Report of Subsurface Exploration
and Geotechnical Engineering Evaluation
Proposed DC Consolidated Laboratory Facility

4^{th} & School Streets SW, Washington, DC

F&R Project No.: H68-134G

Prepared For:
HO+K
3223 Grace Street NW
Washington, DC 20007-3614

By:
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July 26, 2007

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July 26, 2007

HO+K
3223 Grace Street NW
Washington, DC 20007-3614

Attention: Mr. Tim O'Connell

Subject: Proposed DC Consolidated Laboratory Facility
4th & School Street SW, Washington, DC
F&R Record No. H68-134G

Dear Mr. O'Connell:

The purpose of this report is to present the results of the 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 dated December 20, 2006, as authorized by your office. The attached report presents our understanding of the project, reviews our exploration procedures, describes existing site and general subsurface conditions, and presents our evaluations, conclusions, and recommendations.

We have enjoyed working with you on this project, and we are prepared to assist you with the recommended quality assurance monitoring and 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.

DISTRICT OF COLUMBIA ★ OSCAR R. MERIDA ★ 904486 7/26/07 REGISTERED PROFESSIONAL ENGINEER

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1.0 INTRODUCTION

1.1 Project Information

Project information for this project was provided to us from various site plan drawings from HO+K as well as several conversations with your office. We understand that ReStl Consulting Engineers has been retained as the structural engineer for this project.

We understand that a new six story building is planned at the intersection of 4^{th} Street SW and School Street SW, in Washington, DC (see Site Vicinity Map, Drawing No. 1, Appendix A). Originally, the proposed building encompasses the entire city block from E Street SW to School Street SW and from 4^{th} Street SW to 6^{th} Street SW. However, since the onset of the exploration, the footprint of the building was reduced to approximately one-half of the block. The proposed building will have two levels of below grade parking. The current plans indicate a 300 feet by 180 feet building footprint on the eastern half of the property.

We understand that the proposed building will be used by the District of Columbia Police Department as the Criminal Laboratory and Forensic Building. No surface parking and/or driveways are expected within the project site.

At the time of this report only preliminary renditions of the facility were available. Preliminary structural loading and finished floor top of garage elevations were provided by ReStl and HO+K. For the purposes of analysis, we have utilized the provided maximum interior column load of 1800 kips and top of garage slab elevation of -3.0 feet. We request the opportunity to review the recommendations contained in this report once finished floor levels have been established and column loads have been determined.

1.2 Scope of Services

The purposes of our involvement in the project were to provide general descriptions of the subsurface soil conditions encountered at the locations explored, provide foundation design recommendations, and comment on geotechnical aspects of the proposed development. In order to accomplish the above 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) Obtained a DC drilling permit to conduct test borings on site.

3) Coordinated with the Miss Utility System of the District of Columbia for utility clearance.

4) Reviewed readily available geologic and subsurface information relative to the project site.

5) Executed a subsurface exploration consisting of sixteen standard penetration test borings each drilled to a depth of seventy-five feet (no rock coring was included).

6) Performed field Pressuremeter testing within three selected test borings.

7) Provided a Seismic Site Class Definition per the 2003 International Building Code (IBC) based on interpretation of the standard penetration test data.

8) Performed soil classification testing on selected split-spoon and undisturbed Shelby tube samples.

9) Evaluated the findings of the test borings and laboratory testing relative to a suitable foundation system for the proposed building and provided appropriate design criteria.

10) Prepared this written report summarizing our work on the project, providing descriptions of the subsurface conditions encountered, providing foundation design criteria for the proposed building, and discussing geotechnical related aspects of the proposed construction.

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

2.0 SUBSURFACE EXPLORATION PROCEDURES

The subsurface exploration program (consisting of sixteen test borings designated B-1 through B-16) was performed on April 10 through May 9, 2007, at the approximate locations shown on the attached Boring Location Plan (Drawing No. 2, Appendix A). F&R personnel marked the boring locations in the field by taping and/or otherwise estimating distances. Ground surface elevations were interpolated to the nearest foot using topographic information contained on the Preliminary Site Plan, Drawing No. 1 dated March 30, 2007, provided by HO+K. In consideration of the methods used in their determination, the boring locations shown on the attached Boring Location Plan as well as the elevations shown on the attached boring logs should be considered approximate.

The test borings were performed in accordance with generally accepted drilling practice. Test borings were advanced using a truck-mounted Mobile B-57 rotary drill rig utilizing a manual safety hammer. Hollow-stem augers were advanced to pre-selected depths, the center plug was

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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. 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.

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 soil cuttings. A one inch slotted PVC pipe was installed in test borings B-2, B-5, B-11, and B-16 to record groundwater levels after completion of drilling. Groundwater levels were allowed to stabilize within these test borings prior to removal of the pipe and backfilling of the boreholes.

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 (ASTM D 2487). Representative soil samples were subjected to moisture content, sieve analysis, and Atterberg Limits testing in order to substantiate the visual classifications and determine the soil engineering properties. 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.

In addition to use of N-Value correlations available from Standard Penetration Testing conducted during the test boring investigation, field pressuremeter tests were conducted to aid in evaluating deformation characteristics of the soils. This test is performed by inserting a cylindrical probe into the borehole. The probe is inflated by pressure to form a contact against the boring sidewalls. As the pressure is increased in subsequent steps, volume changes are recorded. Four (4) pressuremeter test borings were performed on May 1 through May 4, 2007, within off-set test boring B-1A, B-3A, B-11A, and B-16A as shown on the Boring Location Plan in Appendix A.

The basic result is a pressuremeter curve, as given by the pressuremeter test results in Appendix C. The pressuremeter curve indicates variation of pressure applied to expand the cylindrical probe, plotted as the *Pressure, kgf/cm^2 (kilograms force per centimeter^2)* against *Volume,cc (cubic centimeters)*. Typically, after an initial portion of the curve that represents adjustment of the probe to the borehole sidewalls, there is a straight-line portion representing elastic deformation of the subsoil. The slope of the straight-line portion is the pressuremeter modulus, which is indicated on the Pressuremeter Test Summary Sheet under the column heading *Modulus* *(tsf)*. After adjustment for anisotropy, the pressuremeter modulus values obtained in this testing are used for the deformation modulus listed on the Summary Sheet under the column heading *E (vert) tsf.*

3.0 SITE AND SUBSURFACE CONDITIONS

3.1 Site Description

The project site currently contains a single story fire station building located on the west half of the property and a two story police station building and parking deck on the eastern half of the property. An asphalt alley currently bisects the two halves of the property and provides surface parking for the existing fire station. This alley connects to E Street SW to the south while the northern portion of the alley is enclosed by a chain link fence.

The existing fire station is a single story brick building that is surrounded by landscaped grass and a tree area. For the fire engines, a concrete driveway accesses 6^{th} Street SW. The fire station has a finished floor elevation of 25.88 feet.

The existing police station is a two-story brick building with frontage located along 4^{th} Street SW with a garage and mezzanine office space located immediately west of the main building. The two story rectangular garage structure, having approximate dimensions of 152 feet by 189 feet, consists of an at-grade parking level and an elevated mezzanine office level. The parking area is surrounded by a four to five foot privacy wall. Access to the parking area is provided via School Street and the existing alley located at the center of the property. An elevated walkway connects the main police station to the additional office space. The existing police station has a finished floor elevation of 18.97 feet.

In general, the site gently slopes from elevation 24.0 feet at 6^{th} Street SW east to elevation 17.0 at 4^{th} Street, with the existing structures founded on slightly raised building pads. No basement levels were observed within the existing buildings, however, some storm water facilities and lines were observed within the existing parking area and alleyway.

3.2 Regional Geology

Available geologic references report that the site is underlain by sedimentary alluvial deposits over the Potomac Formation. The sedimentary alluvial deposits are comprised of gravel, sand, silt and clay. These deposits are late Pliocene in age and are described gray brown, yellow, and pale orange, crudely to well-bedded. These deposits are mainly in Washington, DC under surfaces typically 35 feet above sea level. A thickness of 40 to 80 feet deep is typical for this formation.

The Potomac Formation underlies the Pliocene age sands and gravels in this area. The Potomac Formation is lower Cretaceous in age and is described as pebbly, poorly sorted quartzo-feldspathic sand interbedded with sandy clay and silt; minor organic rich clay and silt. The Potomac Group soils, which are from the oldest sedimentary deposits in the Washington, DC area, are overconsolidated at least about 10 tsf in excess of the existing overburden pressure. These soils are formed by alluvial deposits and comprise the coastal plain.

3.3 Subsurface Conditions

3.3.1 General

The subsurface conditions discussed in the following paragraphs and those shown on the attached boring logs represent an estimate of the subsurface conditions based on interpretation of the boring data using normally accepted geotechnical engineering judgments. The transitions between different soil strata are usually less distinct than those shown on the boring logs. Sometimes the relatively small sample obtained in the field is insufficient to definitely describe the origin of the subsurface material. In these cases, we qualify our origin descriptions with "possible" before the word fill. 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 borings are shown on the attached boring logs in Appendix B.

Below the existing ground surface, the borings generally encountered surface material including surface "organic" soils, asphalt, fill material, and coastal plain soils. These materials are generally discussed in the following paragraphs. Subsurface Profiles, Drawing No. 3, are included in Appendix A of this report.

3.3.2 Surface Material

Approximately eight inches of concrete were encountered in test borings conducted within the paved areas on site. Approximately four to eight inches of surficial "organic" material was recorded within the test borings conducted on landscaped areas on site. Actual surficial soil and asphalt depths may vary in unexplored areas of the site.

Surficial "organic" soil is typically a dark-colored soil material containing roots, fibrous mater, and/or organic components, and is generally unsuitable for engineering purposes. F&R has not performed any laboratory testing to determine the organic content or other horticultural properties of the observed surficial "organic" soil material. Therefore, the term surficial "organic" soil is not intended to indicate suitability for landscaping and/or other purposes. The surficial "organic" soil depths provided in this report are based on driller observations and should be considered approximate. We note that the observation and measurement of surficial "organic" soil depths is subjective. Actual surficial "organic" soil depths should be expected to vary.

3.3.3 Stratum A: Fill Material

Fill material was encountered below surface organic soils and concrete to a depth ranging from about 2.5 to 5.5 feet in the test borings. Sampled fill material typically contained sand, sandy silt, and silty sand with varying amounts of brick fragments, timber fragments and other organics as well as gravel. Standard Penetration Test (SPT) resistances ranging from 6 to 40 blows per foot (bpf) were recorded in this stratum indicating a loose to dense state.

3.3.4 Stratum B: Coastal Plain – Pliocene Deposits Upper Soils

Pliocene age coastal plain alluvial deposits were encountered below the fill materials on site to depths ranging from 28.0 to 42.5 feet (elevation -11.0 to -18.0 feet). These deposits are generally more granular than the Pliocene deposits comprising Stratum C defined below. These soils are described as light brown to tan brown, sandy LEAN CLAY (CL), gravelly SAND (SP), sandy GRAVEL (GP), and sandy SILT (ML). These soils were placed by alluvial deposition and form the coastal plain as described in the geology section of this report. SPT resistances ranging from 14 bpf to 50 blows per 2 inches of sampler penetration were recorded in this stratum indicating a medium dense to very dense state.

3.3.5 Stratum C: Coastal Plain – Pliocene Deposits Lower Soils

Below the coarser grained soils as described above, softer and finer grained soils also comprising the Pliocene age deposits were encountered. This stratum generally consists of brown to gray, FAT CLAY (CH), and ELASTIC SILT (MH). Below this stratum of fine grained soils, a layer of gravelly SAND (SP) and sandy GRAVEL (GP) was encountered above the deeper Potomac deposits. SPT resistances ranging from 6 to 24 bpf were recorded in this stratum indicating a soft to very stiff consistency.

3.3.6 Stratum D: Coastal Plain – Potomac Formation

The Potomac Formation was encountered below Stratum C at a depth ranging from 47.5 to 53 feet deep (elevation -23.5 to 34.0 feet) to the completion of all borings at 75 feet. These materials are described as clayey SAND (SC), sandy LEAN CLAY (CL), and SAND (SP). SPT resistances ranging from 20 to 81 were recorded in this stratum indicating a medium dense to very dense state or a stiff to hard consistency.

3.3.7 Subsurface Water

Groundwater was recorded upon completion of the borings at depths ranging from 27.0 to 39.7 feet. A one inch ID PVC pipe was installed in test borings B-2, B-5, B-11, and B-16 to record ground water levels after completion of drilling. A summary of water observation readings conducted in these temporary wells is given in the table below. Fluctuations in subsurface water levels and soil moisture can be anticipated with changes in precipitation, run-off, and season.

Boring No.	Elevation of Boring (feet)	Elevation of Ground Water After Completion of Drilling (feet)				
		24 hr	48 hr	72 hr	96 hr	120 hr*
B-2	24.0	-7.8	-7.5	-7.5	-7.5	-7.5
B-5	20.0	-9.2	-8.5	-8.5	-8.5	-8.5
B-11	25.0	-7.3	-1.3	-1.2	-1.2	-1.2
B-16	17.0	-9.4	-9.3	-8.7	-8.7	-8.7

*Temporary one inch slotted PVC pipe removed upon completion of final reading.

3.4 Field Pressuremeter Testing, Design Parameters

Results of field pressuremeter tests conducted for the DC Crime Labs are as follows:

Test Location Boring No./Depth	Estimated SPT N-Value	Pressuremeter Modulus (tsf)	Vertical Deformation Modulus, E_S (tsf)
B-1A/29.5 ft	67 bpf	65	98
B-1A/39.5 ft	14 bpf	40	60
B-3A/44.5 ft	17 bpf	25	38
B-11A/40.0 ft	13 bpf	18	27
B-11A/44.5 ft	14 bpf	18	27
B-11A/64.0 ft	48 bpf	50	75
B-16A/34.5 ft	8 bpf	105	105
B-16A/39.5 ft	13 bpf	70	106
B-16A/44.5 ft	10 bpf	40	60

Pressuremeter data and curves are included in Appendix C of this Report.

3.5 Laboratory Testing Program

Selected split spoon samples obtained during the field investigation were tested in general accordance with applicable American Society for Testing and Materials (ASTM) test methods for moisture content (ASTM D 2216), Atterberg limits (ASTM D 4318), and mechanical sieve analysis (ASTM D 422). The results of the laboratory tests are summarized in the Laboratory Test Summary Sheet included in Appendix D of this report.

4.0 GEOTECHNICAL RECOMMENDATIONS

4.1 General

The following evaluations and recommendations are based on our observations at the site, interpretation of the field and laboratory 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 and settlement using engineering judgment and established correlations. Subsurface conditions in unexplored locations may vary from those encountered. If structure locations, loadings, or elevations are changed, we request that we be advised so that we may re-evaluate our 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 pressure 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 Foundation Design

The proposed building may be supported on a shallow foundation system bearing on verified, granular coastal plain soils comprising Stratum B. Based on the preliminary structural loads and the subsurface conditions encountered in our test borings, we recommend that foundations be designed for a maximum allowable bearing pressure of 6,000 pounds per square foot (psf) for footings bearing on approved subgrades.

To reduce the possibility of localized shear failures, spread and strip footings should be a minimum of 3 feet and 2 feet wide, respectively. We recommend that exterior footings be constructed at least 2.5 feet below adjacent grades in order to bear below normal frost depth.

4.3 Estimated Settlements

Our settlement analyses was performed on the basis of assumed structural loading and grading information as discussed in the project information section of this report. Actual settlements experienced by the structure and the time required for these soils to settle will be influenced by undetected variations in subsurface conditions, actual structural loads, and foundation construction.

Based on the boring data and provided load information, we estimate total settlements due to the proposed building loads of less than one inch, with differential settlement of half the estimated total settlement. The magnitude of differential settlements will be influenced by the variation in excavation requirements across the building footprint, the distribution of loads, and the variability of underlying soils.

4.4 Garage Floor Slabs

Garage floor slabs may be designed as a slab-on-grade supported by undisturbed coastal plain soils, or newly placed controlled structural fill. We recommend that ground floor slabs have a minimum thickness of four inches and be reinforced with welded wire fabric. A granular drainage blanket, consisting of 6 inches of crushed or washed gravel should be placed beneath the garage slab for lateral drainage.

Proper jointing of the ground floor slab is also essential to minimize cracking. ACI suggests that unreinforced, plain concrete slabs may be jointed at spacings of 24 to 36 times the slab thickness, up to a maximum spacing of 18 feet. Floor slab construction should incorporate isolation joints along bearing walls and around column locations to allow minor movements to occur without damage. Utility or other construction excavations in the prepared floor subgrade should be backfilled with controlled fill placed in accordance with the recommendations of this report to provide uniform floor support.

4.5 Groundwater and Subdrainage

For design purposes, we recommend using an estimated long term groundwater level of El -7.0 based on the test boring exploration. Groundwater measurement recorded at -1.0 in test boring B-11 appears to be a perched condition. The lowest finished floor elevation for the proposed building is at approximate elevation -3.0 feet. Consideration should be given to providing vertical waterproofing for perched groundwater. The vertical waterproofing should extend along all below grade walls. Temporary perched water should be expected at higher levels, at least up to about El -1.0. Water seepage, primarily from the anticipated higher perched water levels, are long term design considerations for the proposed below grade garage levels. We recommend using a subdrainage system to handle water against the below grade foundation walls and below the floor slab.

Basically, the recommended subdrainage system consists of a prefabricated drainage element along the below grade foundation walls, a perimeter collector below the garage slab, outlet piping extending to sump collector(s), and pumping for final disposal of collected water. Sheet No. 1, Subdrainage Recommendations, located in Appendix E of the report depicts the recommended typical section at an exterior wall. In addition to the perimeter collector line shown thereon, intermediate interior subdrainage lines should be included in the final layout of piping. We recommend using a maximum center-to-center spacing of about 40 ft for the final layout.

Recommended typical sections and material specifications are included on Sheet No. 1. The recommended layout of piping, consisting of a single perimeter collector and intermediate interior lines below the floor slab, and full coverage of drainage board for below grade walls, is based on the preliminary proposed building footprint and lower floor level data available for this reporting. The design is also based on estimated groundwater conditions indicated by the test boring data. Adjustments may be necessary or advisable based on additional groundwater data obtained during the construction and final layout of the proposed building and foundations.

The recommended layout considers gravity flow with final outlet to sumps for pumping to a conveniently available storm sewer system. A minimum 6-inch layer of crushed stone or washed gravel is recommended below the garage slab as part of the system. This pervious layer and recommended layout of piping described herein should be adequate to outlet the capacity of water collected by the subdrainage system recommended to be placed against the foundation walls and also to handle water collected below the floor slab.

We anticipate groundwater flow to the subdrainage piping recommended herein will be primarily through moderately pervious natural sand and silt soils. There may also be some relatively limited site areas where there may be more pervious gravelly soil layers. The layout and pipe sizing recommended is based on an estimated flow quantity of about 50 gallons per minute for the entire system. Field observations during construction should include measurement of actual flow quantities. Some adjustment of the layout and size of piping may be necessary based on this additional field test data. Final selection of pump capacities should be based on field measurements of flow quantities.

A final plan should be prepared to indicate the layout of piping for collection and outletting of water for the subdrainage system recommended herein. The plan should indicate locations of cleanouts, invert grades, and means of final disposal of collected groundwater. Two sources of power should be used to operate a pumping system, and standby pumping facilities should be planned. The typical section and recommended layout described herein should not be considered a final plan for use in the construction.

4.6 Lateral Earth Pressures

The following information is provided to aid in analysis of soil loads on the proposed below grade walls. It is our understanding that approximately 20 to 25 feet of soil may be retained by the exterior wall. Earth pressures on walls below grade are influenced by structural design of the walls, conditions of wall restraint, methods of construction and/or compaction, and the strength of the materials being restrained. The most common conditions assumed for earth retaining wall design are the active and at-rest conditions. Active conditions apply to relatively flexible earth retention structures, such as freestanding walls, where some movement and rotation may occur to mobilize soil shear strength. Walls that are rigidly restrained, such as basement, pit, and tunnel walls, require design using at-rest earth pressures.

