | GRAPHIC SYMBOL  | DESCRIPTION  |                | REMARKS |
|--------------------------|-------------------|----------------------|-----------------------|--------------|----------------|------------|------|---|--|----------------|---------|
|                          |                   |                      |                       |              |                |            |      |   |  |                |         |
| S1                       | 0.0               | 18                   | 1-2-2                 | 4            |                | 0          |      |    | Brown, wet, loose, Clayey Sand, trace brick fragments. (SC-Fill)           | Topsoil: 6 in. |         |
| S2                       | 2.5               | 12                   | 4-6-4                 | 10           |                |            |      |   |  |                |         |
| S3                       | 5.0               | 16                   | 5-5-6                 | 11           |                | 5          | SM   |    | Brown, moist, medium dense, Silty SAND, trace clay. (SM)                   |                |         |
| S4                       | 8.5               | 14                   | 5-6-10                | 16           |                | 10         | CL   |    | Gray brown, moist, very stiff, Silty Clay, trace medium grained sand. (CL) |                |         |
| S5                       | 13.5              | 18                   | 5-7-12                | 19           |                | 15         | SM   |  | Yellow brown, gray, moist, medium dense, Silty SAND. (SM)                  |                |         |
| S6                       | 18.5              | 18                   | 4-4-6                 | 10           |                | 20         |      |   | ---, wet, trace clay   |                |         |
| S7                       | 23.5              | 18                   | 5-6-6                 | 12           |                | 25         |      |   | ---, gray  |                |         |
| S8                       | 28.5              | 18                   | 5-7-11                | 18           |                | 30         | CH   |  | Multicolor, moist, very stiff, Fat Clay. (CH)                              |                |         |
| S9                       | 33.5              | 18                   | 7-12-14               | 26           |                | 35         |      |   | ---, red   |                |         |
| S10                      | 38.5              | 18                   | 10-11-15              | 26           |                | 40         |      |   |  |                |         |
| End of Boring @ 40.0 ft. |                   |                      |                       |              |                |            |      |   |  |                |         |

NOTES:

LOG 030817.GPJ 1/20/05



**GEO-TECHNOLOGY ASSOCIATES, INC.**  
 45064 Underwood Lane, Suite A  
 Sterling, Virginia 20166




# LOG OF BORING NO. W-1

PROJECT: **Anacostia**  
 PROJECT NO: **030817.V**  
 PROJECT LOCATION: **Washington D.C.**

WATER LEVEL:  $\nabla$  Dry  $\nabla$  Dry  $\nabla$  \_\_\_\_\_  
 DATE: **10/28/2003** **10/29/2003** \_\_\_\_\_  
 CAVED (ft): 9.3 8.3 \_\_\_\_\_

DATE STARTED: **October 28, 2003**  
 DATE COMPLETED: **October 28, 2003**  
 DRILLING CONTRACTOR: **GTA**  
 DRILLER: **GTA**  
 DRILLING METHOD: **HSA**  
 SAMPLING METHOD: **Split Spoon**

GROUND SURFACE ELEVATION: \_\_\_\_\_  
 DATUM: \_\_\_\_\_  
 EQUIPMENT: **CME 45**  
 LOGGED BY: **SG**  
 CHECKED BY: **AR**

| SAMPLE NUMBER            | SAMPLE DEPTH (ft) | SAMPLE RECOVERY (in) | SAMPLE BLOWS/6 inches | N (blows/ft) | ELEVATION (ft) | DEPTH (ft) | USCS | GRAPHIC SYMBOL  | DESCRIPTION  | REMARKS               |
|--------------------------|-------------------|----------------------|-----------------------|--------------|----------------|------------|------|---|--|-----------------------|
| S1                       | 0.0               | 11                   | 2-2-2                 | 4            |                | 0          |      |    | Brown, dark brown, moist, loose, Silty SAND, some clay, little organics. (SM-Fill)     | Topsoil: 6 in.        |
| S2                       | 2.5               | 13                   | 14-15-14              | 29           |                | 5          | SM   |    | Pale brown, yellow brown, moist, medium dense, Silty SAND, some quartz fragments. (SM) | Bag Sample: 2 - 7 ft. |
| S3                       | 5.0               | 18                   | 7-10-13               | 23           |                | 10         |      | ---, trace clay   |  |                       |
| S4                       | 8.5               | 6                    | 7-8-9                 | 17           |                | 15         | CH   |  | Red, moist, very stiff, Fat Clay, trace fine grained sand. (CH)                        |                       |
| S5                       | 13.5              | 8                    | 12-11-13              | 24           |                | 20         |      | ---, multicolor   |  |                       |
| S6                       | 18.5              | 18                   | 10-18-19              | 37           |                | 25         |      |   |  |                       |
| S7                       | 23.5              | 18                   | 11-38-34              | 72           |                |            |      |   |  |                       |
| End of Boring @ 25.0 ft. |                   |                      |                       |              |                |            |      |   |  |                       |

NOTES:

LOGS 030817.GPJ 1/20/05



**GEO-TECHNOLOGY ASSOCIATES, INC.**  
 45064 Underwood Lane, Suite A  
 Sterling, Virginia 20166

**LOG OF BORING NO. W-1**

# LOG OF BORING NO. W-2

PROJECT: **Anacostia**  
 PROJECT NO: **030817.V**  
 PROJECT LOCATION: **Washington D.C.**

WATER LEVEL:  $\nabla$  Dry  $\nabla$  Dry  $\nabla$  \_\_\_\_\_  
 DATE: 10/28/2003 10/29/2003 \_\_\_\_\_  
 CAVED (ft): 16.3 14.0 \_\_\_\_\_