A third condition, the passive state, represents the maximum possible pressure when a structure is pushed against the soil, and is used in wall foundation design to help resist active or at-rest pressures. Because significant wall movements are required to develop the passive pressure, the total calculated passive pressure should be reduced by one-half to two-thirds for design purposes.

Based on the subsurface exploration, we envision that the upper soils underlying the project site generally consist of gravelly SAND (SP) and sandy SILT (ML). We envision that a solider pile and lagging system will be used to support the excavation, and granular stone backfill will be used between the natural soil and the wall face once the support of excavation is removed. For the onsite gravelly SAND (SP) and sandy SILT (ML) soils, we recommend the following lateral earth pressure parameters be used in design of below-grade walls, at-rest earth pressure applies:

Earth Pressure Conditions	Coefficient	Recommended Equivalent Fluid Pressure (psf/ft)
Active (K_a)	0.27	35
At-Rest (K_o)	0.43	50
Passive (K_p)	3.69	300

Sheet No. 2, Lateral Earth Pressures, located in Appendix E of the report provides graphical recommended equivalent fluid pressure values and corresponding relations for use in calculating lateral pressures. Active and at-rest cases are included in accordance with the explanation of symbols and units given by Note 1 on Sheet No.1. At-rest pressures should be used for design of the below grade walls on site.

Using the enclosed generalized diagram for this case, the lateral earth pressure in pounds per square foot (psf) at depth h(ft) is the sum of $P_1 + P_2$ as shown. Specific coefficients and unit weight values are given by Note 2 of Sheet No. 1. A soil unit weight of 125 pounds per cubic foot should be used for design calculations.

Our recommendations assume that the ground surface above the wall is level. The recommended equivalent fluid pressures assume that constantly functioning drainage systems are installed between walls and soil backfill to prevent the buildup of hydrostatic pressures and lateral stresses in excess of those stated. If a functioning drainage system is not installed, then lateral earth pressures should be determined using the buoyant weight of the soil. Hydrostatic pressures calculated with the unit weight of water (62.4 pcf) should be added to these earth pressures to obtain the total stresses for design.

Heavy equipment should not operate within 5 feet of below-grade walls to prevent lateral pressures in excess of those cited. If footings or other surcharge loads are located a short distance outside below grade walls, they may also exert appreciable additional lateral pressures. Surcharge loads should be evaluated using the appropriate active or at-rest pressure coefficients provided above. The effect of surcharge loads should be added to the recommended earth pressures to determine total lateral stresses.

Sheet No. 3, SOE Earth Pressures, at the end of this section of the report provides recommended equivalent fluid pressure values and corresponding relations for use in calculating earth pressures for design of the Support of Excavation (SOE) system. We assume that a flexible wall excavation system will be utilized during construction of this building. A flexible wall system will not allow full mobilization of soil strength as occurs in the active condition. For design of the SOE system, we recommend earth pressures as given on Sheet No. 3. These pressures are between active and at rest earth pressure cases. Lateral hydrostatic (water) pressures are not included in the diagram. Full drainage behind the SOE system will need to be included in the design.

4.7 Seismic Site Classification

The following Seismic Site Class Definition was established per Section 1615.1.1 of the 2003 International Building Code (IBC). Our scope of services did not include a seismic conditions survey to determine site-specific shear wave velocity information. IBC 2003 provides a methodology for interpretation of Standard Penetration Test resistance values (N-values) to determine a Site Class Definition. Based on the SPT soil testing, we recommend that a Seismic Site Class D be used in accordance with IBC 2000.

5.0 CONSTRUCTION RECOMMENDATIONS

5.1 Site Preparation

Before proceeding with construction, any surficial soils and other deleterious non-soil materials should be stripped or removed from the proposed construction area. All existing building foundations should be overexcavated from the footprint of the new building. 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 new fill, pavements, floor slabs, and foundations should be carefully evaluated by a geotechnical engineer. At that time, the engineer may require verification of the subgrade with excavation equipment on site. Verification 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.

5.2 Foundation Construction

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. 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. 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. Water should not be allowed to pond in any excavation.

5.3 Controlled Structural Fill

Controlled structural fill will be required to backfill over excavations on site. Based on the boring data, controlled structural fill may be constructed using the on-site soils or an off-site borrow source having a classification of GM, GP, SW, SP, SM, SC, CL, and ML as defined by the Unified Soil Classification System. Fill soils should have a maximum liquid limit of 40 and plasticity less than 20. On site soils should be suitable for use as structural fill. Soils that classify as CH and MH soils at the site are not acceptable for area fill placements. Other materials may be suitable for use as controlled structural fill material and should be individually evaluated by the geotechnical engineer. 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 100 pounds per cubic feet for fill materials.

Fill materials should be placed in horizontal lifts with maximum height of 8 inches loose. New fill should be adequately keyed into stripped and scarified subgrade soils. During fill operations, positive surface drainage should be maintained to prevent the accumulation of water. We recommend that structural fill be compacted to at least 98 percent of the standard Proctor maximum dry density. 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. 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 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 2,500 square feet (approximately 50 feet square) of fill area, with a minimum of two tests per lift. In confined areas, a greater frequency may be required.

5.4 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 expect a design ground water level elevation of -7.0 feet. This is slightly below the lowest excavation level on site. Groundwater should be maintained a minimum of 2.0 feet below the foundation subgrade levels during construction. Footing concrete should be placed as soon as possible after final excavations in order to limit disturbance of the soil subgrade. A mud mat consisting of lean concrete may be used to protect the subgrade.

5.5 Dewatering

Groundwater should be maintained at least about 2.0 ft below the final footing subgrades for the final subgrade observations and during placement of the footing concrete. The use of localized sumps and pumping should be adequate for temporary construction dewatering within the lowest garage level. This dewatering system may consist of a series of French drains and a gravel drainage system. Dewatering of the site should be limited to the excavation. Deep zones of dewatering may induce settlements of adjacent roadways and buildings and should be avoided.

6.0 CONTINUATION OF SERVICES

We recommend that we be given the opportunity to review the foundation 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 services.

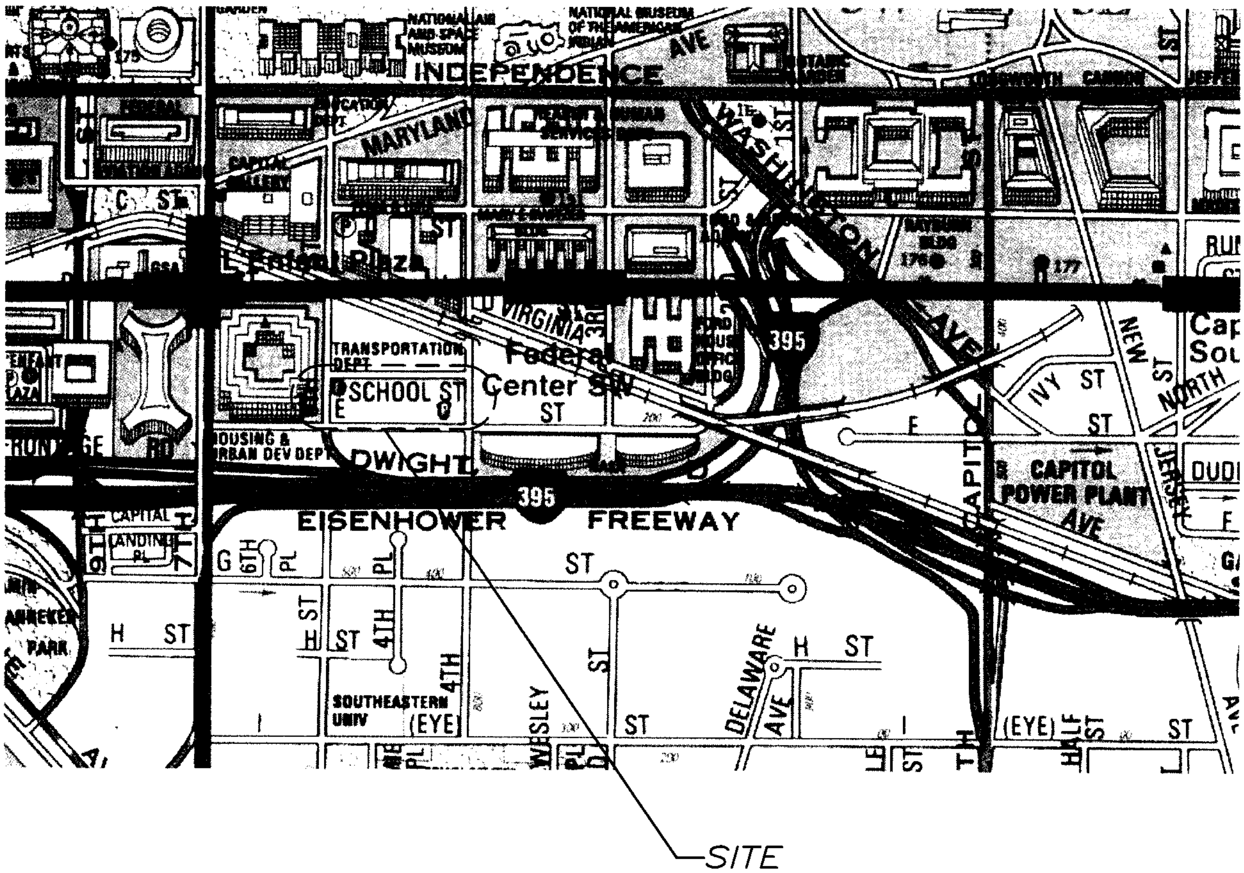
7.0 LIMITATIONS

This report has been prepared for the exclusive use of HO+K or their agent, for specific application to the proposed DC Crime Labs at 4th & School Streets SW, in Washington, DC, in accordance with generally accepted soil and foundation engineering practices. No other warranty, express or implied, is made. Our conclusions and recommendations are based on design information furnished to us; the data obtained from the previously described subsurface exploration program, and generally accepted geotechnical engineering practice. The 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. Should such variations become apparent during construction, it will be necessary to re-evaluate our conclusions and recommendations based upon on-site observations of the conditions.

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 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 15 pages of text and the attached appendices.

APPENDIX A



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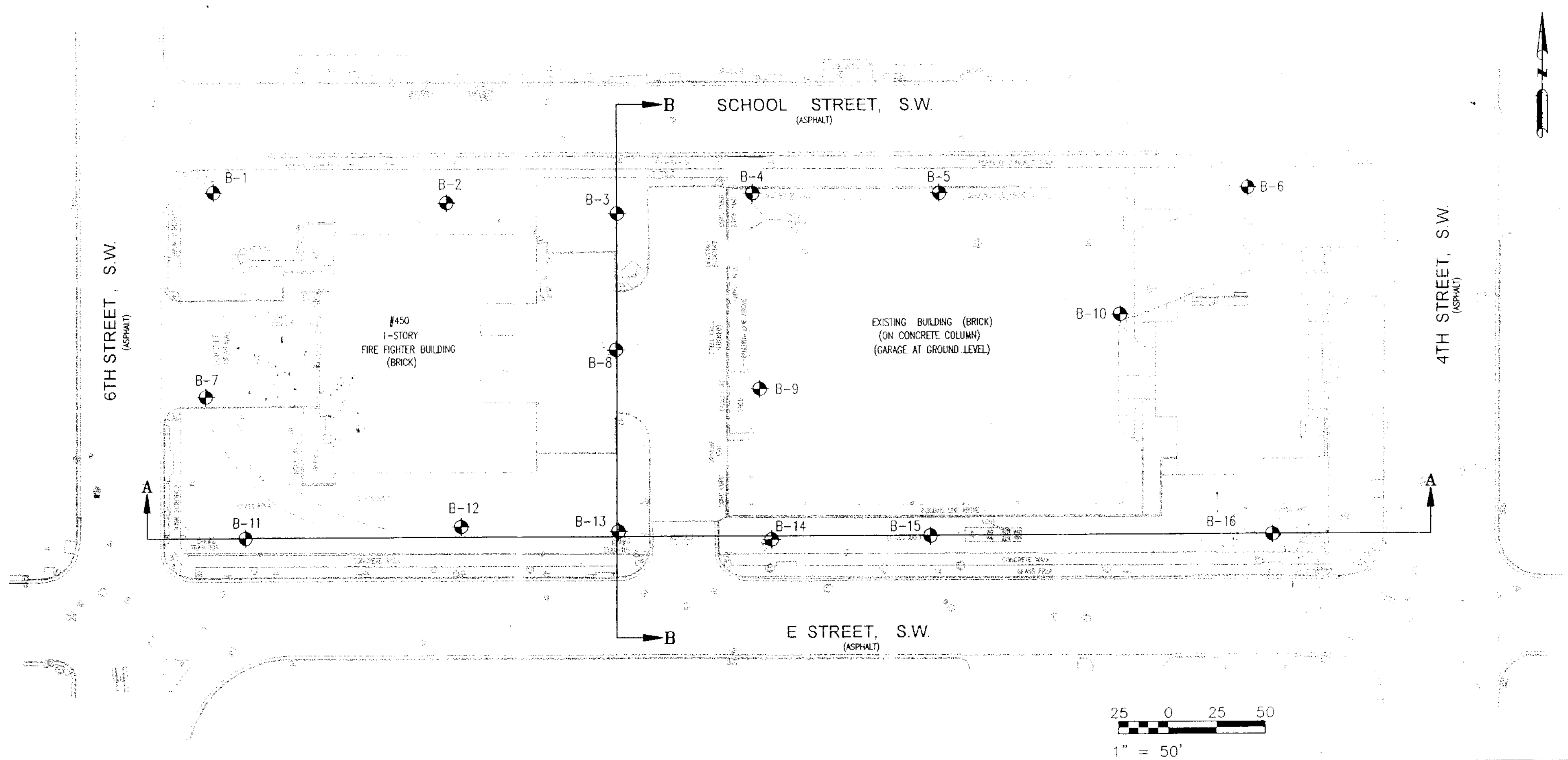
22923 Quicksilver Drive
Sterling, VA 20166
Ph: (703) 996-0123 Fax: (703) 996-0124

SITE LOCATION PLAN

PROJECT: CONSOLIDATED LABORATORY FACILITY
LOCATION: SW WASHINGTON, D.C.

SCALE:	DATE:	DRAWN BY:
NTS	5-31-07	GDH
CLIENT: H O + K DULLES, VIRGINIA	F&R PROJECT No. H68-134G	DRAWING NO. 1



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22923 Quicksilver Drive
Sterling, Va 20166
Ph: (703)996-0123 Fax: (703) 996-0124

BORING LOCATION PLAN

PROJECT: DC CONSOLIDATED LAB FACILITY			
LOCATION: 4th & SCHOOL STREETS, SW WASHINGTON, DC			
SCALE: 1" = 50'	DATE: 5-9-07	DRAWN BY: GDH	
CLIENT: HO+K WASHINGTON, DC	F&R PROJECT NO. H68-134G	DRAWING NO. 2 OF 3	REV. 0

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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	Soil Classification: 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]	$Cu \geq 4$ and $1 \leq Cc \leq 3$[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]	$Cu \geq 6$ and $1 \leq Cc \leq 3$[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

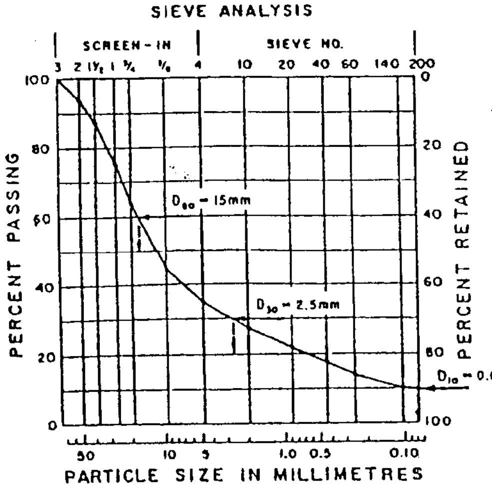
[A]Based on the material passing the 3-in. (75-mm) sieve
[B]If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
[C]Gravels with 5 to 12% fines require dual symbols:
GW-GM well-graded gravel with silt
GW-GC well-graded gravel with clay
GP-GM poorly 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] $Cu = D_{60}/D_{10}$, $Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$

[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.

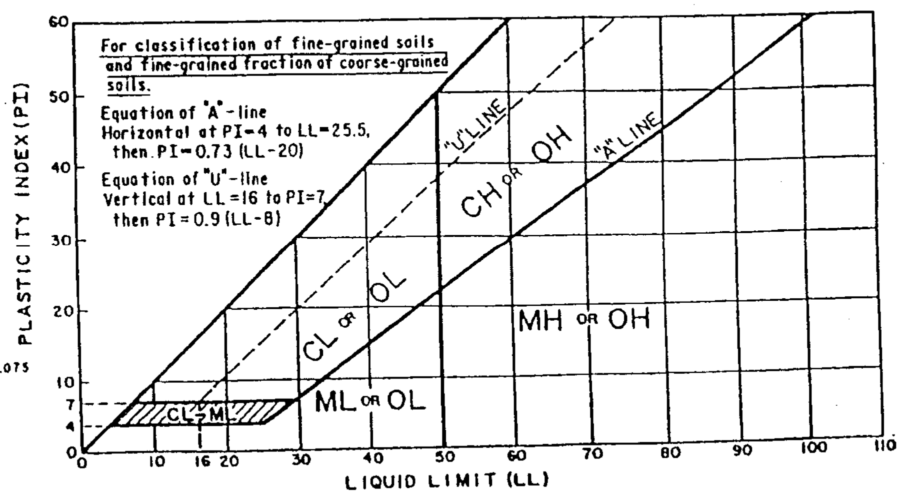
[J]If Atterberg limits plot in hatched area, soil is a CL-ML, silty clay.
[K]If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.
[L]If soil contains ≥ 30% plus No. 200, predominantly sand, add "sandy" to group name.
[M]If soil contains ≥ 30% plus No. 200, 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



PARTICLE SIZE IN MILLIMETRES

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



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.

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS: GRAPH	SYMBOLS: LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		(LITTLE OR NO FINES)		GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
		(APPRECIABLE AMOUNT OF FINES)		GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	SAND AND SANDY SOILS	CLEAN SANDS		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		(LITTLE OR NO FINES)		SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	SANDS WITH FINES		SM	SILTY SANDS, SAND - SILT MIXTURES
		(APPRECIABLE AMOUNT OF FINES)		SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

BORING LOG

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Report No.: **H68-134G** Date: **July 2007**

Client: **HO+K**	
Project: **DC Consolidated Laboratory Facility, 4th and School Streets, SW DC**	
Boring No.: **B-1** **(1 of 1)** Total Depth **75.0'** Elev: **24.0 ± ****	Location: **See Boring Location Plan**
Type of Boring: **2.25" HSA** Started: **4/10/07** Completed: **4/11/07**	Driller: **AJ Wilhelm**

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	* Sample Blows	Sample Depth (feet)	N Value (blows/ft)	REMARKS
23.5	0.5	6 Inches surficial "organic" soil	3-15-25	0.0 1.5	40	
21.5	2.5	**STRATUM A - FILL:** Reddish-brown, dry, dense, poorly-graded medium SAND with brick fragments	4-6-11	3.5 5.0	17	
18.5	5.5	**STRATUM B - COASTAL PLAIN:** Brown, moist, very stiff, fine sandy LEAN CLAY (CL) with trace gravel and root fragments	7-8-10	6.0 7.5	18	
			7-8-7	8.5 10.0	15	
12.0	12.0	Brown, moist, medium-dense, poorly-graded fine SAND (SP) with trace gravel				
		Tannish-brown, moist, very dense, poorly-graded gravely fine to medium SAND (SP)	30-50/6"	13.5	100+	
			35-32-30	18.5 20.0	62	
			15-31-36	23.5 25.0	67	
			37-37-39	28.5 30.0	76	Pressuremeter Test conducted at 29.5 feet in offset test boring B-1A
-8.0	32.0	Tannish-brown, wet, very dense, poorly-graded sandy GRAVEL (GP)	33-50/5"	33.5	100+	
-13.0	37.0	**STRATUM C** Brown, wet, stiff medium-dense, clayey fine to medium SAND (SC)	5-5-9	38.5 40.0	14	Water encountered at 38.0 feet during drilling
			17-7-17	43.5 45.0	24	Pressuremeter Test conducted at 39.5 feet in offset test boring B-1A
-22.5	46.5	Brown, wet, medium-dense, poorly-graded gravely medium to coarse SAND (SP)	2-5-9	48.5 50.0	14	
-28.0	52.0	**STRATUM D - POTOMAC FORMATION:** Tannish-brown, wet, dense, poorly-graded GRAVEL (GP) with medium sand and clay	6-11-27	53.5 55.0	38	
-33.0	57.0	Brownish-gray, moist, dense, clayey medium SAND (SC)	13-25-25	58.5 60.0	50	
-38.0	62.0	Blue-green to black, moist, hard, ELASTIC SILT (MH) with fine sand	20-28-33	63.5 65.0	61	
			19-30-39	68.5 70.0	69	
-51.0	75.0		18-22-36	73.5 75.0	58	
		Boring terminated at 75 feet Note: Standard Penetration Tests (SPT) conducted using a safety hammer **Ground surface elevation data estimated to the nearest 1.0 foot from information contained in Preliminary Drawing No. 1 dated March 30, 2007				Water at 27.0 feet upon completion Boring caved at 28.0 feet upon completion

*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 BORING LOGS.GPJ F&R.GDT 7/25/07

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Report No.: **H68-134G** Date: **July 2007**

Client: **HO+K**

Project: **DC Consolidated Laboratory Facility, 4th and School Streets, SW DC**

Boring No.: **B-2** **(1 of 1)** Total Depth **75.0'** Elev: **24.0 ± **** Location: **See Boring Location Plan**

Type of Boring: **2.25" HSA** Started: **4/11/07** Completed: **4/12/07** Driller: **AJ Wilhelm**

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	* Sample Blows	Sample Depth (feet)	N Value (blows/ft)	REMARKS
23.5	0.5	6 Inches surficial "organic" soil	5-7-11	0.0 1.5	18	
21.5	2.5	**STRATUM A - FILL:** Reddish-brown, moist, medium-dense, fine silty SAND with brick fragments, root fragments, organics, and gravel	7-8-18	3.5 5.0	26	
17.5	6.5		12-50/6"	6.0	100+	
14.0	10.0	**STRATUM B - COASTAL PLAIN:** Brown, moist, very stiff, sandy LEAN CLAY (CL) with trace gravel	20-30-35	8.5 10.0	65	
		Brown, dry, very dense, silty fine SAND (SM) with gravel and trace root fragments				
		Light brown, dry to wet, dense to very dense, poorly-graded SAND (SP-SM) with silt and gravel	23-33-35	13.5 15.0	68	
			26-37-37	18.5 20.0	74	
			29-31-31	23.5 25.0	62	
			40-28-21	28.5 30.0	49	
			40-5/5"	33.5	100+	Water at 33.3 feet 24 hours after completion
-13.5	37.5	Brown, wet, medium-dense, poorly-graded medium to coarse SAND (SP) with some gravel	20-12-18	38.5 40.0	30	Water encountered at 39.1 feet during drilling
-18.5	42.5	**STRATUM C** Gray, moist, stiff, medium sandy FAT CLAY (CH) with trace gravel	4-5-5	43.5 45.0	10	
-23.5	47.5	**STRATUM D - POTOMAC FORMATION:** Gray to brown, moist, medium-dense to dense, silty, clayey medium to coarse SAND (SC-SM) with trace gravel	9-9-9	48.5 50.0	18	
			6-1-27	53.5 55.0	28	
			13-25-25	58.5 60.0	50	
-38.5	62.5	Blue-green to reddish-brown, miost, hard, fine sandy LEAN CLAY (CL)	20-28-33	63.5 65.0	61	
			19-30-39	68.5 70.0	69	
-51.0	75.0		18-22-36	73.5 75.0	58	
		Boring terminated at 75 feet Note: Standard Penetration Tests (SPT) conducted using a safety hammer **Ground surface elevation data estimated to the nearest 1.0 foot from information contained in Preliminary Drawing No. 1 dated March 30, 2007				1 inch temporary piezometer installed upon completion

*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.: **H68-134G** Date: **July 2007**

Client: **HO+K**			
Project: **DC Consolidated Laboratory Facility, 4th and School Streets, SW DC**			
Boring No.: **B-3** **(1 of 1)**	Total Depth **75.0'**	Elev: **22.0 ± ****	Location: **See Boring Location Plan**
Type of Boring: **2.25" HSA**	Started: **4/20/07**	Completed: **4/20/07**	Driller: **AJ Wilhelm**

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	* Sample Blows	Sample Depth (feet)	N Value (blows/ft)	REMARKS
21.5	0.5	7 Inches surficial "organic" soil	3-4-5	0.0 / 1.5	9	
19.0	3.0	**STRATUM A - FILL:** Dark brown, moist, loose, silty fine SAND with brick fragments, root fragments and organics	9-8-7	3.5 / 5.0	15	
			5-7-8	6.0 / 7.5	15	
14.0	8.0	**STRATUM B - COASTAL PLAIN:** Brown, moist, medium-dense, fine sandy SILT (ML) with trace organics	5-6-10	8.5 / 10.0	16	
		Brown, moist, medium-dense to very dense, silty fine to medium SAND (SM) with gravel	50/6"	13.5	100+	
6.0	16.0	Brown-tan, dry to moist, very dense, poorly-graded gravely medium to coarse SAND (SP)	37-50/6"	18.5	100+	
			38-50/6"	23.5	100+	
			37-37-24	28.5 / 30.0	61	
-11.0	33.0	Brown-tan, wet, very dense, poorly-graded medium to coase sandy GRAVEL (GP)	50/5"	33.5	100+	
-15.0	37.0	Gray, moist, medium-dense, clayey fine to medium SAND (SC)	8-8-8	38.5 / 40.0	16	Water encountered at 39.2 feet during drilling
-17.0 ▽	39.0	**STRATUM C** Brown to gray, moist to wet, very stiff, fine to medium sandy LEAN CLAY (CL)	4-9-8	43.5 / 45.0	17	Pressuremeter Test conducted at 44.5 feet in offset test boring B-3A
			5-11-15	48.5 / 50.0	26	
-30.0	52.0	**STRATUM D - POTOMAC FORMATION:** Brown-gray, wet, very dense, poorly-graded coarse sandy GRAVEL (GP)	23-38-43	53.5 / 55.0	81	
-34.0	56.0	Brown, wet, dense, well-graded medium to coarse SAND (SW-SM) with silt and gravel	10-18-25	58.5 / 60.0	43	
-37.0	59.0	Gray, moist, dense, clayey medium SAND (SC)	18-20-22	63.5 / 65.0	42	
-45.0	67.0	Blue-gray to gray, moist, hard, LEAN CLAY (CL) with trace fine sand	14-19-24	68.5 / 70.0	43	
			22-25-33	73.5 / 75.0	58	
-53.0	75.0	Boring terminated at 75 feet				

Note: Standard Penetration Tests (SPT) conducted using a safety hammer

**Ground surface elevation data estimated to the nearest 1.0 foot from information contained in Preliminary Drawing No. 1 dated March 30, 2007

*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.: **H68-134G** Date: **July 2007**

Client: **HO+K**

Project: **DC Consolidated Laboratory Facility, 4th and School Streets, SW DC**

Boring No.: **B-4** **(1 of 1)** Total Depth **75.0'** Elev: **21.0 ± **** Location: **See Boring Location Plan**

Type of Boring: **2.25" HSA** Started: **5/7/07** Completed: **5/8/07** Driller: **AJ Wilhelm**

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	* Sample Blows	Sample Depth (feet)	N Value (blows/ft)	REMARKS
20.5	0.5	6 Inches surficial "organic" soil	5-7-9	0.0 1.5	16	
18.0	3.0	**STRATUM A - FILL:** Brown, dry, medium-dense, silty fine SAND with trace brick fragments	7-11-11	3.5 5.0	22	
16.0	5.0	**STRATUM B - COASTAL PLAIN:** Brown, moist, medium-dense, silty fine SAND (SM)	9-14-15	6.0 7.5	29	
		Brown, dry, medium-dense to dense, silty fine SAND (SM) with gravel	12-15-16	8.5 10.0	31	
9.0	12.0	Brown, dry to moist, very dense, poorly-graded GRAVEL with silt and sand (GP-GM)	50/4"	13.5	100+	
			40-50/5"	18.5	100+	
			30-50/6"	23.5	100+	
-7.0	28.0	Brown-tan, moist, very dense, poorly-graded coarse sandy GRAVEL (GP)	50/3"	28.5	100+	
-11.0	32.0	**STRATUM C:** Gray, moist, very stiff, fine sandy LEAN CLAY (CL)	7-8-9	33.5 35.0	17	Water encountered at 33.1 feet during drilling
-16.0	37.0	Gray, moist, very stiff to stiff, medium to coarse silty, clayey SAND (SC-SM) with trace fine gravel	9-9-9	38.5 40.0	18	
			5-5-7	43.5 45.0	12	
-26.5	47.5	Brown-tan, wet, very dense, poorly-graded gravely coarse SAND (SP)	21-22-30	48.5 50.0	52	
-31.0	52.0	**STRATUM D - POTOMAC FORMATION:** Brown-tan, moist, dense, clayey SAND (SC) with gravel	19-20-21	53.5 55.0	41	
-36.0	57.0	Blue-gray, olive and maroon mottled, moist, hard, LEAN CLAY (CL) with trace fine sand	18-19-22	58.5 60.0	41	
			21-22-25	63.5 65.0	47	
			14-19-22	68.5 70.0	41	
			16-24-26	73.5 75.0	50	
-54.0	75.0	Boring terminated at 75 feet Note: Standard Penetration Tests (SPT) conducted using a safety hammer **Ground surface elevation data estimated to the nearest 1.0 foot from information contained in Preliminary Drawing No. 1 dated March 30, 2007				Boring dry upon completion Boring caved at 26.0 feet upon completion

*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.: **H68-134G** Date: **July 2007**

Client: **HO+K**

Project: **DC Consolidated Laboratory Facility, 4th and School Streets, SW DC**

Boring No.: **B-5** **(1 of 1)** Total Depth **75.0'** Elev: **20.0 ± **** Location: **See Boring Location Plan**

Type of Boring: **3.25" HSA** Started: **4/30/07** Completed: **4/30/07** Driller: **AJ Wilhelm**

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	* Sample Blows	Sample Depth (feet)	N Value (blows/ft)	REMARKS
19.3	0.7	8 Inches surficial "organic" soil	4-6-10	0.0 1.5	16	
17.0	3.0	**STRATUM A - FILL:** Brown, moist, medium-dense, silty fine SAND with trace brick fragments, root fragments and organics	5-7-11	3.5 5.0	18	
			5-9-9	6.0 7.5	18	
12.0	8.0	**STRATUM B - COASTAL PLAIN:** Brown, moist, very stiff, LEAN CLAY (CL) with sand	6-15-17	8.5 10.0	32	
7.5	12.5	Brown, moist, medium-dense, clayey GRAVEL (GC) with sand				
		Brown-tan, dry to moist, very dense, poorly-graded gravely fine to medium SAND (SP)	50/1"	13.5	100+	
			25-33-45	18.5 20.0	78	
			23-40-43	23.5 25.0	83	
-7.0	27.0	Brown-tan, wet, very dense, poorly-graded medium to coarse sandy GRAVEL (GP)	39-50/5"	28.5	100+	
-12.0	32.0	**STRATUM C:** Gray, moist, stiff, fine sandy LEAN CLAY (CL)	4-5-6	33.5 35.0	11	
-18.0	38.0	Gray, moist, stiff, LEAN CLAY (CL) with sand	5-6-5	38.5 40.0	11	
-24.5	44.5	Gray, wet, medium-dense, clayey medium to coarse SAND (SC)	5-5-7	43.5 45.0	12	
-27.0	47.0	Tan, wet, very dense, poorly-graded medium to coarse sandy GRAVEL (GP)	29-39-24	48.5 50.0	63	
-32.0	52.0	**STRATUM D - POTOMAC FORMATION:** Blue-gray and maroon mottled, moist, hard, LEAN CLAY (CL) with trace fine sand	11-12-14	53.5 55.0	26	
			10-12-15	58.5 60.0	27	
			12-12-18	63.5 65.0	30	
			14-16-21	68.5 70.0	37	
-55.0	75.0		16-16-23	73.5 75.0	39	
		Boring terminated at 75 feet Note: Standard Penetration Tests (SPT) conducted using a safety hammer **Ground surface elevation data estimated to the nearest 1.0 foot from information contained in Preliminary Drawing No. 1 dated March 30, 2007				1 inch temporary piezometer installed upon completion

*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.: **H68-134G** Date: **July 2007**

Client: **HO+K**

Project: **DC Consolidated Laboratory Facility, 4th and School Streets, SW DC**

Boring No.: **B-6** **(1 of 1)** Total Depth **75.0'** Elev: **18.0 ± **** Location: **See Boring Location Plan**

Type of Boring: **2.25" HSA** Started: **4/26/07** Completed: **4/27/07** Driller: **AJ Wilhelm**

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	* Sample Blows	Sample Depth (feet)	N Value (blows/ft)	REMARKS
17.6	0.4	5 Inches surficial "organic" soil	11-14-16	0.0 1.5	30	
15.5	2.5	**STRATUM A - FILL:** Red and dark brown, moist, medium-dense, silty fine SAND with brick and asphalt fragments	7-8-12	3.5 5.0	20	
			8-12-15	6.0 7.5	27	
		STRATUM B - COASTAL PLAIN: Light gray to brown, moist, medium-dense, fine sandy SILT (ML)	8-9-10	8.5 10.0	19	
5.5	12.5	Brown-tan, dry to moist, very dense to medium-dense, poorly-graded GRAVEL (GP) with fine to medium sand	12-31-39	13.5 15.0	70	
			50/2"	18.5	100+	
			16-9-5	23.5 25.0	14	
-8.0	26.0	Brown-tan, wet, very dense, poorly-graded medium to coarse sandy GRAVEL (GP)	40-50/5"	28.5	100+	
-14.0 ▽	32.0	**STRATUM C:** Gray, moist, very stiff to medium stiff, fine sandy SILT (ML)	8-9-1	33.5 35.0	10	Water encountered at 32.7 feet during drilling
			10-9-8	38.5 40.0	17	
			3-3-4	43.5 45.0	7	
-29.0	47.0	Gray, wet, dense, poorly-graded medium to coarse sandy GRAVEL (GP)	17-24-25	48.5 50.0	49	
-34.0	52.0	**STRATUM D - POTOMAC FORMATION:** Grayish-purple, moist, medium-dense to dense, clayey SAND (SC)	7-8-12	53.5 55.0	20	
			14-24-24	58.5 60.0	48	
			12-18-25	63.5 65.0	43	
			12-26-23	68.5 70.0	49	
			14-23-27	73.5 75.0	50	
-57.0	75.0	Boring terminated at 75 feet Note: Standard Penetration Tests (SPT) conducted using a safety hammer **Ground surface elevation data estimated to the nearest 1.0 foot from information contained in Preliminary Drawing No. 1 dated March 30, 2007				Boring dry upon completion Boring caved at 19.7 feet upon completion

*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.: **H68-134G** Date: **July 2007**

Client: **HO+K**

Project: **DC Consolidated Laboratory Facility, 4th and School Streets, SW DC**

Boring No.: **B-7** **(1 of 1)** Total Depth **75.0'** Elev: **25.0 ± **** Location: **See Boring Location Plan**

Type of Boring: **2.25" HSA** Started: **4/16/07** Completed: **4/16/07** Driller: **AJ Wilhelm**

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	* Sample Blows	Sample Depth (feet)	N Value (blows/ft)	REMARKS
24.5	0.5	6 Inches surficial "organic" soil	5-4-3	0.0 1.5	7	
22.5	2.5	**STRATUM A - FILL:** Brown, moist, loose, silty fine SAND with brick fragments, root fragments and organics	9-13-18	3.5 5.0	31	
			10-9-9	6.0 7.5	18	
13.5	11.5	**STRATUM B - COASTAL PLAIN:** Brown, moist, dense to medium-dense, silty fine SAND (SM) with trace gravel	7-7-8	8.5 10.0	15	
9.0	16.0	Brown, moist, very dense, silty fine to medium SAND (SM) with trace gravel	22-36-25	13.5 15.0	61	
		Brown, moist, very dense, poorly-graded gravely medium to coarse SAND (SP)	42-50/6"	18.5	100+	
			20-33-35	23.5 25.0	68	
-7.0	32.0		50/6"	28.5	100+	
-12.0	37.0	Brown, wet, very dense, poorly-graded medium to coarse sandy GRAVEL (GP)	41-41-45	33.5 35.0	86	
-19.0	44.0	**STRATUM C** Gray, moist, stiff, sandy LEAN CLAY (CL)	5-5-5	38.5 40.0	10	
-24.0	49.0	Gray to brown, wet, very stiff, medium to coarse sandy FAT CLAY (CH) with some gravel	4-13-14	43.5 45.0	27	
-29.0	54.0	Brown, wet, very stiff, LEAN CLAY (CL) with sand	6-12-13	48.5 50.0	25	
-34.0 ▽	59.0	**STRATUM D - POTOMAC FORMATION:** Gray to brown, wet, mediump-dense, clayey medium to coarse SAND (SC)	4-14-16	53.5 55.0	30	
		Gray, moist, stiff to very stiff, fine sandy FAT CLAY (CH) with thin medium grained sand lenses	12-13-16	58.5 60.0	29	Water encountered at 59.8 feet during drilling
-42.0	67.0		12-16-20	63.5 65.0	36	
		Blue-gray, moist, hard, LEAN CLAY (CL) with trace fine sand	20-25-32	68.5 70.0	57	
-50.0	75.0		21-28-37	73.5 75.0	65	
		Boring terminated at 75 feet Note: Standard Penetration Tests (SPT) conducted using a safety hammer **Ground surface elevation data estimated to the nearest 1.0 foot from information contained in Preliminary Drawing No. 1 dated March 30, 2007				Boring dry upon completion Boring caved at 21.2 feet upon completion

*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.: **H68-134G**   Date: **July 2007**

Client: **HO+K**

Project: **DC Consolidated Laboratory Facility, 4th and School Streets, SW DC**

Boring No.: **B-8** (1 of 1) Total Depth **75.0'** Elev: **24.0 ± **** Location: **See Boring Location Plan**

Type of Boring: **2.25" HSA** Started: **4/24/07** Completed: **4/24/07** Driller: **AJ Wilhelm**

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	* Sample Blows	Sample Depth (feet)	N Value (blows/ft)	REMARKS
23.3	0.7	8 Inches concrete	9-10-9	1.0 2.5	19	
21.0	3.0	**STRATUM A - FILL:** Dark brown, moist, meidum-dense, fine sandy SILT with brick fragments, organics, and trace root fragments	5-7-9	3.5 5.0	16	
18.0	6.0	**STRATUM B - COASTAL PLAIN:** Brown, moist, medium-dense, fine sand SILT (ML)	6-9-12	6.0 7.5	21	
			10-10-17	8.5 10.0	27	
12.0	12.0	Brown, moist, medium-dense, silty, clayey SAND with gravel (SC-SM)				
		Brown, moist, very dense, poorly-graded GRAVEL with silt and sand (GP-GM)	50/6"	13.5	100+	
			40-50/2"	18.5	100+	
			35-35-30	23.5 25.0	65	
-3.5	27.5	Brown, wet, medium-dense, poorly-graded medium to coarse sandy GRAVEL (GP)	8-12-11	28.5 30.0	23	
-8.0	32.0	Brown-tan, wet, very dense, poorly-graded gravely medium to coarse SAND (SP)	50/5"	33.5	100+	
-13.0	37.0	**STRATUM C** Gray, moist to wet, stiff, fine sandy FAT CLAY (CH)	7-6-6	38.5 40.0	12	Water encountered at 39.7 feet during drilling
			3-4-6	43.5 45.0	10	
-23.0	47.0	Brown-tan, wet, dense, poorly-graded GRAVEL with silt and sand (GP-GM)	16-17-17	48.5 50.0	34	
-28.5	52.5	**STRATUM D - POTOMAC FORMATION:** Gray, moist, very dense, clayey medium SAND (SC)	21-28-36	53.5 55.0	64	
			21-31-34	58.5 60.0	65	
-38.0	62.0	Blue-gray to dark gray, moist, hard, LEAN CLAY (CL) with trace fine sand	20-21-28	63.5 65.0	49	
			17-22-26	68.5 70.0	48	
			12-20-21	73.5 75.0	41	
-51.0	75.0	Boring terminated at 75 feet Note: Standard Penetration Tests (SPT) conducted using a safety hammer **Ground surface elevation data estimated to the nearest 1.0 foot from information contained in Preliminary Drawing No. 1 dated March 30, 2007				Water at 34.6 feet upon completion Boring caved at 42.1 feet upon completion