DATE STARTED: **October 28, 2003**  
 DATE COMPLETED: **October 28, 2003**  
 DRILLING CONTRACTOR: **GTA**  
 DRILLER: **GTA**  
 DRILLING METHOD: **HSA**  
 SAMPLING METHOD: **Split Spoon**

GROUND SURFACE ELEVATION: \_\_\_\_\_  
 DATUM: \_\_\_\_\_  
 EQUIPMENT: **CME 45**  
 LOGGED BY: **SG**  
 CHECKED BY: **AR**

| SAMPLE NUMBER | SAMPLE DEPTH (ft) | SAMPLE RECOVERY (in) | SAMPLE BLOWS/6 inches | N (blows/ft) | ELEVATION (ft) | DEPTH (ft) | USCS | GRAPHIC SYMBOL | DESCRIPTION   | REMARKS  |
|---------------|-------------------|----------------------|-----------------------|--------------|----------------|------------|------|----------------|---|--|
| S1            | 0.0               | 12                   | 3-6-5                 | 11           |                | 0          | CL   |                | Brown, red brown, moist, stiff, Silty Clay. (CL)                | Topsoil: 4 in.<br><br><br><br><br><br><br>Hard drilling @ 12 ft. |
| S2            | 2.5               | 16                   | 10-19-36              | 55           |                |            | SM   |                | Red brown, dry, very dense, Silty SAND. (SM)                    |  |
| S3            | 5.0               | 18                   | 8-17-27               | 44           |                | 5          | CL   |                | Brown, moist, hard, Silty Clay. (CL)                            |  |
| S4            | 8.5               | 18                   | 13-16-19              | 35           |                |            | SM   |                | Red brown, moist, very dense, Silty SAND, trace clay. (SM)      |  |
| S5            | 13.5              | 18                   | 19-22-36              | 58           |                | 15         | CL   |                | Gray, moist, hard, Silty Clay, little medium grained sand. (CL) |  |
| S6            | 18.5              | 18                   | 10-18-19              | 37           |                | 20         | CH   |                | Gray, moist, very stiff, Fat CLAY. (CH)                         |  |
| S7            | 23.5              | 18                   | 7-13-16               | 29           |                | 25         |      |                | End of Boring @ 25.0 ft.  |  |

NOTES:

LOG 030817.GPJ 1/20/05



**GEO-TECHNOLOGY ASSOCIATES, INC.**  
 45064 Underwood Lane, Suite A  
 Sterling, Virginia 20166

**LOG OF BORING NO. W-2**

# LOG OF BORING NO. W-3

PROJECT: **Anacostia**  
 PROJECT NO: **030817.V**  
 PROJECT LOCATION: **Washington D.C.**

WATER LEVEL:  $\nabla$  Dry  $\nabla$  Dry  $\nabla$  \_\_\_\_\_  
 DATE: **10/29/2003** **10/30/2003** \_\_\_\_\_  
 CAVED (ft): 16.8 16.3 \_\_\_\_\_

DATE STARTED: **October 29, 2003**  
 DATE COMPLETED: **October 29, 2003**  
 DRILLING CONTRACTOR: **GTA**  
 DRILLER: **GTA**  
 DRILLING METHOD: **HSA**  
 SAMPLING METHOD: **Split Spoon**

GROUND SURFACE ELEVATION: \_\_\_\_\_  
 DATUM: \_\_\_\_\_  
 EQUIPMENT: **CME 45**  
 LOGGED BY: **SG**  
 CHECKED BY: **AR**

| SAMPLE NUMBER | SAMPLE DEPTH (ft) | SAMPLE RECOVERY (in) | SAMPLE BLOWS/6 inches | N (blows/ft) | ELEVATION (ft) | DEPTH (ft) | USCS | GRAPHIC SYMBOL | DESCRIPTION   |  | REMARKS   |
|---------------|-------------------|----------------------|-----------------------|--------------|----------------|------------|------|----------------|---|--|---|
|               |                   |                      |                       |              |                |            |      |                | DESCRIPTION   |  |   |
| S1            | 0.0               | 18                   | 1-2-3                 | 5            |                | 0          | CL   |                | Red brown, moist, medium stiff, Sandy CLAY. (CL)              |  | Topsoil: 6 in.<br><br>Bag Sample:<br>1 - 6 ft.<br><br><br><br>Hard drilling @<br>12.5 ft. |
| S2            | 2.5               | 18                   | 7-8-9                 | 17           |                |            |      |                |   |  |   |
| S3            | 5.0               | 18                   | 5-7-7                 | 14           |                | 5          | CL   |                | Gray, moist, stiff, Silty Clay, trace fine grained sand. (CL) |  |   |
| S4            | 8.5               | 18                   | 6-8-10                | 18           |                | 10         |      |                |   |  |   |
| S5            | 13.5              | 18                   | 8-22-20               | 42           |                | 15         | CH   |                | Red, gray, moist, hard, Fat Clay. (CH)                        |  |   |
| S6            | 18.5              | 18                   | 13-19-26              | 45           |                | 20         | CL   |                | Red brown, moist, hard, Sandy CLAY. (CL)                      |  |   |
| S7            | 23.5              | 18                   | 5-10-11               | 21           |                | 25         |      |                | ---, gray   |  |   |
|               |                   |                      |                       |              |                |            |      |                | End of Boring @ 25.0 ft.                                      |  |   |

NOTES:



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**LOG OF BORING NO. W-3**

# LOG OF BORING NO. W-4

PROJECT: **Anacostia**  
 PROJECT NO: **030817.V**  
 PROJECT LOCATION: **Washington D.C.**

WATER LEVEL:  $\nabla$  Dry  $\nabla$  Dry  $\nabla$  \_\_\_\_\_  
 DATE: **10/30/2003** **10/31/2003** \_\_\_\_\_  
 CAVED (ft): 16.5 - \_\_\_\_\_

DATE STARTED: **October 30, 2003**  
 DATE COMPLETED: **October 30, 2003**  
 DRILLING CONTRACTOR: **GTA**  
 DRILLER: **GTA**  
 DRILLING METHOD: **HSA**  
 SAMPLING METHOD: **Split Spoon**

GROUND SURFACE ELEVATION: \_\_\_\_\_  
 DATUM: \_\_\_\_\_  
 EQUIPMENT: **CME 45**  
 LOGGED BY: **SG**  
 CHECKED BY: **AR**

| SAMPLE NUMBER            | SAMPLE DEPTH (ft) | SAMPLE RECOVERY (in) | SAMPLE BLOWS/6 inches | N (blows/ft) | ELEVATION (ft) | DEPTH (ft) | USCS | GRAPHIC SYMBOL | DESCRIPTION  | REMARKS        |
|--------------------------|-------------------|----------------------|-----------------------|--------------|----------------|------------|------|----------------|--|----------------|
| S1                       | 0.0               | 12                   | 3-3-3                 | 6            |                | 0          | SM   |                | Yellow brown, gray, moist, loose, Silty SAND, trace to little clay. (SM) | Topsoil: 5 in. |
| S2                       | 2.5               | 13                   | 5-4-4                 | 8            |                |            | CL   |                | Brown, gray, moist, stiff, Silty Clay. (CL)                              |                |
| S3                       | 5.0               | 16                   | 11-14-14              | 28           |                | 5          |      |                | ---, very stiff  |                |
| S4                       | 8.5               | -                    | 18-13-11              | 24           |                | 10         |      |                | ---, purple, little medium grained sand                                  |                |
| S5                       | 13.5              | 18                   | 7-13-16               | 29           |                | 15         |      |                |  |                |
| S6                       | 18.5              | 18                   | 15-16-18              | 34           |                | 20         | SM   |                | Yellow brown, gray, moist, medium dense, Silty Sand, trace clay. (SM)    |                |
| S7                       | 23.5              | 18                   | 22-14-10              | 24           |                | 25         |      |                |  |                |
| End of Boring @ 25.0 ft. |                   |                      |                       |              |                |            |      |                |  |                |

NOTES:



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**LOG OF BORING NO. W-4**






# LOG OF BORING NO. W-5

PROJECT: **Anacostia**  
 PROJECT NO: **030817.V**  
 PROJECT LOCATION: **Washington D.C.**

WATER LEVEL:  $\nabla$  Dry  $\nabla$  Dry  $\nabla$  \_\_\_\_\_  
 DATE: **10/30/2003** **10/31/2003** \_\_\_\_\_  
 CAVED (ft): 18.0 16.0 \_\_\_\_\_

DATE STARTED: **October 30, 2003**  
 DATE COMPLETED: **October 30, 2003**  
 DRILLING CONTRACTOR: **GTA**  
 DRILLER: **GTA**  
 DRILLING METHOD: **HSA**  
 SAMPLING METHOD: **Split Spoon**

GROUND SURFACE ELEVATION: \_\_\_\_\_  
 DATUM: \_\_\_\_\_  
 EQUIPMENT: **CME 45**  
 LOGGED BY: **SG**  
 CHECKED BY: **AR**

| SAMPLE NUMBER            | SAMPLE DEPTH (ft) | SAMPLE RECOVERY (in) | SAMPLE BLOWS/6 inches | N (blows/ft) | ELEVATION (ft) | DEPTH (ft) | USCS | GRAPHIC SYMBOL  | DESCRIPTION  |                               |
|--------------------------|-------------------|----------------------|-----------------------|--------------|----------------|------------|------|---|--|-------------------------------|
|                          |                   |                      |                       |              |                |            |      |   | DESCRIPTION  | REMARKS                       |
| S1                       | 0.0               | 18                   | 1-2-2                 | 4            |                | 0          |      |    | Brown, moist, loose, Silty Sand, little clay. (SM-Fill)        | Topsoil: 6 in.                |
| S2                       | 2.5               | 14                   | 4-5-6                 | 11           |                |            |      |   | ---  | some organics, rock fragments |
| S3                       | 5.0               | 18                   | 10-10-10              | 20           |                | 5          | SM   |    | Brown, moist, dense, Silty Sand. (SM)                          |                               |
| S4                       | 8.5               | 18                   | 4-5-8                 | 13           |                | 10         | CL   |    | Gray brown, moist, stiff Silty Clay. (CL)                      |                               |
| S5                       | 13.5              | 18                   | 7-7-7                 | 14           |                | 15         | SM   |  | Pale gray, yellow brown, moist, medium dense, Silty Sand. (SM) |                               |
| S6                       | 18.5              | 18                   | 4-5-6                 | 11           |                | 20         |      |   | ---  | wet, yellow brown             |
| S7                       | 23.5              | 18                   | 5-6-9                 | 15           |                | 25         | CH   |  | Brown, gray, moist, very stiff, Fat Clay. (CH)                 |                               |
| End of Boring @ 25.0 ft. |                   |                      |                       |              |                |            |      |   |  |                               |

NOTES:



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 Sterling, Virginia 20166

**LOG OF BORING NO. W-5**

# LOG OF BORING NO. W-10

PROJECT: **Anacostia**  
 PROJECT NO: **030817.V**  
 PROJECT LOCATION: **Washington D.C.**

WATER LEVEL:  $\nabla$  Dry  $\nabla$  Dry  $\nabla$  \_\_\_\_\_  
 DATE: 10/30/2003 10/31/2003 \_\_\_\_\_  
 CAVED (ft): 15.2 19.0 \_\_\_\_\_

DATE STARTED: **October 30, 2003**  
 DATE COMPLETED: **October 30, 2003**  
 DRILLING CONTRACTOR: **GTA**  
 DRILLER: **GTA**  
 DRILLING METHOD: **HSA**  
 SAMPLING METHOD: **Split Spoon**

GROUND SURFACE ELEVATION: \_\_\_\_\_  
 DATUM: \_\_\_\_\_  
 EQUIPMENT: **CME 45**  
 LOGGED BY: **SG**  
 CHECKED BY: **AR**

| SAMPLE NUMBER | SAMPLE DEPTH (ft) | SAMPLE RECOVERY (in) | SAMPLE BLOWS/6 inches | N (blows/ft) | ELEVATION (ft) | DEPTH (ft) | USCS | GRAPHIC SYMBOL | DESCRIPTION  |                | REMARKS |
|---------------|-------------------|----------------------|-----------------------|--------------|----------------|------------|------|----------------|--|----------------|---------|
|               |                   |                      |                       |              |                |            |      |                |  |                |         |
| S1            | 0.0               | 16                   | 5-5-4                 | 9            |                | 0          |      |                | Brown, dark brown, moist, stiff, Sandy Clay. (CL-Fill) | Topsoil: 6 in. |         |
| S2            | 2.5               | 12                   | 4-4-6                 | 10           |                | 2.5        | CH   |                | Multi-colored, moist, stiff, fat CLAY. (CH)            |                |         |
| S3            | 5.0               | 18                   | 5-7-13                | 20           |                | 5          | CL   |                | Pale brown, moist, very stiff, Silty Clay. (CL)        |                |         |
| S4            | 8.5               | 18                   | 9-16-20               | 36           |                | 10         |      |                | ---, trace medium to coarse grained sand               |                |         |
| S5            | 13.5              | 18                   | 7-6-5                 | 11           |                | 15         | CL   |                | Brown, moist, stiff, Sandy Clay. (CL)                  |                |         |
| S6            | 18.5              | 18                   | 6-6-5                 | 11           |                | 20         |      |                |  |                |         |
| S7            | 23.5              | 18                   | 7-9-8                 | 17           |                | 25         | CH   |                | Red, moist, very stiff, Fat Clay. (CH)                 |                |         |
| S8            | 28.5              | 18                   | 9-8-8                 | 16           |                | 30         |      |                | End of Boring @ 30.0 ft.                               |                |         |

NOTES:



**GEO-TECHNOLOGY ASSOCIATES, INC.**  
 45064 Underwood Lane, Suite A  
 Sterling, Virginia 20166

**LOG OF BORING NO. W-10**

LOG 030817.GPJ 1/20/05

**APPENDIX C**  
**LABORATORY DATA**

**GEO-TECHNOLOGY ASSOCIATES, INC.**  
**Natural Moisture Content Summary**

**Anacostia**  
**February 18, 2004**  
**030817.V**

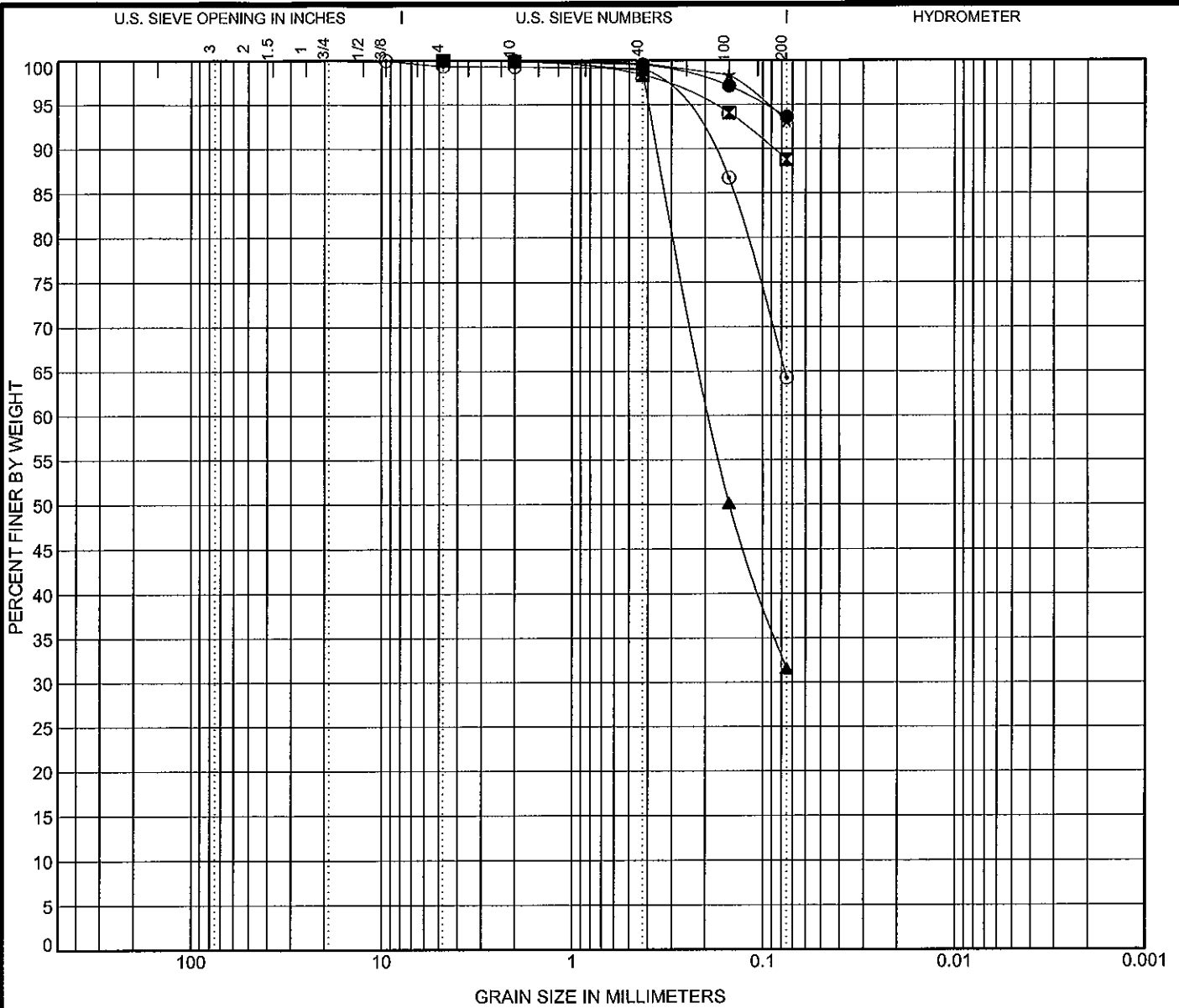
| Boring No. | Sample No. | Depth (ft) | Natural Moisture Content (%) |
|------------|------------|------------|------------------------------|
| B-1        | S-1        | 0.0 - 1.5  | 13.3                         |
|            | S-2        | 2.5 - 4.0  | 6.4                          |
| B-2        | S-1        | 0.0 - 1.5  | 18.3                         |
|            | S-2        | 2.5 - 4.0  | 11.8                         |
| B-3        | S-1        | 0.0 - 1.5  | 15                           |
|            | S-2        | 2.5 - 4.0  | 19.7                         |
| B-4        | S-1        | 0.0 - 1.5  | 15                           |
|            | S-2        | 2.5 - 4.0  | 16.5                         |
| B-5        | S-1        | 0.0 - 1.5  | 8.9                          |
|            | S-2        | 2.5 - 4.0  | 17                           |
| B-6        | S-1        | 0.0 - 1.5  | 15.9                         |
|            | S-2        | 2.5 - 4.0  | 18.8                         |
| W-1        | S-1        | 0.0 - 1.5  | 16.8                         |
|            | S-2        | 2.5 - 4.0  | 7.6                          |
| W-2        | S-1        | 0.0 - 1.5  | 19.1                         |
|            | S-2        | 2.5 - 4.0  | 8.7                          |
| W-3        | S-1        | 0.0 - 1.5  | 16.6                         |
|            | S-2        | 2.5 - 4.0  | 14.9                         |

**GEO-TECHNOLOGY ASSOCIATES, INC.**  
**Natural Moisture Content Summary**

**Anacostia**  
**February 18, 2004**  
**030817.V**

| <b>Boring No.</b>                       | <b>Sample No.</b> | <b>Depth (ft)</b> | <b>Natural Moisture Content (%)</b> |
|---|-------------------|-------------------|-------------------------------------|
| W-4                                     | S-1               | 0.0 - 1.5         | 14.3                                |
|   | S-2               | 2.5 - 4.0         | 15.4                                |
| W-5                                     | S-1               | 0.0 - 1.5         | 10.3                                |
|   | S-2               | 2.5 - 4.0         | 8                                   |
| W-10                                    | S-1               | 0.0 - 1.5         | 10.2                                |
|   | S-2               | 2.5 - 4.0         | 16.7                                |
| <b>Average Natural Moisture Content</b> |                   |                   | <b>14.0</b>                         |





|         |        |      |        |        |      |              |
|---------|--------|------|--------|--------|------|--------------|
| COBBLES | GRAVEL |      | SAND   |        |      | SILT OR CLAY |
|         | coarse | fine | coarse | medium | fine |              |

| Specimen Identification | Classification                           | LL | PL | PI | Cc | Cu |
|-------------------------|--|----|----|----|----|----|
| ● B-1 18.5              | Brown and Gray, Fat CLAY w/ Tr. Sand     | 97 | 19 | 78 |    |    |
| ☒ B-4 8.5               | Multicolor, Fat CLAY w/ some Sand        | 55 | 19 | 36 |    |    |
| ▲ B-6 13.5              | Brown, Gray, Silty SAND                  | NP | NP | NP |    |    |
| ★ W-1 18.5              | Brown, Black, Gray, Fat CLAY w/ tr. Sand | 55 | 16 | 39 |    |    |
| ⊙ W-3 1.0               | Reddish Brown, Sandy Lean CLAY           | 27 | 14 | 13 |    |    |

| Specimen Identification | Nat. Moist. | D60   | D30 | D10 | %Gravel | %Sand | %Silt & Clay |
|-------------------------|-------------|-------|-----|-----|---------|-------|--------------|
| ● B-1 18.5              | 26.6        |       |     |     | 0.0     | 6.4   | 93.6         |
| ☒ B-4 8.5               | 19.0        |       |     |     | 0.0     | 11.2  | 88.8         |
| ▲ B-6 13.5              | 16.1        | 0.185 |     |     | 0.0     | 68.4  | 31.6         |
| ★ W-1 18.5              | 19.5        |       |     |     | 0.0     | 6.9   | 93.1         |
| ⊙ W-3 1.0               | 15.8        |       |     |     | 0.7     | 35.1  | 64.3         |