*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.: **H68-134G** Date: **July 2007**

Client: **HO+K**

Project: **DC Consolidated Laboratory Facility, 4th and School Streets, SW DC**

Boring No.: **B-9** **(1 of 1)** Total Depth **75.0'** Elev: **22.0 ± **** Location: **See Boring Location Plan**

Type of Boring: **2.25" HSA** Started: **5/9/07** Completed: **5/9/07** Driller: **AJ Wilhelm**

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	* Sample Blows	Sample Depth (feet)	N Value (blows/ft)	REMARKS
21.3	0.7	8 Inches concrete				
		STRATUM B - COASTAL PLAIN: Brown, moist, medium-dense, fine sandy SILT (ML) with trace organics	4-6-7	1.0 / 2.5	13	
17.0	5.0		7-9-10	3.5 / 5.0	19	
		Brown, moist, medium-dense, slity fine SAND (SM) with trace gravel	6-8-11	6.0 / 7.5	19	
			7-11-15	8.5 / 10.0	26	
12.0	10.0	Brown, moist, very dense to dense, poorly-graded gravely fine to medium SAND (SP)				
			50/6"	13.5	100+	
			21-26-21	18.5 / 20.0	47	
			12-18-14	23.5 / 25.0	32	
-5.0	27.0	Gray to tan, moist to wet, very dense, poorly-graded gravely medium to coarse SAND (SP)	12-28-50/4"	28.5 / 29.8	100+	
			24-34-50/4"	33.5 / 34.8	100+	Water at 32.2 feet before pulling augers. Water at 32.3 feet 24 hours after drilling before pulling augers
-15.5	37.5	**STRATUM C:** Gray, moist, stiff, silty CLAY (CL-ML) with sand	5-5-5	38.5 / 40.0	10	
-20.5	42.5	Gray, moist, medium-dense, silty, clayey SAND (SC-SM)	4-7-8	43.5 / 45.0	15	
-25.0	47.0	Brown-tan, wet, dense, poorly-graded coarse sandy GRAVEL (GP)				
-30.0	52.0	**STATUM D - POTOMAC FORMATION:** Reddish-tan, moist, very dense, clayey fine SAND (SC)	16-34-38	53.5 / 55.0	72	
-35.0	57.0	Blue-gray, moist, dense, clayey medium SAND (SC)	18-24-26	58.5 / 60.0	50	
-40.0	62.0	Blue-gray and redd mottled, moist, hard, LEAN CLAY (CL) with trace fine sand	12-15-24	63.5 / 65.0	39	
			15-17-23	68.5 / 70.0	40	
-53.0	75.0		20-26-29	73.5 / 75.0	55	
		Boring terminated at 75 feet Note: Standard Penetration Tests (SPT) conducted using a safety hammer **Ground surface elevation data estimated to the nearest 1.0 foot from information contained in Preliminary Drawing No. 1 dated March 30, 2007				Boring caved at 28.2 feet upon completion

*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.: **H68-134G** Date: **July 2007**

Client: **HO+K**

Project: **DC Consolidated Laboratory Facility, 4th and School Streets, SW DC**

Boring No.: **B-10** **(1 of 1)** Total Depth **75.0'** Elev: **18.0 ± **** Location: **See Boring Location Plan**

Type of Boring: **2.25" HSA** Started: **4/25/07** Completed: **4/25/07** Driller: **AJ Wilhelm**

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	* Sample Blows	Sample Depth (feet)	N Value (blows/ft)	REMARKS
17.3	0.7	8 Inches concrete	3-4-3	1.0 2.5	7	
15.0	3.0	**STRATUM A - FILL:** Dark brown, moist, loose, silty fine SAND with brick fragments, asphalt fragments and organics	6-9-14 8-12-12	3.5 5.0 6.0 7.5	23 24	
		STRATUM B - COASTAL PLAIN: Orange to brown, moist, medium-dense, fine sandy SILT (ML)	7-10-10	8.5 10.0	20	
5.5	12.5	Brown, moist to wet, very dense, poorly-graded gravely fine to medium SAND (SP)	50/5" 10-50/4"	13.5 18.5	100+ 100+	
-4.0	22.0	Brown, moist to wet, very dense, poorly-graded medium to coarse sandy GRAVEL (GP)	50/6" 50/5"	23.5 28.5	100+ 100+	
-14.0	32.0	**STRATUM C:** Gray, moist, medium stiff to stiff, fine sandy LEAN CLAY (CL)	3-4-4 5-5-8	33.5 35.0 38.5 40.0	8 13	
-24.0	42.0	Dark gray, moist, medium-dense, clayey fine to medium SAND (SC)	4-5-9	43.5 45.0	14	
-29.0	47.0	Tan, moist, very dense, poorly-graded medium to coarse sandy GRAVEL (GP)	15-50/6"	48.5	100+	
-34.0	52.0	**STRATUM D - POTOMAC FORMATION:** Dark gray, moist, very stiff to hard, LEAN CLAY (CL) with trace fine sand	10-12-16 12-16-22 12-19-24 14-19-24 17-22-28	53.5 55.0 58.5 60.0 63.5 65.0 68.5 70.0 73.5 75.0	28 38 43 43 50	
-57.0	75.0	Boring terminated at 75 feet Note: Standard Penetration Tests (SPT) conducted using a safety hammer **Ground surface elevation data estimated to the nearest 1.0 foot from information contained in Preliminary Drawing No. 1 dated March 30, 2007				Water at 24.2 feet upon completion Boring caved at 59.2 feet upon completion

*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.: **H68-134G**

Date: **July 2007**

Client: **HO+K**

Project: **DC Consolidated Laboratory Facility, 4th and School Streets, SW DC**

Boring No.: **B-11** **(1 of 1)** Total Depth **75.0'** Elev: **25.0 ± **** Location: **See Boring Location Plan**

Type of Boring: **2.25" HSA** Started: **4/12/07** Completed: **4/13/07** Driller: **AJ Wilhelm**

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	* Sample Blows	Sample Depth (feet)	N Value (blows/ft)	REMARKS
24.5	0.5	6 Inches surficial "organic" soil	5-9-9	0.0 1.5	18	
22.5	2.5	**STRATUM A - FILL:** Reddish-brown to brown, moist, medium-dense, silty fine SAND with brick fragments, root fragments, gravel and organics	2-3-3	3.5 5.0	6	
19.5	5.5	Brown, moist, loose, clayey fine SAND with brick fragments, gravel, root fragments, glass, and ceramic tile fragments	9-7-9	6.0 7.5	16	
			7-9-10	8.5 10.0	19	
		STRATUM B - COASTAL PLAIN: Brown, moist, medium-dense to dense, silty, clayey fine SAND (SC-SM) with gravel	18-14-22	13.5 15.0	36	
7.0	18.0	Tan, dry, very dense, poorly-graded gravely medium to coarse SAND (SP)	36-50/5"	18.5	100+	
			24-30-38	23.5 25.0	68	
			50/6"	28.5	100+	
			20-50/6"	33.5	100+	Water encountered at 34.5 feet during drilling
-12.5	37.5	**STRATUM C** Gray, moist, medium-dense, clayey SAND (SC)	5-6-7	38.5 40.0	13	Pressuremeter Test conducted at 40.0 feet in offset test boring B-11A
-17.0	42.0	Gray, moist, stiff, medium sandy FAT CLAY (CH) with some gravel	3-3-7	43.5 45.0	10	Pressuremeter Test conducted at 44.5 feet in offset test boring B-11A
-22.5	47.5	Gray, moist, loose, poorly-graded medium SAND (SP) with trace gravel	3-5-5	48.5 50.0	10	
-27.0	52.0	**STRATUM D - POTOMAC FORMATION:** Tan, wet, very dense, poorly-graded gravely medium to coarse SAND (SP)	50/6"	53.5	100+	
			26-24-34	58.5 60.0	58	
-37.0	62.0	Gray, moist, very dense, clayey medium SAND (SC)	21-34-40	63.5 65.0	74	Pressuremeter Test conducted at 64 feet in offset test boring B-11A
-42.0	67.0	Blue-green, moist, hard, LEAN CLAY (CL)	17-19-25	68.5 70.0	44	
			18-22-30	73.5 75.0	52	
-50.0	75.0	Boring terminated at 75 feet Note: Standard Penetration Tests (SPT) conducted using a safety hammer **Ground surface elevation data estimated to the nearest 1.0 foot from information contained in Preliminary Drawing No. 1 dated March 30, 2007				1 inch temporary piezometer installed upon completion

*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.: **H68-134G** Date: **July 2007**

Client: **HO+K**

Project: **DC Consolidated Laboratory Facility, 4th and School Streets, SW DC**

Boring No.: **B-12** (1 of 1) Total Depth **75.0'** Elev: **23.0 ± **** Location: **See Boring Locaion Plan**

Type of Boring: **2.25" HSA** Started: **4/10/07** Completed: **4/10/07** Driller: **AJ Wilhelm**

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	* Sample Blows	Sample Depth (feet)	N Value (blows/ft)	REMARKS
22.5	0.5	5 Inches surficial "organic" soil	3-4-3	0.0 / 1.5	7	
20.0	3.0	**STRATUM A - FILL:** Brown, moist, loose, fine sandy SILT with brick fragments, asphalt fragments, and timber fragments	11-19-18	3.5 / 5.0	37	
18.0	5.0	**STRATUM B - COASTAL PLAIN:** Dark brown, moist, dense, silty fine SAND (SM) with trace gravel and root fragments	11-17-40	6.0 / 7.5	57	
			16-21-31	8.5 / 10.0	52	
		Tannish-brown, dry to moist, dense to very dense, poory-graded SAND with silt and gravel (SP-SM)	13-23-31	13.5 / 15.0	54	
			50/6"	18.5	100+	
			17-22-28	23.5 / 25.0	50	
			31-26-26	28.5 / 30.0	52	
-7.0	30.0	Brown, wet, very dense, poorly graded sandy GRAVEL (GP)	34-50/6"	33.5	100+	
-14.0	37.0	**STRATUM C** Gray, moist, stiff, fine sandy FAT CLAY (CH)	5-6-7	38.5 / 40.0	13	
-21.0	44.0	Gray, moist, medium-dense, clayey medium to coarse SAND (SC)	3-4-8	43.5 / 45.0	12	
			3-4-8	48.5 / 50.0	12	
-30.0	53.0	**STRATUM D - POTOMAC FORMATION:** Tan, wet, very dense, poorly-graded gravely medium to coarse SAND (SP)	15-27-40	53.5 / 55.0	67	
-34.0	57.0	Brownish-gray, moist, very dense, clayey medium SAND (SC)	17-24-29	58.5 / 60.0	53	
-39.0	62.0	Blue-green and brown to dark gray, moist, hard, sandy ELASTIC SILT (MH)	12-16-25	63.5 / 65.0	41	
			46-42-50	68.5 / 70.0	92	
			13-20-30	73.5 / 75.0	50	
-52.0	75.0	Boring terminated at 75 feet Note: Standard Penetration Tests (SPT) conducted using a safety hammer **Ground surface elevation data estimated to the nearest 1.0 foot from information contained in Preliminary Drawing No. 1 dated March 30, 2007				Boring dry upon completion and 24 hours after completion Boring caved at 31.0 feet upon completion

*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.: **H68-134G** | Date: **July 2007**

Client: **HO+K**

Project: **DC Consolidated Laboratory Facility, 4th and School Streets, SW DC**

Boring No.: **B-13** **(1 of 1)** | Total Depth **75.0'** | Elev: **23.0 ± **** | Location: **See Boring Location Plan**

Type of Boring: **2.25" HSA** | Started: **4/17/07** | Completed: **4/17/07** | Driller: **AJ Wilhelm**

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	* Sample Blows	Sample Depth (feet)	N Value (blows/ft)	REMARKS
22.5	0.5	6 Inches surficical "organic" soil	4-5-10	0.0 / 1.5	15	
20.0	3.0	**STRATUM A - POSSIBLE FILL:** Brown, moist, medium-dense, fine sandy SILT with trace organics	7-8-10	3.5 / 5.0	18	
17.5	5.5	**STRATUM B - COASTAL PLAIN:** Brown, moist, medium-dense, clayey fine SAND (SC) with trace gravel and organics	8-16-14	6.0 / 7.5	30	
			9-21-31	8.5 / 10.0	52	
11.5	11.5	Brown, moist, medium-dense to very dense, silty fine SAND (SM) with gravel				
		Brown, moist to wet, very dense, poorly-graded GRAVEL with sand (GP)	34-50/6"	13.5	100+	
			37-40-41	18.5 / 20.0	81	
			27-30-36	23.5 / 25.0	66	
			26-50/6"	28.5	100+	
			50/6"	33.5	100+	
-14.0	37.0	**STRATUM C** Reddish-gray, moist, stiff, FAT CLAY (CH) with trace fine sand	5-5-7	38.5 / 40.0	12	Water encountered at 36.2 feet during drilling
-20.0	43.0	Gray, wet, loose, clayey SAND (SC)	5-3-6	43.5 / 45.0	9	
-25.0	48.0	Brown-tan, wet, dense, poorly-graded gravely medium to coarse SAND (SP)	15-22-17	48.5 / 50.0	39	
-29.5	52.5	**STRATUM D - POTOMAC FORMATION:** Light gray, moist, dense, silty medium SAND (SM)	11-15-19	53.5 / 55.0	34	
-34.0	57.0	Dark gray to blue-gray, moist, hard, ELASTIC SILT (MH) with trace fine sand	18-30-40	58.5 / 60.0	70	
			14-18-27	63.5 / 65.0	45	
			16-20-28	68.5 / 70.0	48	
-52.0	75.0		21-25-26	73.5 / 75.0	51	
		Boring terminated at 75 feet Note: Standard Penetration Tests (SPT) conducted using a safety hammer **Ground surface elevation data estimated to the nearest 1.0 foot from information contained in Preliminary Drawing No. 1 dated March 30, 2007				Boring dry upon completion Boring caved at 21.2 feet upon completion

*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.: **H68-134G** Date: **July 2007**

Client: **HO+K**

Project: **DC Consolidated Laboratory Facility, 4th and School Streets, SW DC**

Boring No.: **B-14** **(1 of 1)** Total Depth **75.0'** Elev: **21.0 ± **** Location: **See Boring Location Plan**

Type of Boring: **2.25" HSA** Started: **4/24/07** Completed: **4/24/07** Driller: **AJ Wilhelm**

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	* Sample Blows	Sample Depth (feet)	N Value (blows/ft)	REMARKS
20.5	0.5	6 Inches surficial "organic" soil	3-4-5	0.0 1.5	9	
18.5	2.5	**STRATUM A - POSSIBLE FILL:** Brown, miost, loose, silty fine SAND	5-6-7	3.5 5.0	13	
15.0	6.0	**STRATUM B - COASTAL PLAIN:** Brown, moist, medium-dense, fine sandy LEAN CLAY (CL)	7-6-10	6.0 7.5	16	
13.0	8.0	Brown, moist, very stiff, clayey fine SAND (SC)	8-10-11	8.5 10.0	21	
9.0	12.0	Brown, moist, medium-dense, silty fine SAND (SM) with trace gravel	23-35-45	13.5 15.0	80	
		Brown, moist to wet, very dense to dense, poorly-graded SAND with silt and gravel (SP-SM)	21-25-25	18.5 20.0	50	
			19-25-26	23.5 25.0	51	
			30-50/6"	28.5	100+	
			29-32-12	33.5 35.0	44	Water encountered at 33.7 feet during drilling
-17.0	38.0	**STRATUM C** Gray, moist, medium stiff, fine sandy LEAN CLAY (CL)	2-2-4	38.5 40.0	6	
			5-4-4	43.5 45.0	8	
-27.0	48.0	Brown-tan, wet, medium-dense to very dense, poorly-graded medium to coarse sandy GRAVEL (GP)	10-19-10	48.5 50.0	29	
-32.0	53.0	**STRATUM D - POTOMAC FORMATION:** Gray, moist, very dense, silty medium SAND (SM)	16-23-28	53.5 55.0	51	
-37.0	58.0	Dark gray to blue-gray, moist, hard, ELASTIC SILT (MH) with trace fine sand	12-23-26	58.5 60.0	49	
			12-24-24	63.5 65.0	48	
			13-23-39	68.5 70.0	62	
-54.0	75.0		14-22-28	73.5 75.0	50	
		Boring terminated at 75 feet Note: Standard Penetration Tests (SPT) conducted using a safety hammer **Ground surface elevation data estimated to the nearest 1.0 foot from information contained in Preliminary Drawing No. 1 dated March 30, 2007				Boring dry upon completion Boring caved at 23.5 upon completion

*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.: **H68-134G** Date: **July 2007**

Client: **HO+K**

Project: **DC Consolidated Laboratory Facility, 4th and School Streets, SW DC**

Boring No.: **B-15** **(1 of 1)** Total Depth **75.0'** Elev: **20.0 ± **** Location: **See Boring Location Plan**

Type of Boring: **3.25" HSA** Started: **4/18/07** Completed: **4/19/07** Driller: **AJ Wilhelm**

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	* Sample Blows	Sample Depth (feet)	N Value (blows/ft)	REMARKS
19.5	0.5	6 Inches surficial "organic" soil	3-5-8	0.0 1.5	13	
17.0	3.0	**STRATUM A - FILL:** Dark brown, moist, medium-dense, silty fine SAND with brick fragments and root fragments	6-9-10	3.5 5.0	19	
		STRATUM B - COASTAL PLAIN: Brown, moist, very stiff to hard, sandy LEAN CLAY (CL) Gravel at 6.0 feet	21-28-34	6.0 7.5	62	
			17-25-26	8.5 10.0	51	
7.5	12.5	Brown, dry to moist, very dense, silty SAND (SM) with gravel	50/4"	13.5	100+	
			41-50/3"	18.5	100+	
			40-50/4"	23.5	100+	
-8.0	28.0	Gray, wet, very dense, poorly-graded GRAVEL (GP) with medium sand and clay	28-32-50/5"	28.5 29.9	100+	
-12.5	32.5	**STRATUM C** Gray, moist to wet, very stiff to stiff, LEAN CLAY (CL) with sand	7-8-9	33.5 35.0	17	Shelby tube sample from 34.0 feet to 36.0 feet
			5-6-5	38.5 40.0	11	
-24.0	44.0	Gray, wet, medium-dense, clayey medium SAND (SC)	4-6-12	43.5 45.0	18	
-27.5 ▽	47.5	**STRATUM D - POTOMAC FORMATION:** Tan, wet, dense, poorly-graded gravely medium to coarse SAND (SP)	25-25-25	48.5 50.0	50	Water encountered at 47.5 feet during drilling
-32.5	52.5	Gray, moist, very dense, clayey medium SAND (SC)	18-28-38	53.5 55.0	66	
-37.5	57.5	Dark gray to blue-green, moist, very stiff to hard, fine sandy LEAN CLAY (CL)	5-5-19	58.5 60.0	24	
			19-20-21	63.5 65.0	41	
			19-21-22	68.5 70.0	43	
			22-24-27	73.5 75.0	51	
-55.0	75.0	Boring terminated at 75 feet Note: Standard Penetration Tests (SPT) conducted using a safety hammer **Ground surface elevation data estimated to the nearest 1.0 foot from information contained in Preliminary Drawing No. 1 dated March 30, 2007				Boring dry upon completion Boring caved at 25.3 feet upon completion

*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.: **H68-134G** Date: **July 2007**

Client: **HO+K**

Project: **DC Consolidated Laboratory Facility, 4th and School Streets, SW DC**

Boring No.: **B-16** **(1 of 1)** Total Depth **75.0'** Elev: **17.0 ± **** Location: **See Boring Location Plan**

Type of Boring: **2.25" HSA** Started: **4/18/07** Completed: **4/19/07** Driller: **AJ Wilhelm**

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	* Sample Blows	Sample Depth (feet)	N Value (blows/ft)	REMARKS
16.5	0.5	6 Inches surficial "organic" soil	5-7-6	0.0 1.5	13	
14.0	3.0	**STRATUM A - FILL:** Dark brown, moist, medium-dense, silty SAND (SM) with brick fragments, root fragments and organics	4-5-9	3.5 5.0	14	
11.5	5.5	**STRATUM B - COASTAL PLAIN:** Light gray, stiff, fine sandy LEAN CLAY (CL)	10-14-16	6.0 7.5	30	
			14-15-19	8.5 10.0	34	
		Light brown, moist, dense, fine sandy SILT (ML)				
4.5	12.5	Brown, moist, very dense to dense, poorly-graded GRAVEL with silt and sand (GP-GM)	50/5"	13.5	100+	
			9-14-24	18.5 20.0	38	
-4.0	21.0	Brown, wet, very dense, poorly graded medium to coarse sandy GRAVEL (GP)	50/6"	23.5	100+	
-11.0 ▽	28.0	**STRATUM C** Dark to light gray, moist, medium-stiff to very stiff, ELASTIC SILT (MH) with trace fine sand	8-9-11	28.5 30.0	20	
			3-3-5	33.5 35.0	8	Pressuremeter Test conducted at 34.5 feet in offset test boring B-16A
			5-6-7	38.5 40.0	13	Pressuremeter Test conducted at 39.5 feet in offset test boring B-16A
			5-6-8	43.5 45.0	14	Pressuremeter Test conducted at 44.5 feet in offset test boring B-16A
-30.0	47.0	Brown, wet, very dense, poorly-graded medium to coars SAND (SP) with gravel	50/5"	48.5	100+	
-36.0	53.0	**STRATUM D - POTOMAC FORMATION:** Gray, moist, dense, clayey medium SAND (SC)	12-18-29	53.5 55.0	47	
-40.0	57.0	Blue-gray, moist, hard, FAT CLAY (CH) with trace fine sand	12-14-19	58.5 60.0	33	
			18-28-33	63.5 65.0	61	
-50.0	67.0	Dark gray, moist, hard, LEAN CLAY (CL) with trace timber fragments	14-22-33	68.5 70.0	55	
			17-26-34	73.5 75.0	60	
-58.0	75.0	Boring terminated at 75 feet Note: Standard Penetration Tests (SPT) conducted using a safety hammer **Ground surface elevation data estimated to the nearest 1.0 foot from information contained in Preliminary Drawing No. 1 dated March 30, 2007				1 inch temporary piezometer installed upon completion

*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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APPENDIX C

PRESSUREMETER DATA SHEET

Project Data

Project: DC Consolidated Laboratories

Location: 4th & School Street SW

Weather: Clear/Sunny

Temp: 65 degrees

Date: May 2, 2007

Project Number: H68-134G

Project Engineer: Oscar Merida

Test Engineer: Bob Salo

Test Condition Data

Boring: B-1A

Test Depth: 29.5 ft

Test Elevation: -4 ft, msl

Ground Surface Elevation: 24 ft, msl

Groundwater Depth: 27 ft

Groundwater Elevation: -3 ft, msl

Geology: Coastal Plain — Blow Count: 31-27-40 from 28-29.5 feet

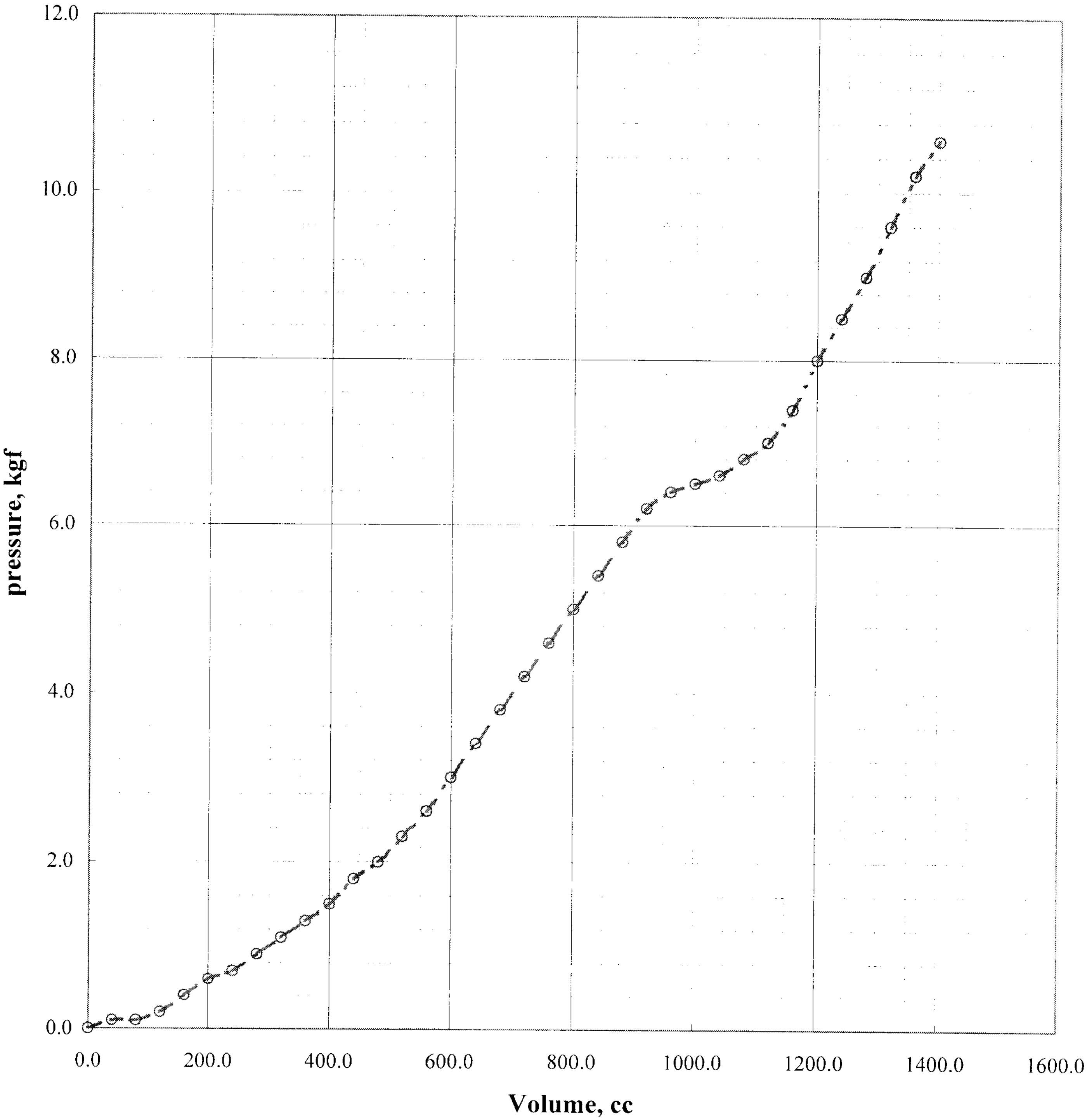
Soil Classification: Poorly-graded gravely SAND (SP) — from ____ feet

Method to Make Pressuremeter Hole (circle one)

roller cone — ***solid auger*** — [oversize spoon] — shelby tube

Test Data

Test Step	Volume (cc)	Pressure (kgf)	Test Step	Volume (cc)	Pressure (kgf)	Test Step	Volume (cc)	Pressure (kgf)
1	0	0.00	16	600	3.00	31	1200	8.00
2	40	0.10	17	640	3.40	32	1240	8.50
3	80	0.10	18	680	3.80	33	1280	9.00
4	120	0.20	19	720	4.20	34	1320	9.60
5	160	0.40	20	760	4.60	35	1360	10.20
6	200	0.60	21	800	5.00	36	1400	10.60
7	240	0.70	22	840	5.40	37	End of Test	
8	280	0.90	23	880	5.80	38		
9	320	1.10	24	920	6.20	39		
10	360	1.30	25	960	6.40	40		
11	400	1.50	26	1000	6.50	41		
12	440	1.80	27	1040	6.60	42		
13	480	2.00	28	1080	6.80	43		
14	520	2.30	29	1120	7.00	44		
15	560	2.60	30	1160	7.40	45		



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Pressuremeter Test Results

Project:	DC Consolidated Laboratories	Date:	May 2, 2007
F&R No.:	H68-134G	Eng.:	Bob Salo
Boring:	B-1A		
Depth:	29.5		

PRESSUREMETER DATA SHEET

Project Data

Project: DC Consolidated Laboratories
Location: 4th & School Street SW
Weather: Clear/Sunny
Temp: 70 degrees

Date: May 2, 2007
Project Number: H68-134G
Project Engineer: Oscar Merida
Test Engineer: Bob Salo

Test Condition Data

Boring: B-1A
Test Depth: 39.5 ft
Test Elevation: -4 ft, msl

Ground Surface Elevation: 24 ft, msl
Groundwater Depth: 27 ft
Groundwater Elevation: -3 ft, msl

Geology: Coastal Plain
Soil Classification: Clayey SAND (SC)

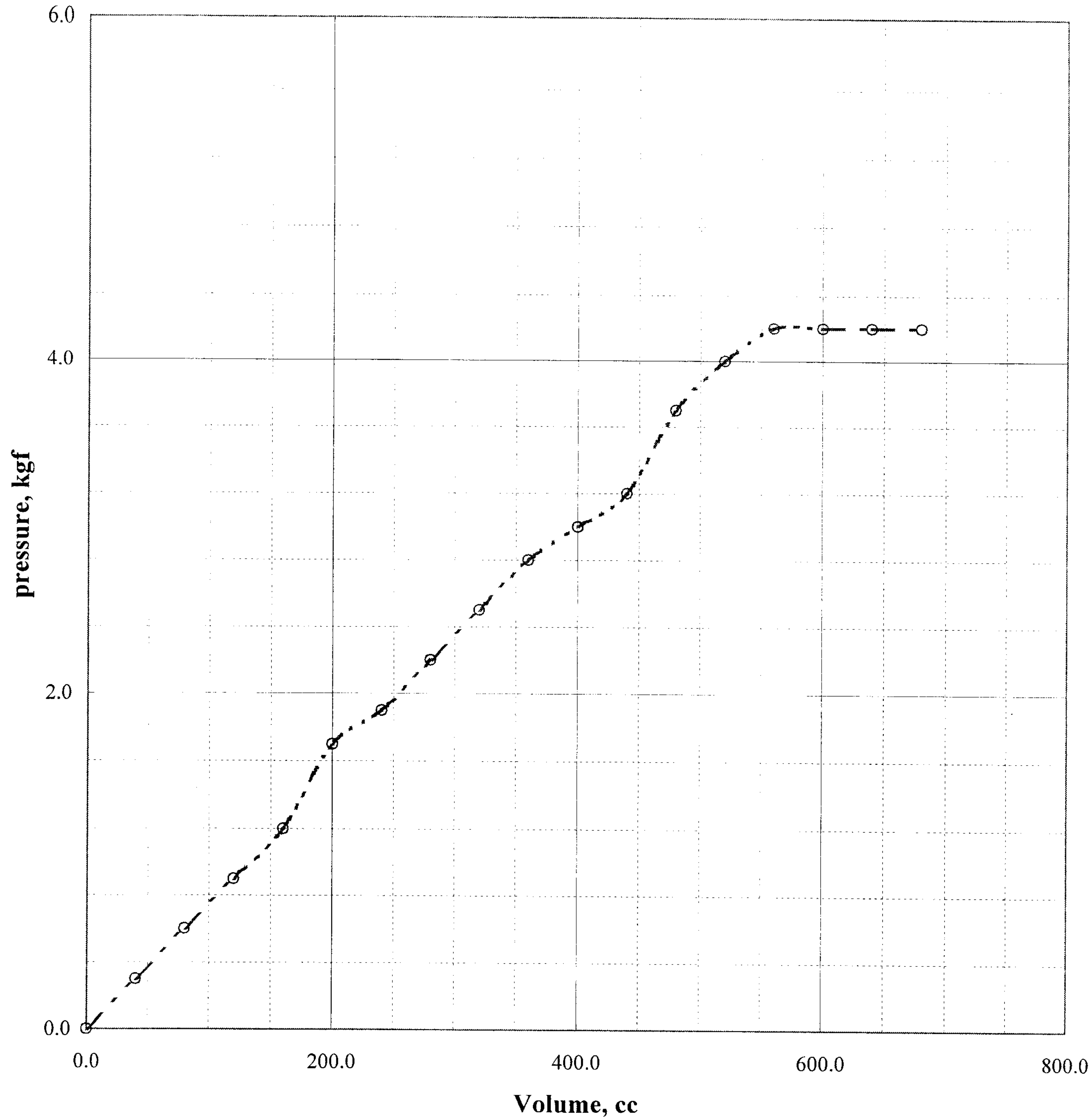
Blow Count: ____ from ____ feet
____ from ____ feet

Method to Make Pressuremeter Hole (circle one)

roller cone ***solid auger*** oversize spoon ***shelby tube***

Test Data

Test Step	Volume (cc)	Pressure (kgf)	Test Step	Volume (cc)	Pressure (kgf)	Test Step	Volume (cc)	Pressure (kgf)
1	0	0.00	16	600	4.20	31		
2	40	0.30	17	640	4.20	32		
3	80	0.60	18	680	4.20	33		
4	120	0.90	19	End of Test		34		
5	160	1.20	20			35		
6	200	1.70	21			36		
7	240	1.90	22			37		
8	280	2.20	23			38		
9	320	2.50	24			39		
10	360	2.80	25			40		
11	400	3.00	26			41		
12	440	3.20	27			42		
13	480	3.70	28			43		
14	520	4.00	29			44		
15	560	4.20	30			45		



Pressuremeter Test Results

Project:	DC Conolidated Laboartories	Date:	May 2, 2007
F&R No.:	H68-134G	Eng.:	Bob Salo
Boring:	B-1A		
Depth:	39.5		

PRESSUREMETER DATA SHEET

Project Data

Project:	DC Conolidated Laboartories	Date:	May 3, 2007
Location:	4th & School Street SW	Project Number:	H68-134G
Weather:	Clear/Sunny	Project Engineer:	Oscar Merida
Temp:	60 degrees	Test Engineer:	Bob Salo

Test Condition Data

Boring:	B-3A	Ground Surface Elevation:	22 ft, msl
Test Depth:	44.5 ft	Groundwater Depth:	27 ft
Test Elevation:	-4 ft, msl	Groundwater Elevation:	-5 ft, msl

Geology: Coastal Plain — Blow Count: ______ from ______ feet

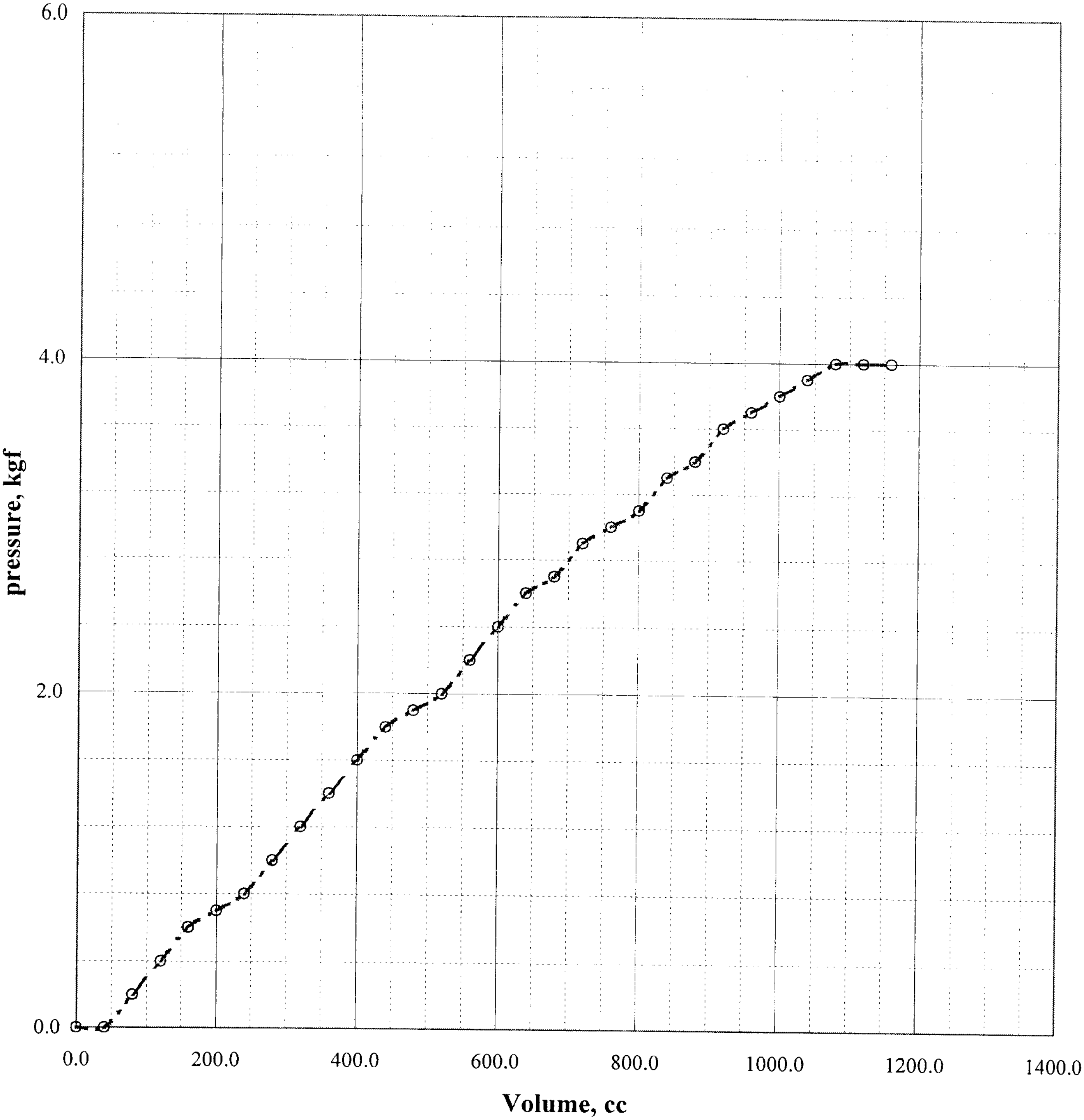
Soil Classification: FAT CLAY (CH) — ______ from ______ feet

Method to Make Pressuremeter Hole (circle one)

roller cone — solid auger — oversize spoon — ***shelby tube***

Test Data

Test Step	Volume (cc)	Pressure (kgf)	Test Step	Volume (cc)	Pressure (kgf)	Test Step	Volume (cc)	Pressure (kgf)
1	0	0.00	16	600	2.40	31	End of Test	
2	40	0.00	17	640	2.60	32		
3	80	0.20	18	680	2.70	33		
4	120	0.40	19	720	2.90	34		
5	160	0.60	20	760	3.00	35		
6	200	0.70	21	800	3.10	36		
7	240	0.80	22	840	3.30	37		
8	280	1.00	23	880	3.40	38		
9	320	1.20	24	920	3.60	39		
10	360	1.40	25	960	3.70	40		
11	400	1.60	26	1000	3.80	41		
12	440	1.80	27	1040	3.90	42		
13	480	1.90	28	1080	4.00	43		
14	520	2.00	29	1120	4.00	44		
15	560	2.20	30	1160	4.00	45		