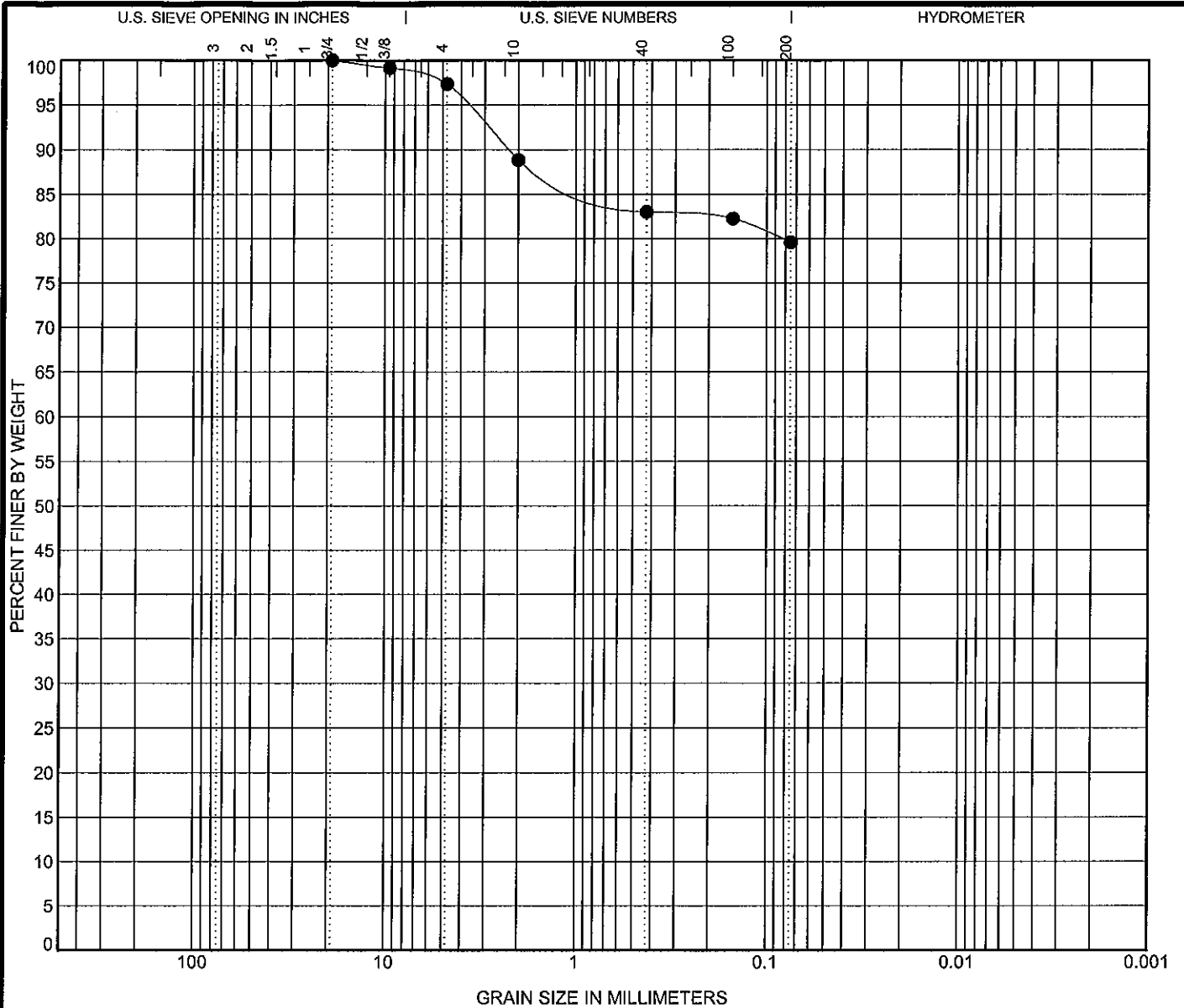
US GRAIN SIZE 030817L.GPJ US LAB.GDT 2/18/04



Geo-Technology Associates, Inc.  
 45064 Underwood Lane, Suite A  
 Sterling, Virginia  
 Telephone: 703-478-0055  
 Fax: 703-478-0137

### GRAIN SIZE DISTRIBUTION

Project: Anacostia  
 Location: Washington D.C.  
 Number: 030817.V



| COBBLES | GRAVEL |      | SAND   |        |      | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
|         | coarse | fine | coarse | medium | fine |              |

| Specimen Identification | Classification   | LL | PL | PI | Cc | Cu |
|-------------------------|--|----|----|----|----|----|
| ● W-4                   | 13.5 Yellowish Brown, Gray, Lean CLAY w/ Sand and tr. Gravel | 33 | 17 | 16 |    |    |

| Specimen Identification | Nat. Moist. | D60  | D30 | D10 | %Gravel | %Sand | %Silt & Clay |
|-------------------------|-------------|------|-----|-----|---------|-------|--------------|
| ● W-4                   | 13.5        | 13.4 |     |     | 2.7     | 17.8  | 79.6         |