Pressuremeter Test Results

Project:	DC Conolidated Laboartories	Date:	May 3, 2007
F&R No.:	H68-134G	Eng.:	Bob Salo
Boring:	B-3A		
Depth:	44.5		

PRESSUREMETER DATA SHEET

Project Data

Project: DC Conolidated Laboartories

Date: May 4, 2007

Location: 4th & School Street SW

Project Number: H68-134G

Weather: Clear/Sunny

Project Engineer: Oscar Merida

Temp: 65 degrees

Test Engineer: Bob Salo

Test Condition Data

Boring: B-11A

Ground Surface Elevation: 25 ft, msl

Test Depth: 40 ft

Groundwater Depth: 35.5 ft

Test Elevation: -4 ft, msl

Groundwater Elevation: -10.5 ft, msl

Geology: Coastal Plain

Blow Count: ______ from ______ feet

Soil Classification: FAT CLAY (CH)

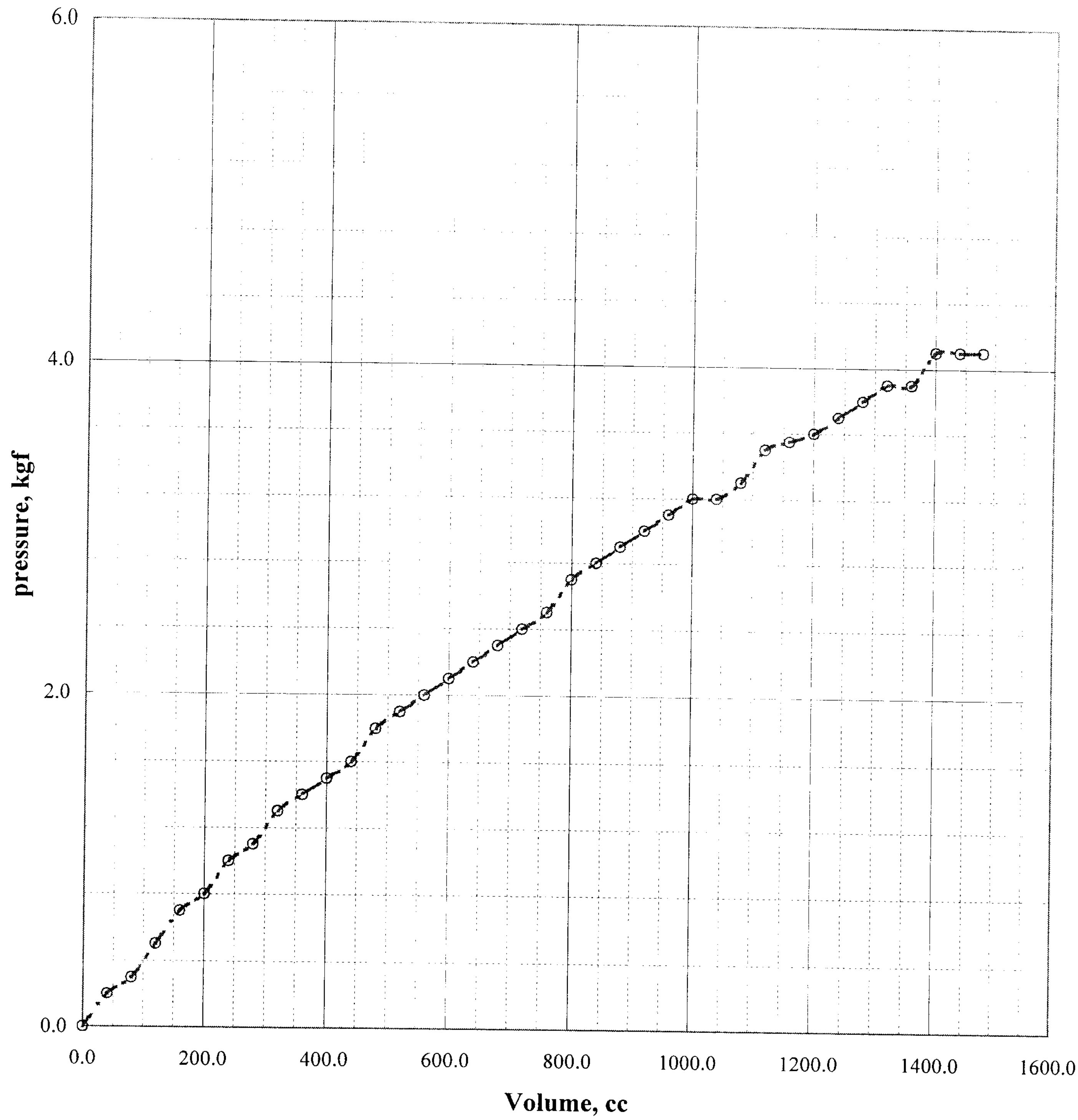
______ from ______ feet

Method to Make Pressuremeter Hole (circle one)

roller cone   solid auger   oversize spoon   ***shelby tube***

Test Data

Test Step	Volume (cc)	Pressure (kgf)	Test Step	Volume (cc)	Pressure (kgf)	Test Step	Volume (cc)	Pressure (kgf)
1	0	0.00	16	600	2.10	31	1200	3.60
2	40	0.20	17	640	2.20	32	1240	3.70
3	80	0.30	18	680	2.30	33	1280	3.80
4	120	0.50	19	720	2.40	34	1320	3.90
5	160	0.70	20	760	2.50	35	1360	3.90
6	200	0.80	21	800	2.70	36	1400	4.10
7	240	1.00	22	840	2.80	37	1440	4.10
8	280	1.10	23	880	2.90	38	1480	4.10
9	320	1.30	24	920	3.00	39	End of Test	
10	360	1.40	25	960	3.10	40		
11	400	1.50	26	1000	3.20	41		
12	440	1.60	27	1040	3.20	42		
13	480	1.80	28	1080	3.30	43		
14	520	1.90	29	1120	3.50	44		
15	560	2.00	30	1160	3.55	45		



Pressuremeter Test Results

Project:	DC Conolidated Laboartories	Date:	May 4, 2007
F&R No.:	H68-134G	Eng.:	Bob Salo
Boring:	B-11A		
Depth:	40		

PRESSUREMETER DATA SHEET

Project Data

Project:	DC Conolidated Laboartories	Date:	May 4, 2007
Location:	4th & School Street SW	Project Number:	H68-134G
Weather:	Clear/Sunny	Project Engineer:	Oscar Merida
Temp:	65 degrees	Test Engineer:	Bob Salo

Test Condition Data

Boring:	B-11A		Ground Surface Elevation:	25 ft, msl
Test Depth:	44.5	ft	Groundwater Depth:	35.5 ft
Test Elevation:	-19.5	ft, msl	Groundwater Elevation:	-10.5 ft, msl

Geology: Coastal Plain — Blow Count: 3-3-11 from 43-44.5 feet

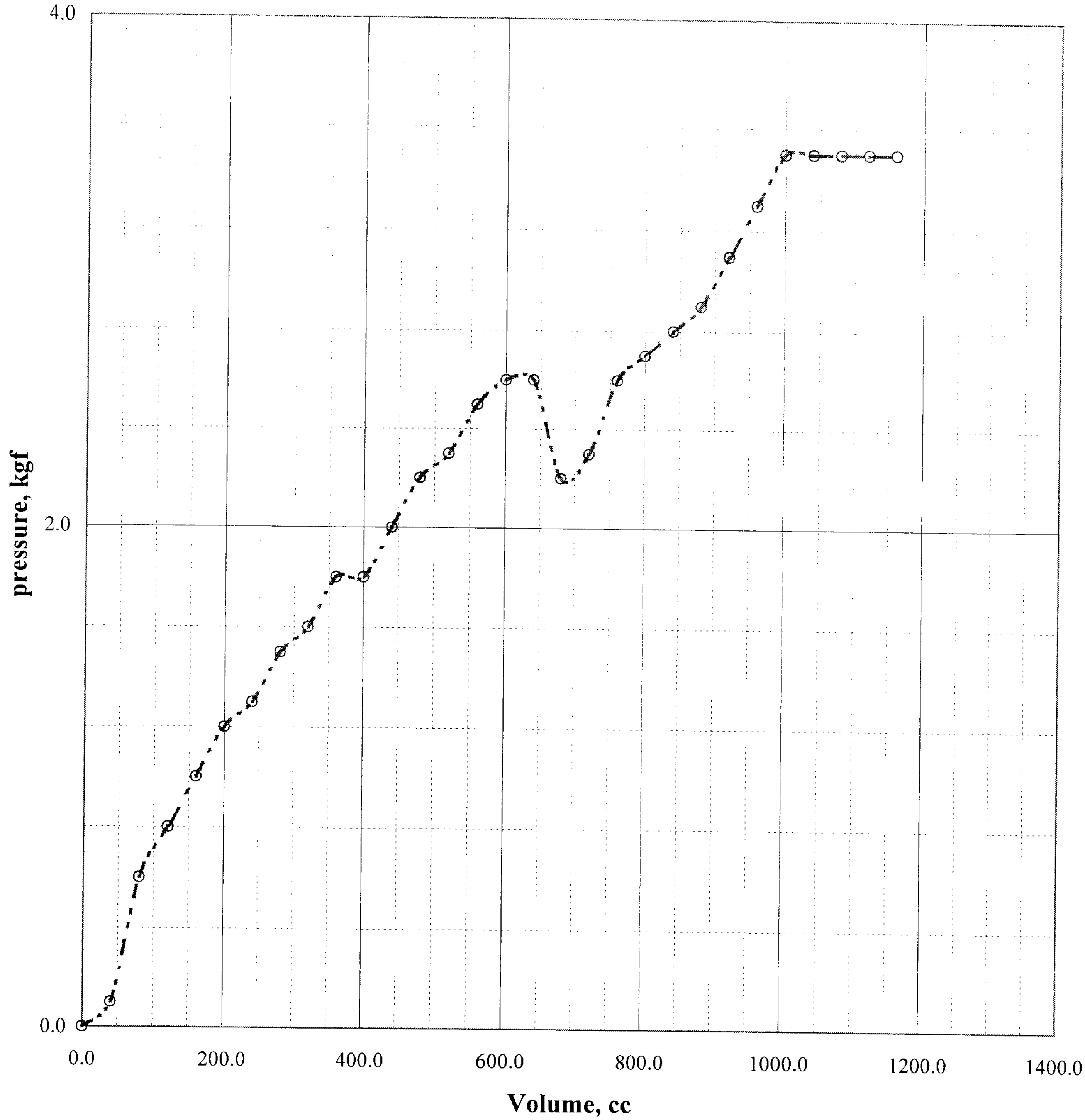
Soil Classification: FAT CLAY (CH) — from feet

Method to Make Pressuremeter Hole (circle one)

roller cone | solid auger | ***oversize spoon*** | shelby tube

Test Data

Test Step	Volume (cc)	Pressure (kgf)	Test Step	Volume (cc)	Pressure (kgf)	Test Step	Volume (cc)	Pressure (kgf)
1	0	0.00	16	600	2.60	31	End of Test	
2	40	0.10	17	640	2.60	32		
3	80	0.60	18	680	2.20	33		
4	120	0.80	19	720	2.30	34		
5	160	1.00	20	760	2.60	35		
6	200	1.20	21	800	2.70	36		
7	240	1.30	22	840	2.80	37		
8	280	1.50	23	880	2.90	38		
9	320	1.60	24	920	3.10	39		
10	360	1.80	25	960	3.30	40		
11	400	1.80	26	1000	3.50	41		
12	440	2.00	27	1040	3.50	42		
13	480	2.20	28	1080	3.50	43		
14	520	2.30	29	1120	3.50	44		
15	560	2.50	30	1160	3.50	45		



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Pressuremeter Test Results

Project:	DC Conolidated Laboartories	Date:	May 4, 2007
F&R No.:	H68-134G	Eng.:	Bob Salo
Boring:	B-11A		
Depth:	44.5		

PRESSUREMETER DATA SHEET

Project Data

Project: DC Conolidated Laboartories

Date: May 4, 2007

Location: 4th & School Street SW

Project Number: H68-134G

Weather: Clear/Sunny

Project Engineer: Oscar Merida

Temp: 65 degrees

Test Engineer: Bob Salo

Test Condition Data

Boring: B-11A

Ground Surface Elevation: 25 ft, msl

Test Depth: 64 ft

Groundwater Depth: 35.5 ft

Test Elevation: -39 ft, msl

Groundwater Elevation: -10.5 ft, msl

Geology: Coastal Plain

Blow Count: 19-21-19 from 62.5-64 feet

Soil Classification: clayey SAND (SC)

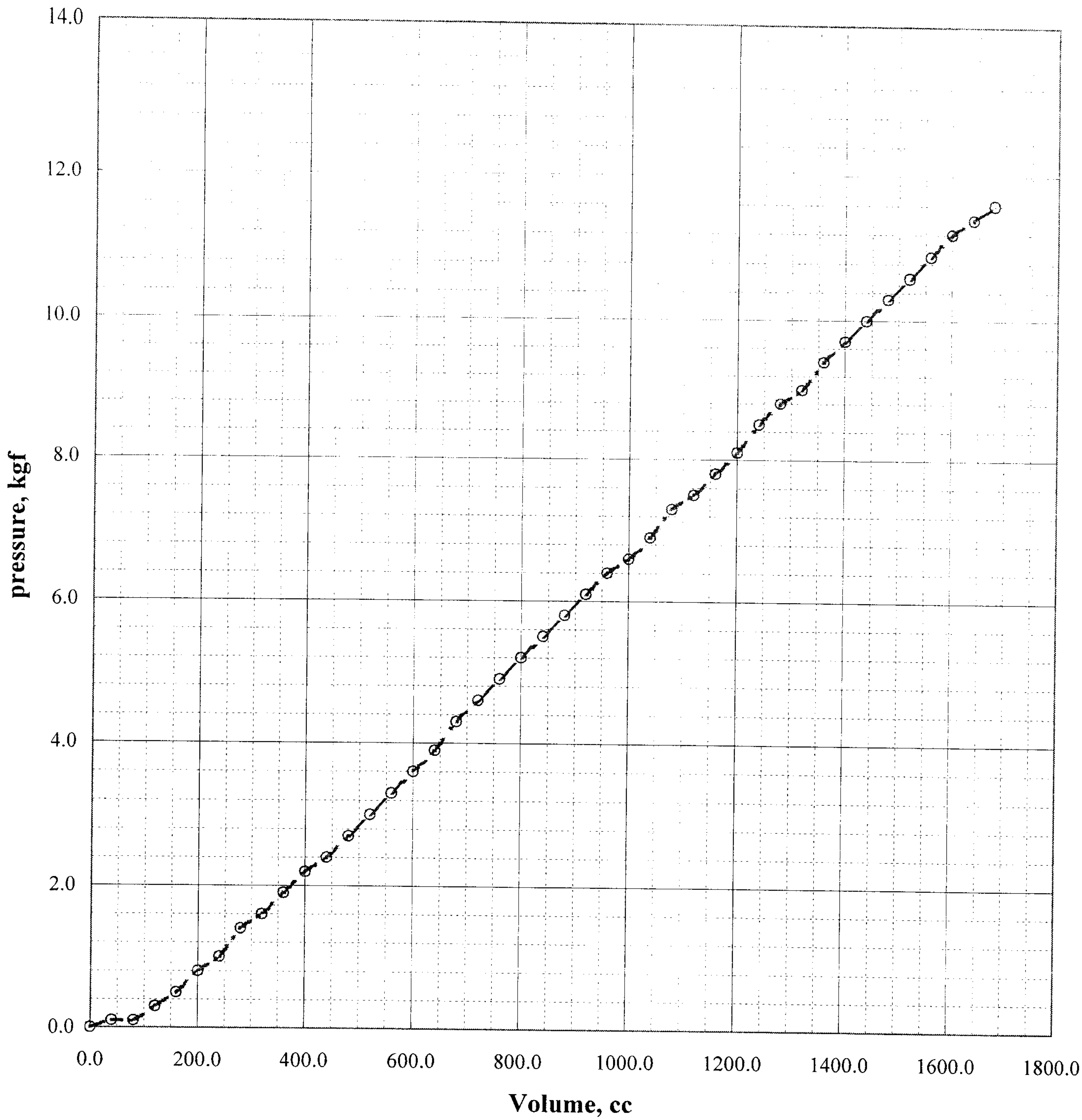
from feet

Method to Make Pressuremeter Hole (circle one)

roller cone | solid auger | ***oversize spoon*** | shelby tube

Test Data

Test Step	Volume (cc)	Pressure (kgf)	Test Step	Volume (cc)	Pressure (kgf)	Test Step	Volume (cc)	Pressure (kgf)
1	0	0.00	16	600	3.60	31	1200	8.10
2	40	0.10	17	640	3.90	32	1240	8.50
3	80	0.10	18	680	4.30	33	1280	8.80
4	120	0.30	19	720	4.60	34	1320	9.00
5	160	0.50	20	760	4.90	35	1360	9.40
6	200	0.80	21	800	5.20	36	1400	9.70
7	240	1.00	22	840	5.50	37	1440	10.00
8	280	1.40	23	880	5.80	38	1480	10.30
9	320	1.60	24	920	6.10	39	1520	10.60
10	360	1.90	25	960	6.40	40	1560	10.9
11	400	2.20	26	1000	6.60	41	1600	11.2
12	440	2.40	27	1040	6.90	42	1640	11.4
13	480	2.70	28	1080	7.30	43	1680	11.6
14	520	3.00	29	1120	7.50	44	End of Test	
15	560	3.30	30	1160	7.80	45		



Pressuremeter Test Results

Project:	DC Conolidated Laboartories	Date:	May 4, 2007
F&R No.:	H68-134G	Eng.:	Bob Salo
Boring:	B-11A		
Depth:	64		

PRESSUREMETER DATA SHEET

Project Data

Project: DC Conolidated Laboartories
Date: May 1, 2007
Location: 4th & School Street SW
Project Number: H68-134G
Weather: Clear/Sunny
Project Engineer: Oscar Merida
Temp: 65 degrees
Test Engineer: Bob Salo

Test Condition Data

Boring: B-16A
Ground Surface Elevation: 17 ft, msl
Test Depth: 34.5 ft
Groundwater Depth: 29.1 ft
Test Elevation: -17.5 ft, msl
Groundwater Elevation: -12.1 ft, msl