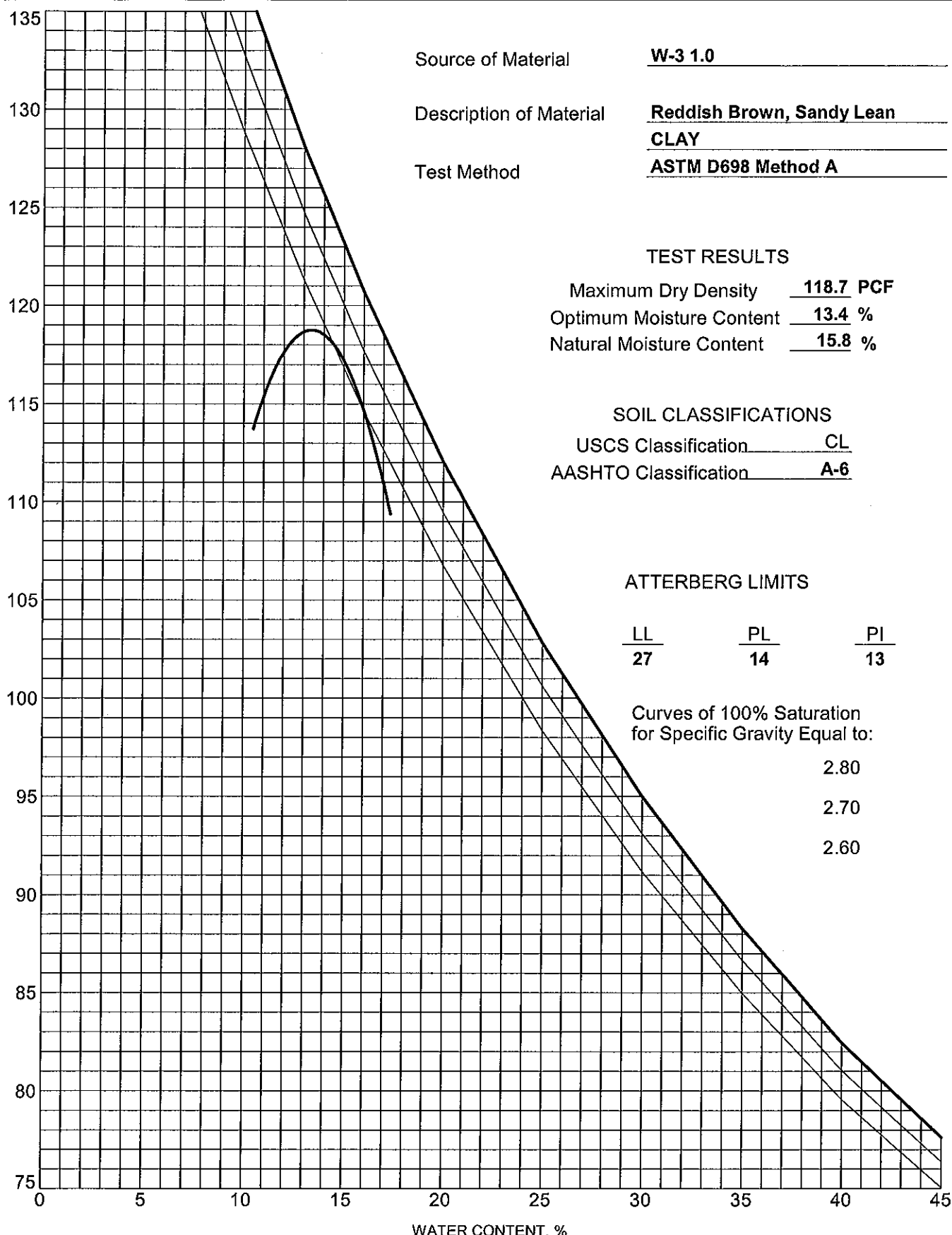


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**GRAIN SIZE DISTRIBUTION**  
 Project: Anacostia  
 Location: Washington D.C.  
 Number: 030817.V

US GRAIN SIZE 030817L.GPJ US LAB.GDT 2/18/04

DRY DENSITY, pcf



Source of Material W-3 1.0  
 Description of Material Reddish Brown, Sandy Lean CLAY  
 Test Method ASTM D698 Method A

TEST RESULTS

Maximum Dry Density 118.7 PCF  
 Optimum Moisture Content 13.4 %  
 Natural Moisture Content 15.8 %

SOIL CLASSIFICATIONS

USCS Classification CL  
 AASHTO Classification A-6

ATTERBERG LIMITS

|    |    |    |
|----|----|----|
| LL | PL | PI |
| 27 | 14 | 13 |

Curves of 100% Saturation for Specific Gravity Equal to:

2.80  
 2.70  
 2.60

US COMPACTION 030817L.GPJ US LAB.GDT 2/18/04

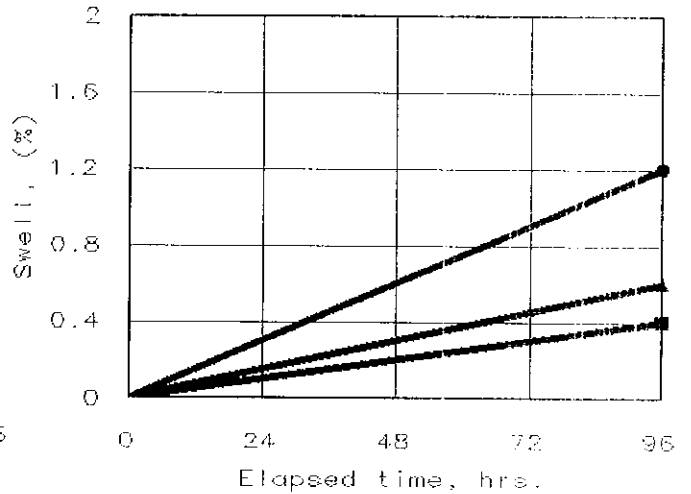
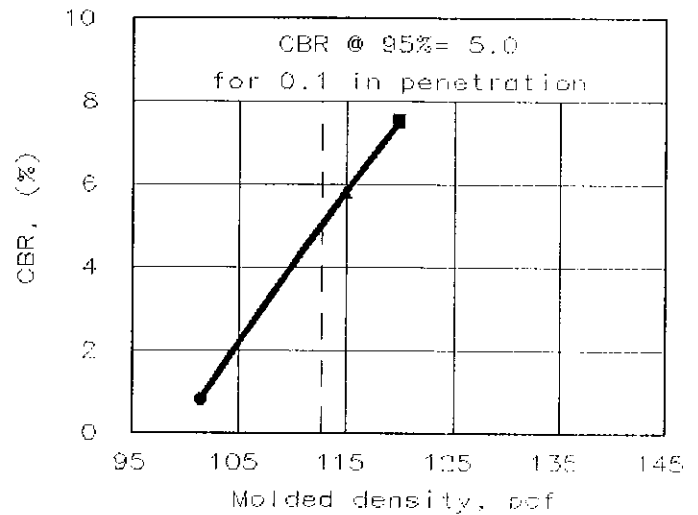
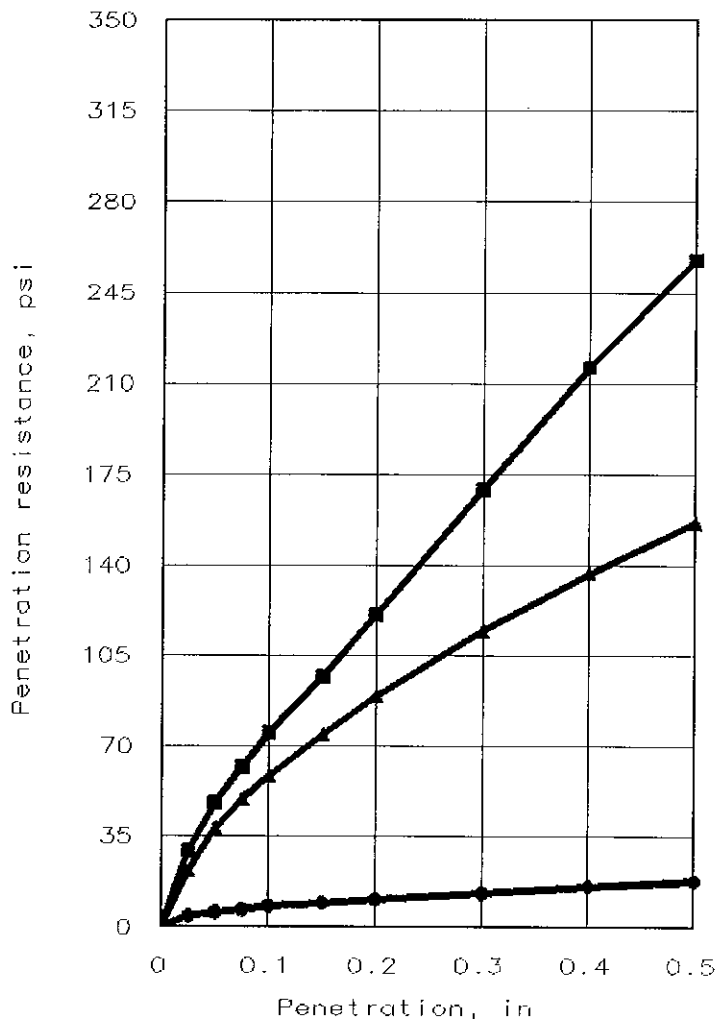


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MOISTURE-DENSITY RELATIONSHIP

Project: Anacostia  
 Location: Washington D.C.  
 Number: 030817.V

# BEARING RATIO TEST REPORT



|     | Molded |       |       | Soaked |       |       | CBR, (%) |        | Lin. Cor. | Pen. Sur. | Swell % |
|-----|--------|-------|-------|--------|-------|-------|----------|--------|-----------|-----------|---------|
|     | Dens.  | % max | moist | Dens.  | % max | moist | 0.1 in   | 0.2 in |           |           |         |
| 1 ● | 101.4  | 85.4  | 13.0% | 100.2  | 84.4  | 22.1% | 0.8      | 0.7    | 0         | 10        | 1.2     |
| 2 ▲ | 114.9  | 96.8  | 13.0% | 114.2  | 96.2  | 17.1% | 5.8      | 5.9    | 0         | 10        | 0.6     |
| 3 ■ | 119.9  | 101.0 | 13.0% | 119.4  | 100.6 | 14.9% | 7.5      | 8.0    | 0         | 10        | 0.4     |

| MATERIAL DESCRIPTION           | USCS | Max. dens. | Opt. w.c. | LL | PI |
|--------------------------------|------|------------|-----------|----|----|
| Reddish Brown, Sandy Lean CLAY | CL   | 118.7      | 13.4      | 27 | 13 |

|  |   |
|--|---|
| Project No: 030817<br>Project: Anacostia<br>Location: W-3<br><br>Date: Feb. 18, 2004 | Test Descr./Remarks:<br>ASTM D-598<br>ASTM D-1383 |
|--|---|