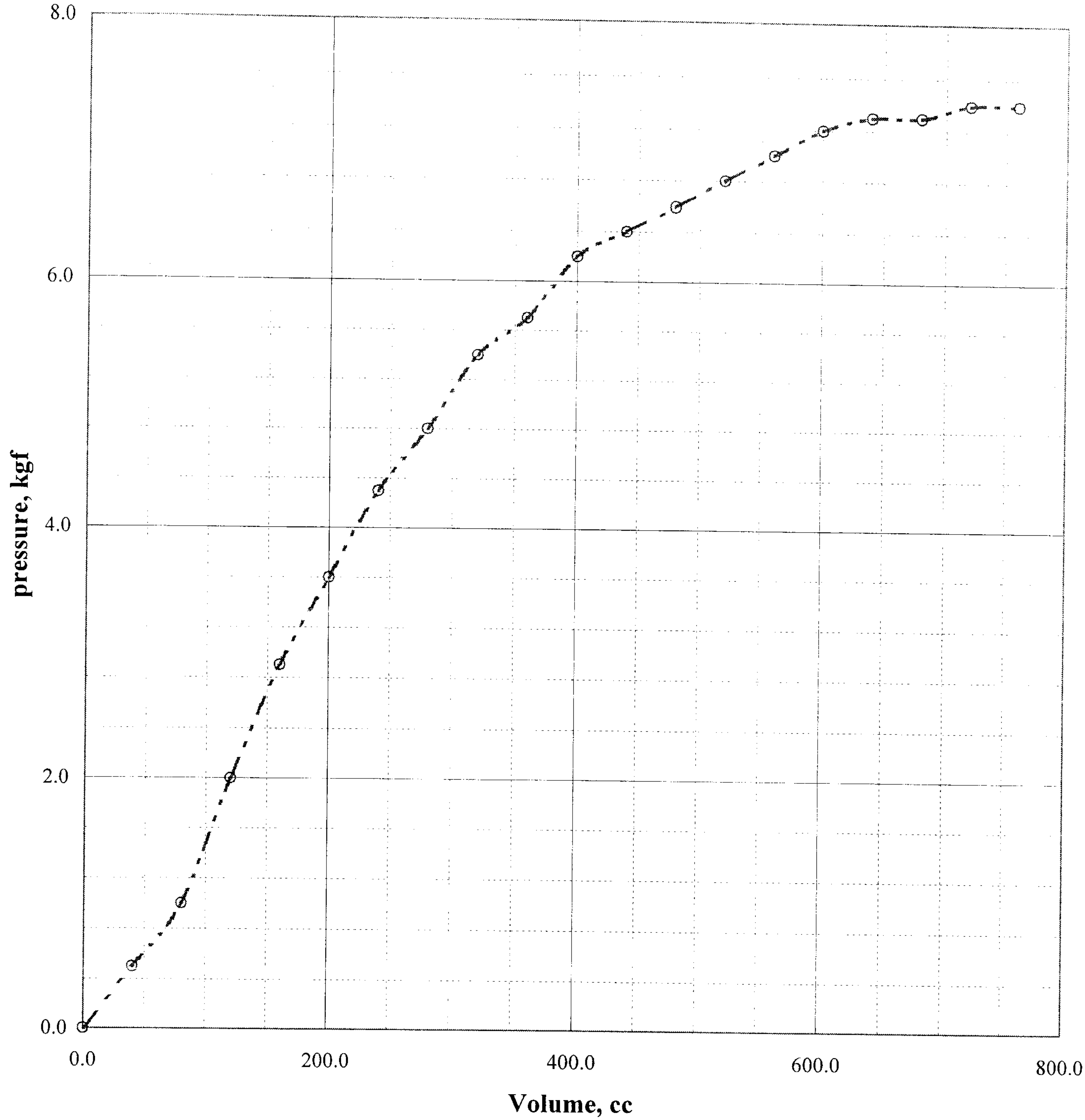
Geology: Coastal Plain
Blow Count: ______ from ______ feet
Soil Classification: FAT CLAY (CH)
______ from ______ feet

Method to Make Pressuremeter Hole (circle one)

roller cone   solid auger   oversize spoon   ***shelby tube***

Test Data

Test Step	Volume (cc)	Pressure (kgf)	Test Step	Volume (cc)	Pressure (kgf)	Test Step	Volume (cc)	Pressure (kgf)
1	0	0.00	16	600	7.20	31		
2	40	0.50	17	640	7.30	32		
3	80	1.00	18	680	7.30	33		
4	120	2.00	19	720	7.40	34		
5	160	2.90	20	760	7.40	35		
6	200	3.60	21	End of Test		36		
7	240	4.30	22			37		
8	280	4.80	23			38		
9	320	5.40	24			39		
10	360	5.70	25			40		
11	400	6.20	26			41		
12	440	6.40	27			42		
13	480	6.60	28			43		
14	520	6.80	29			44		
15	560	7.00	30			45		



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Pressuremeter Test Results

Project:	DC Conolidated Laboartories	Date:	May 1, 2007
F&R No.:	H68-134G	Eng.:	Bob Salo
Boring:	B-16A		
Depth:	34.5		

PRESSUREMETER DATA SHEET

Project Data

Project:	DC Conolidated Laboartories	Date:	May 1, 2007
Location:	4th & School Street SW	Project Number:	H68-134G
Weather:	Clear/Sunny	Project Engineer:	Oscar Merida
Temp:	65 degrees	Test Engineer:	Bob Salo

Test Condition Data

Boring:	B-16A		Ground Surface Elevation:	17 ft, msl
Test Depth:	39.5	ft	Groundwater Depth:	29.1 ft
Test Elevation:	-22.5	ft, msl	Groundwater Elevation:	-12.1 ft, msl

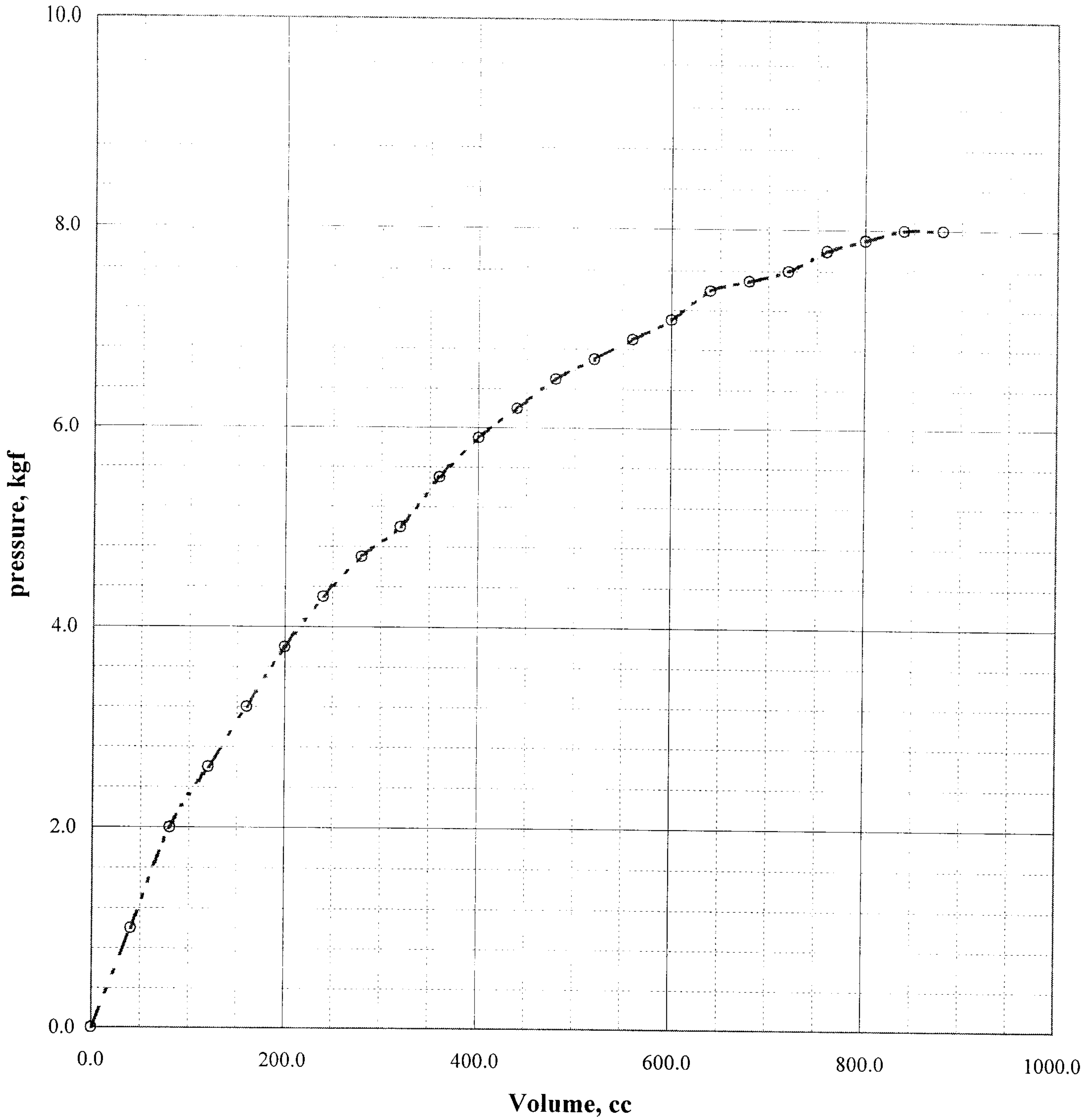
Geology:	Coastal Plain	Blow Count:	4-6-7	from	38-39.5	feet
Soil Classification:	FAT CLAY (CH)			from		feet

Method to Make Pressuremeter Hole (circle one)

roller cone solid auger ***oversize spoon*** shelby tube

Test Data

Test Step	Volume (cc)	Pressure (kgf)	Test Step	Volume (cc)	Pressure (kgf)	Test Step	Volume (cc)	Pressure (kgf)
1	0	0.00	16	600	7.10	31		
2	40	1.00	17	640	7.40	32		
3	80	2.00	18	680	7.50	33		
4	120	2.60	19	720	7.60	34		
5	160	3.20	20	760	7.80	35		
6	200	3.80	21	800	7.90	36		
7	240	4.30	22	840	8.00	37		
8	280	4.70	23	880	8.00	38		
9	320	5.00	24	End of Test		39		
10	360	5.50	25			40		
11	400	5.90	26			41		
12	440	6.20	27			42		
13	480	6.50	28			43		
14	520	6.70	29			44		
15	560	6.90	30			45		



Pressuremeter Test Results

Project:	DC Conolidated Laboartories	Date:	May 1, 2007
F&R No.:	H68-134G	Eng.:	Bob Salo
Boring:	B-16A		
Depth:	39.5		

PRESSUREMETER DATA SHEET

Project Data

Project:	DC Conolidated Laboartories	Date:	May 1, 2007
Location:	4th & School Street SW	Project Number:	H68-134G
Weather:	Clear/Sunny	Project Engineer:	Oscar Merida
Temp:	65 degrees	Test Engineer:	Bob Salo

Test Condition Data

Boring:	B-16A		Ground Surface Elevation:	17	ft, msl
Test Depth:	44.5	ft	Groundwater Depth:	29.1	ft
Test Elevation:	-27.5	ft, msl	Groundwater Elevation:	-12.1	ft, msl

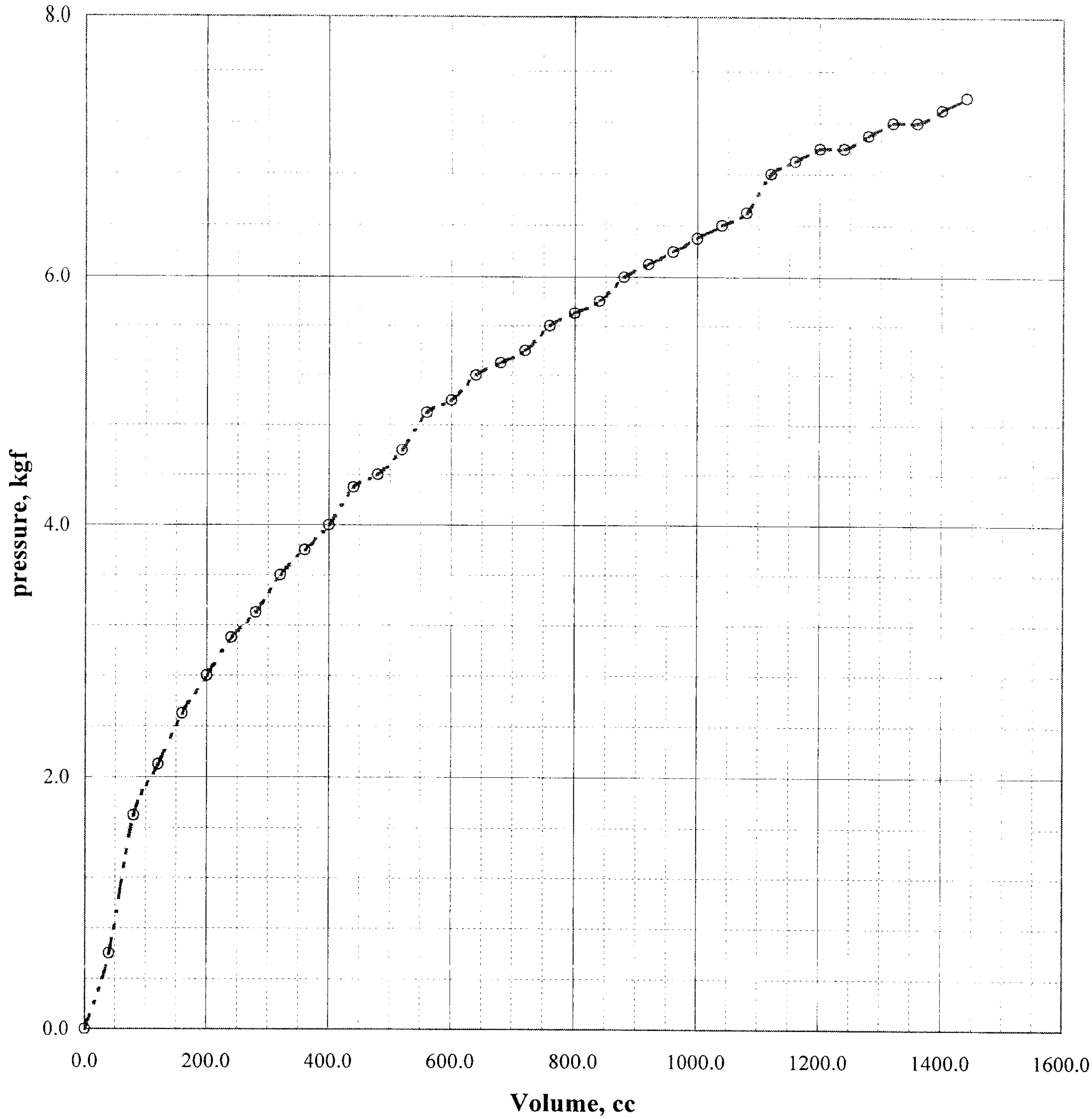
Geology:	Coastal Plain	Blow Count:	4-4-6	from	43-44.5	feet
Soil Classification:	FAT CLAY (CH)			from		feet

Method to Make Pressuremeter Hole (circle one)

roller cone   solid auger   *oversize spoon*   shelby tube

Test Data

Test Step	Volume (cc)	Pressure (kgf)	Test Step	Volume (cc)	Pressure (kgf)	Test Step	Volume (cc)	Pressure (kgf)
1	0	0.00	16	600	5.00	31	1200	7.00
2	40	0.60	17	640	5.20	32	1240	7.00
3	80	1.70	18	680	5.30	33	1280	7.10
4	120	2.10	19	720	5.40	34	1320	7.20
5	160	2.50	20	760	5.60	35	1360	7.20
6	200	2.80	21	800	5.70	36	1400	7.30
7	240	3.10	22	840	5.80	37	1440	7.40
8	280	3.30	23	880	6.00	38	1480	7.40
9	320	3.60	24	920	6.10	39	End of Test	
10	360	3.80	25	960	6.20	40		
11	400	4.00	26	1000	6.30	41		
12	440	4.30	27	1040	6.40	42		
13	480	4.40	28	1080	6.50	43		
14	520	4.60	29	1120	6.80	44		
15	560	4.90	30	1160	6.90	45		



Pressuremeter Test Results

Project:	DC Conolidated Laboartories	Date:	May 1, 2007
F&R No.:	H68-134G	Eng.:	Bob Salo
Boring:	B-16A		
Depth:	44.5		

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APPENDIX D

Laboratory Test Summary Sheet

Boring/ Sample No.	Depth	LL	PL	PI	% Natural Moisture	% Gravel	% Sand	% Fines	USCS Class.	AASHTO Class.	Maximum Dry Density	Optimum Moisture Content	CBR Value @ 0.1
B-01	44.0	29	17	12	17.0	1.5	58.2	40.3	SC	A-6			
B-01	69.0	53	29	24		0.0	27.0	73.0	MH	A-7-6			
B-02	4.0	29	16	13	13.8	2.5	38.3	59.3	CL	A-6	116.6	13.8	
B-02	14.0	NP	NP	NP	2.0	28.8	59.6	11.6	SP-SM	A-1-b			
B-02	54.0	26	21	5		0.0	83.0	17.0	SC-SM	A-2-4			
B-03	16.0	52	31	21	2.6	40.6	45.1	14.3	SM	A-2-7			
B-03	39.0	39	22	17	24.4	0.0	72.3	27.7	SC	A-2-6			
B-03	59.0	NP	NP	NP	21.6	28.5	61.7	9.8	SW-SM	A-1-b			
B-04	24.0	NP	NP	NP	4.3	59.2	34.7	6.1	GP-GM	A-1-a			
B-04	39.0	25	18	7	17.5	8.6	45.3	46.1	SC-SM	A-4			
B-04	44.0	23	16	7	0.7	0.1	71.6	28.4	SC-SM	A-2-4			
B-05	4.0	39	19	20	44.9	0.0	21.4	78.5	CL	A-6	113.3	14.9	
B-05	9.0	27	16	11	13.4	33.1	21.8	45.1	GC	A-6			
B-05	34.0	36	21	15	24.0	0.0	4.8	95.2	CL	A-6			
B-05	39.0	24	16	8	0.9	0.0	28.1	71.9	CL	A-4			
B-06	14.0	NP	NP	NP	4.4	86.3	10.1	3.6	GP	A-1-a			
B-06	34.0	NP	NP	NP	1.6	0.0	5.9	94.1	ML	A-4			
B-06	74.0	44	22	22	19.6	0.0	83.9	16.1	SC	A-2-7			
B-07	14.0	NP	NP	NP	3.3	0.0	73.8	15.4	SM	A-2-4			
B-07	39.0	27	15	12	21.5	0.0	31.6	68.4	CL	A-6			
B-07	54.0	48	18	30	16.8	0.0	27.0	72.9	CL	A-7-6			
B-07	64.0	52	23	29	28.6	0.0	36.8	63.2	CH	A-7-6			
B-08	9.0	22	16	6	13.8	32.7	38.9	28.4	SC-SM	A-2-4			

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Lab Test Summary — Sheet 1 of 3

Report No.: H68-134G
Client: HO+K
Project: DC Crime Labs
Location: 4th and School Streets, SW DC
Date: July 2007

Laboratory Test Summary Sheet

Boring/ Sample No.	Depth	LL	PL	PI	% Natural Moisture	% Gravel	% Sand	% Fines	USCS Class.	AASHTO Class.	Maximum Dry Density	Optimum Moisture Content	CBR Value @ 0.1
B-08	24.0	NP	NP	NP	4.4	68.0	26.7	5.3	GP-GM	A-1-a			
B-08	39.0				1.5	0.0	16.4	83.6					
B-08	49.0	45	32	13	11.2	65.4	27.5	7.1	GP-GM	A-2-7			
B-09	39.0	22	16	6	1.1	0.0	17.6	82.4	CL-ML	A-4			
B-09	44.0	21	16	5	16.3	0.3	61.4	38.3	SC-SM	A-4			
B-09	59.0	32	21	11	25.9	0.0	85.6	14.4	SC	A-2-6			
B-10	39.0	40	23	17	25.5	0.0	12.7	87.3	CL	A-6			
B-10	44.0	30	19	11	20.6	0.0	57.4	42.6	SC	A-6			
B-11	14.0	21	16	5	8.8	7.2	71.3	21.4	SC-SM	A-2-4			
B-11	39.0	29	17	12		0.0	56.9	43.1	SC	A-6			
B-12	14.0	NP	NP	NP	1.9	33.8	59.2	7.0	SP-SM	A-1-b			
B-12	29.0	NP	NP	NP	5.8	28.8	58.3	12.9	SM	A-1-b			
B-12	49.0	25	15	10	15.4	0.7	85.5	13.9	SC	A-2-4			
B-12	64.0	56	31	25	29.6	0.0	41.5	58.5	MH	A-7-5			
B-13	19.0	NP	NP	NP	3.3	74.0	21.3	4.7	GP	A-1-a			
B-13	44.0	27	17	10	20.7	0.0	53.4	46.6	SC	A-4			
B-13	64.0	49	32	17	23.3	0.3	50.8	48.8	SM	A-7-5			
B-13	69.0	52	34	18	4.7	0.0	9.6	90.4	MH	A-7-5			
B-14	9.0	NP	NP	NP	1.0	0.0	75.0	25.0	SM	A-2-4			
B-14	24.0	NP	NP	NP	4.8	39.6	52.2	8.2	SP-SM	A-1-a			
B-14	44.0	27	16	11	16.2	0.4	47.3	52.3	CL	A-6			
B-14	54.0	NP	NP	NP	22.5	0.0	77.3	22.7	SM	A-2-4			
B-14	64.0	55	37	18	4.4	0.0	29.4	70.6	MH	A-7-5			

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Lab Test Summary

Report No.: H68-134G
Client: HO+K
Project: DC Crime Labs
Location: 4th and School Streets, SW DC
Date: July 2007

Laboratory Test Summary Sheet

Boring/ Sample No.	Depth	LL	PL	PI	% Natural Moisture	% Gravel	% Sand	% Fines	USCS Class.	AASHTO Class.	Maximum Dry Density	Optimum Moisture Content	CBR Value @ 0.1
B-15	4.0	30	17	13	15.2	1.3	30.8	67.8	CL	A-6	115.2	14.7	
B-15	19.0	NP	NP	NP	3.6	24.5	58.5	17.0	SM	A-1-b			
B-15	39.0	28	18	10		0.0	41.5	58.4	CL	A-4			
B-16	19.0	NP	NP	NP	2.5	64.8	27.5	7.7	GP-GM	A-1-a			
B-16	34.0	58	27	31	2.0	0.0	2.5	97.5	CH	A-7-6			
B-16	59.0	56	26	30	23.7	0.0	6.0	94.0	CH	A-7-6			
B-16	69.0	42	20	22	23.6	0.0	0.6	99.4	CL	A-7-6			

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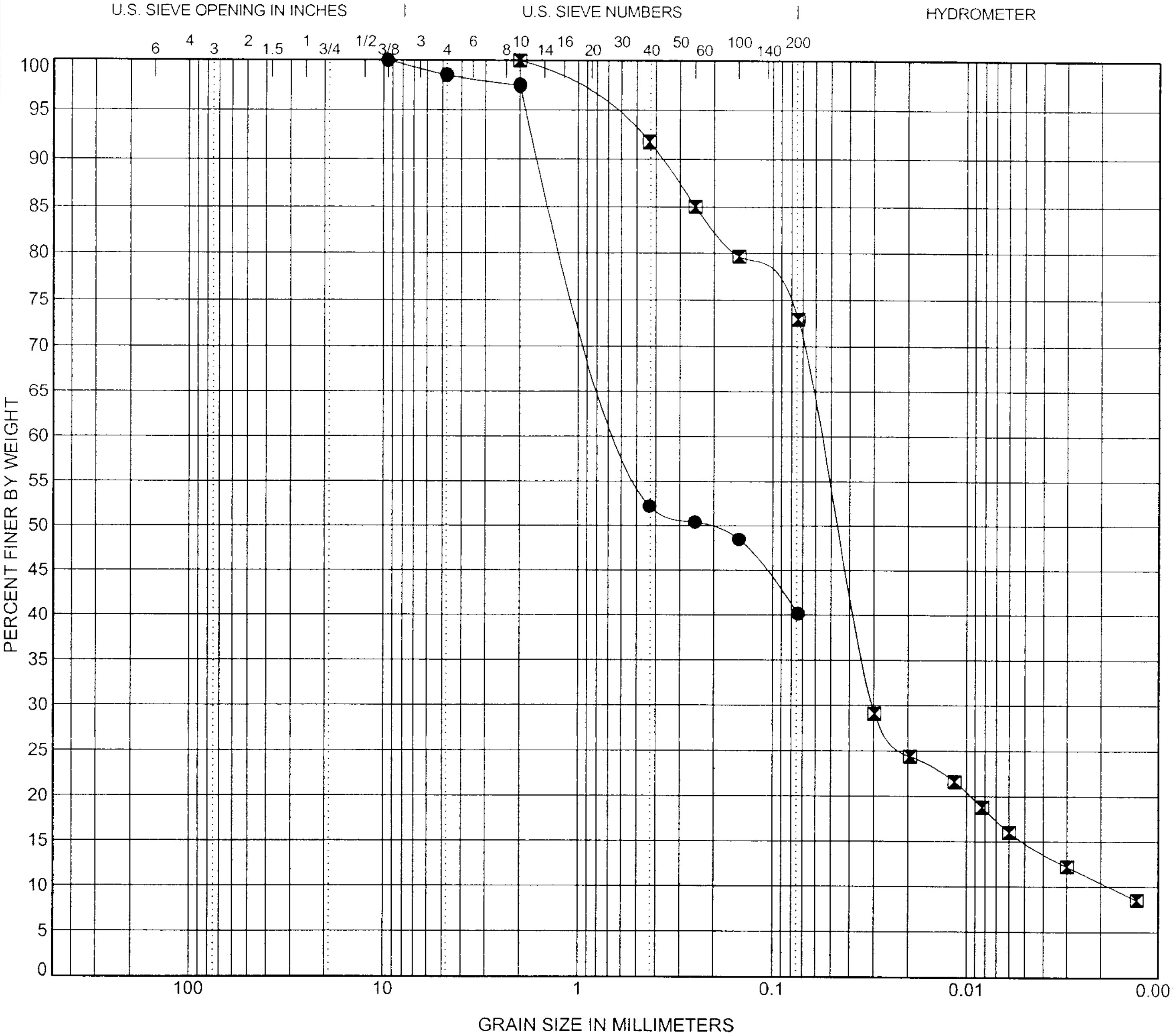
Lab Test Summary — Sheet 3 of 3

Report No.: H68-134G
Client: HO+K
Project: DC Crime Labs
Location: 4th and School Streets, SW DC
Date: July 2007



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring No.		Depth	Classification	LL	PL	PI	Cc	Cu
● B-1	at	44.0	CLAYEY SAND(SC)	29	17	12		
⊠ B-1	at	69.0	ELASTIC SILT with SAND(MH)	53	29	24	8.87	31.01

Boring No.		Depth	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-1	at	44.0	9.52	0.56			1.5	58.2	40.3	
⊠ B-1	at	69.0	2	0.057	0.03	0.002	0.0	27.0	58.0	15.0

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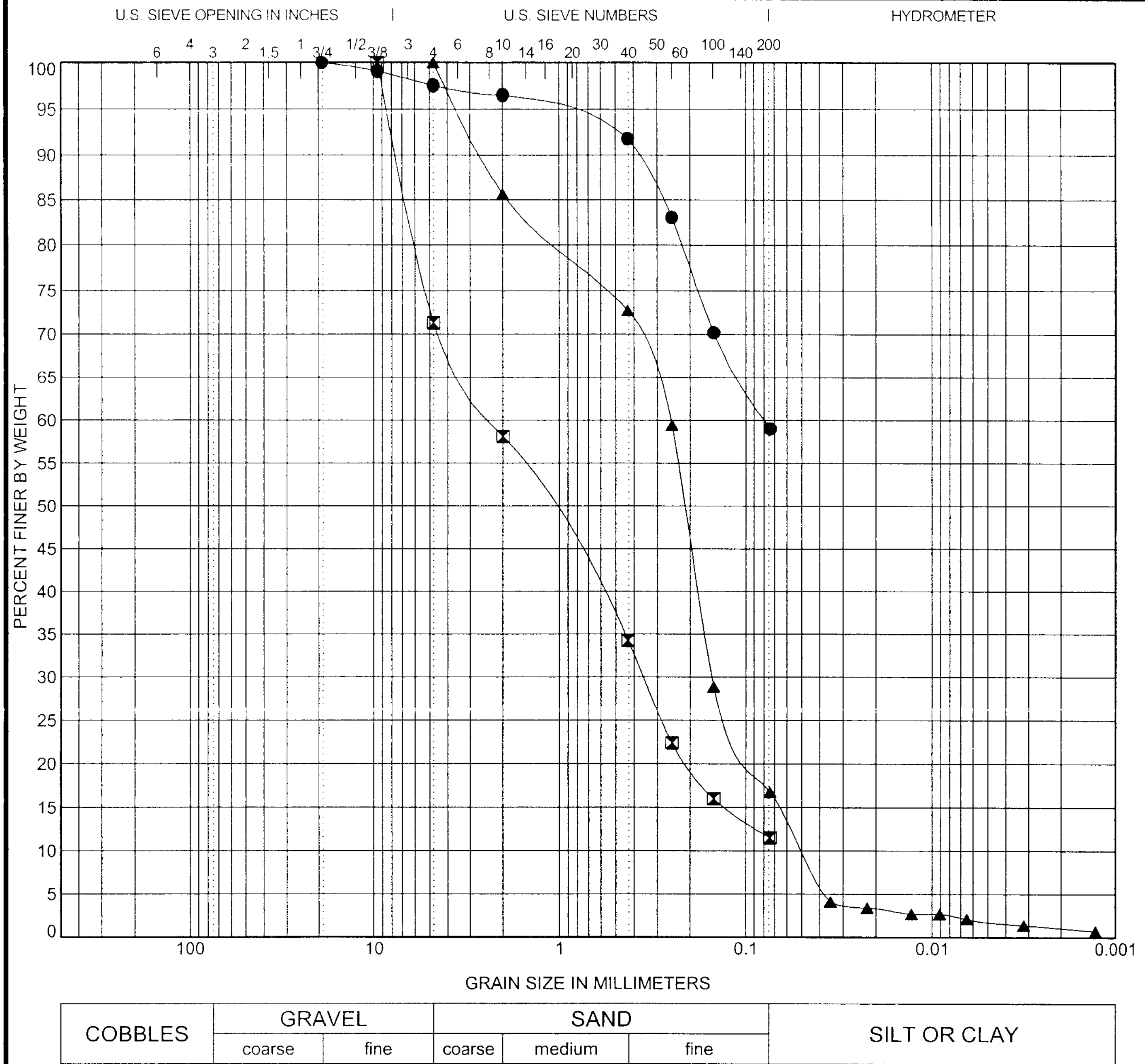
GRAIN SIZE DISTRIBUTION

Report No.: H68-134G
Client: HO+K
Project: DC Crime Labs
Location: 4th and School Streets, SW DC
Date: July 2007

US GRAIN SIZE BORING LOGS.GPJ F&R.GDT 7/9/07



Boring No.		Depth	Classification	LL	PL	PI	Cc	Cu
● B-2	at	4.0	SANDY LEAN CLAY(CL)	29	16	13		
⊠ B-2	at	14.0	POORLY GRADED SAND with SILT and GRAVEL(SP-SM)	NP	NP	NP	0.95	38.87
▲ B-2	at	54.0	SILTY, CLAYEY SAND(SC-SM)	26	21	5	1.82	5.16

Boring No.		Depth	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-2	at	4.0	19.1	0.079			2.5	38.3	59.3	
⊠ B-2	at	14.0	9.52	2.264	0.354		28.8	59.6	11.6	
▲ B-2	at	54.0	4.76	0.256	0.152	0.05	0.0	83.0	15.1	1.8

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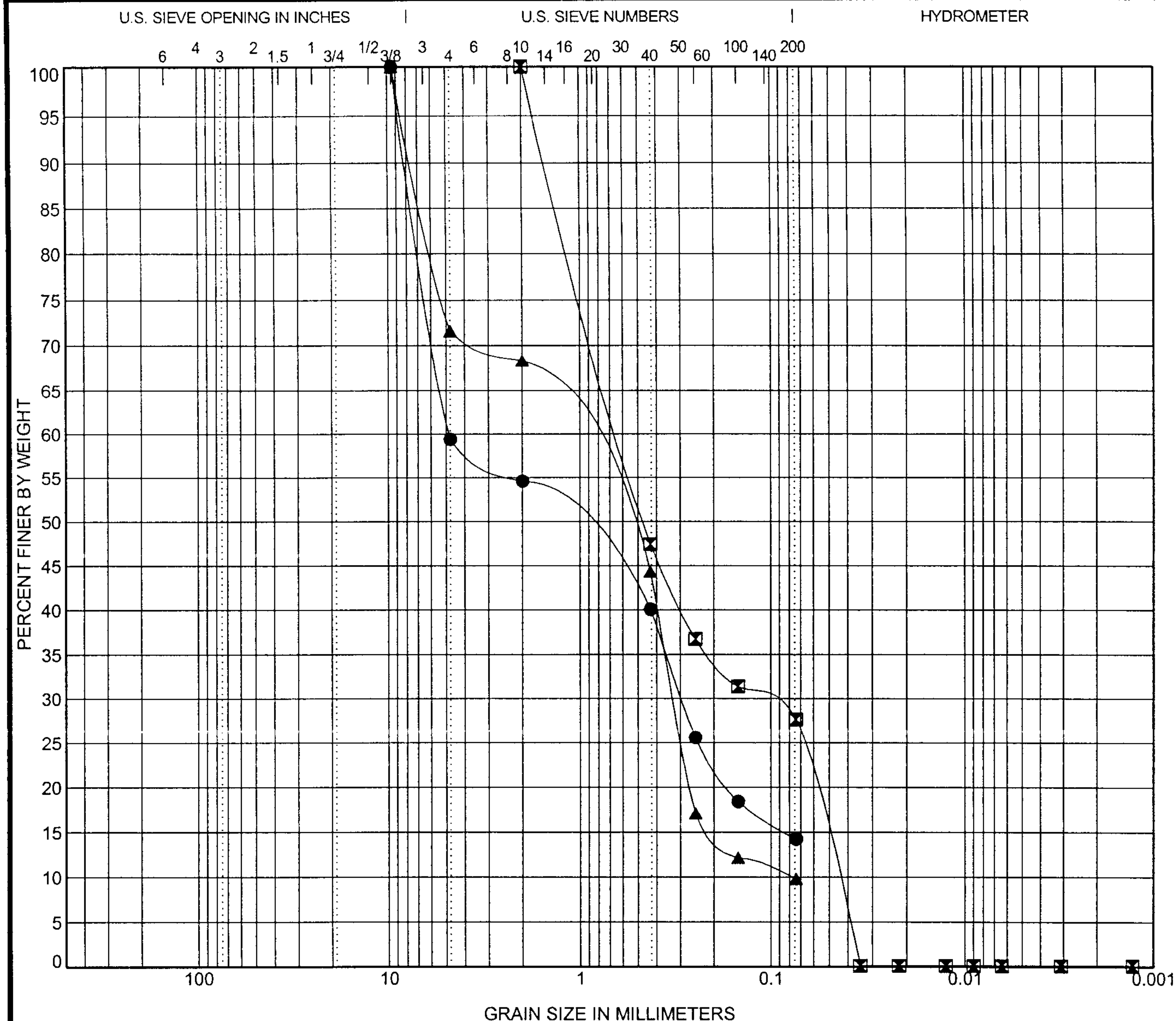
GRAIN SIZE DISTRIBUTION

Report No.: H68-134G
Client: HO+K
Project: DC Crime Labs
Location: 4th and School Streets, SW DC
Date: July 2007

US GRAIN SIZE BORING LOGS.GPJ F&R.GDT 7/9/07



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring No.		Depth	Classification	LL	PL	PI	Cc	Cu
● B-3	at	16.0	SILTY SAND with GRAVEL(SM)	52	31	21		
⊠ B-3	at	39.0	CLAYEY SAND(SC)	39	22	17	0.47	13.65
▲ B-3	at	59.0	WELL-GRADED SAND with SILT and GRAVEL(SW-SM)	NP	NP	NP	1.13	14.91

Boring No.		Depth	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-3	at	16.0	9.52	4.809	0.295		40.6	45.1	14.3	
⊠ B-3	at	39.0	2	0.621	0.116	0.045	0.0	72.3	27.6	0.1
▲ B-3	at	59.0	9.52	1.174	0.323	0.079	28.5	61.7	9.8	

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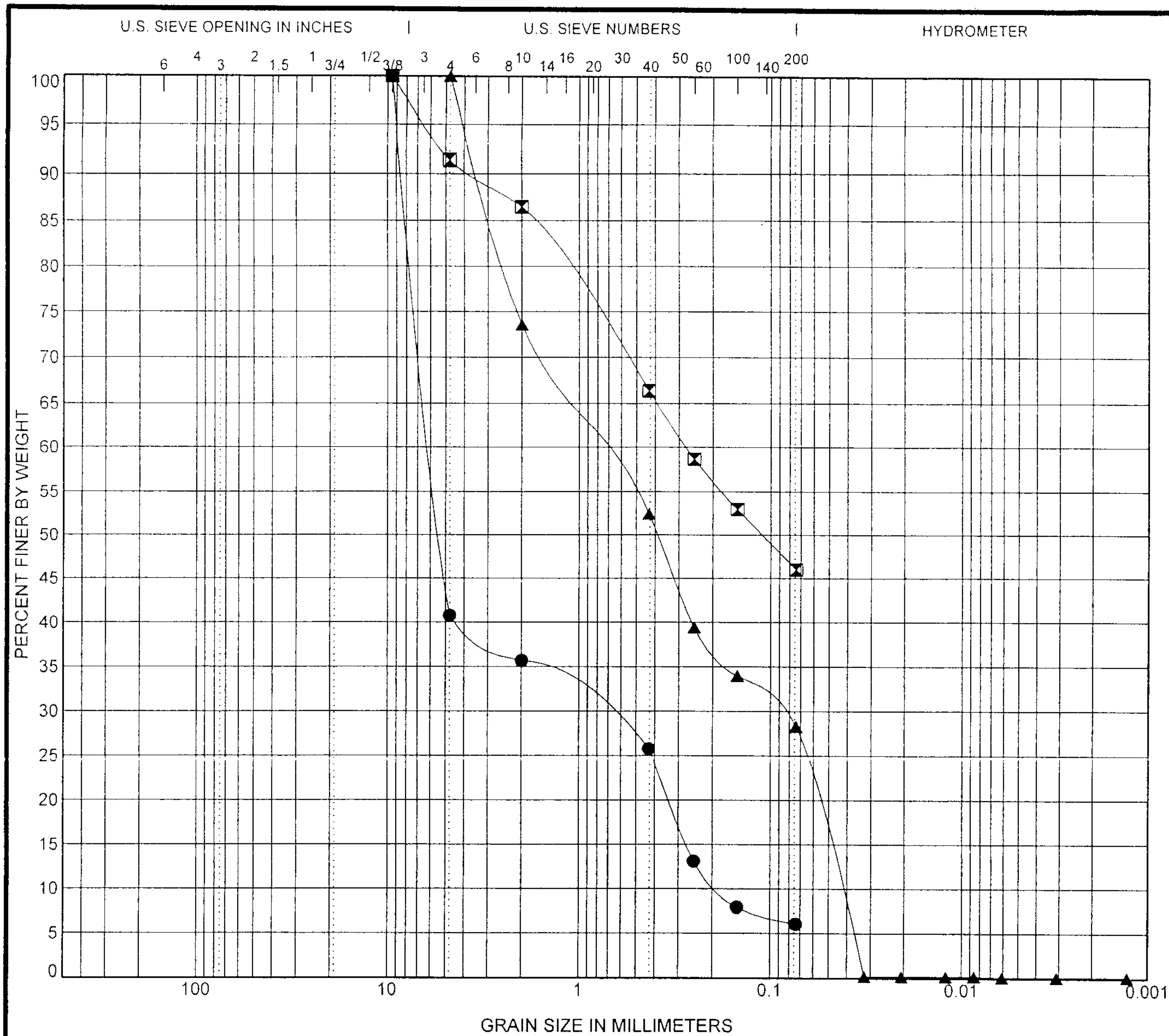
Report No.: H68-134G
Client: HO+K
Project: DC Crime Labs
Location: 4th and School Streets, SW DC
Date: July 2007

US GRAIN SIZE BORING LOGS.GPJ F&R.GDT 6/28/07



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring No.		Depth	Classification	LL	PL	PI	Cc	Cu
●	B-4	at	24.0	POORLY GRADED GRAVEL with SILT and SAND(GP-GM)	NP	NP	NP	0.63	32.55
⌧	B-4	at	39.0	SILTY, CLAYEY SAND(SC-SM)	25	18	7		
▲	B-4	at	44.0	SILTY, CLAYEY SAND(SC-SM)	23	16	7	0.26	17.21

	Boring No.		Depth	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-4	at	24.0	9.52	5.962	0.827	0.183	59.2	34.7	6.1	
⌧	B-4	at	39.0	9.52	0.275			8.6	45.3	46.1	
▲	B-4	at	44.0	4.76	0.746	0.091	0.043	0.1	71.6	28.3	0.1

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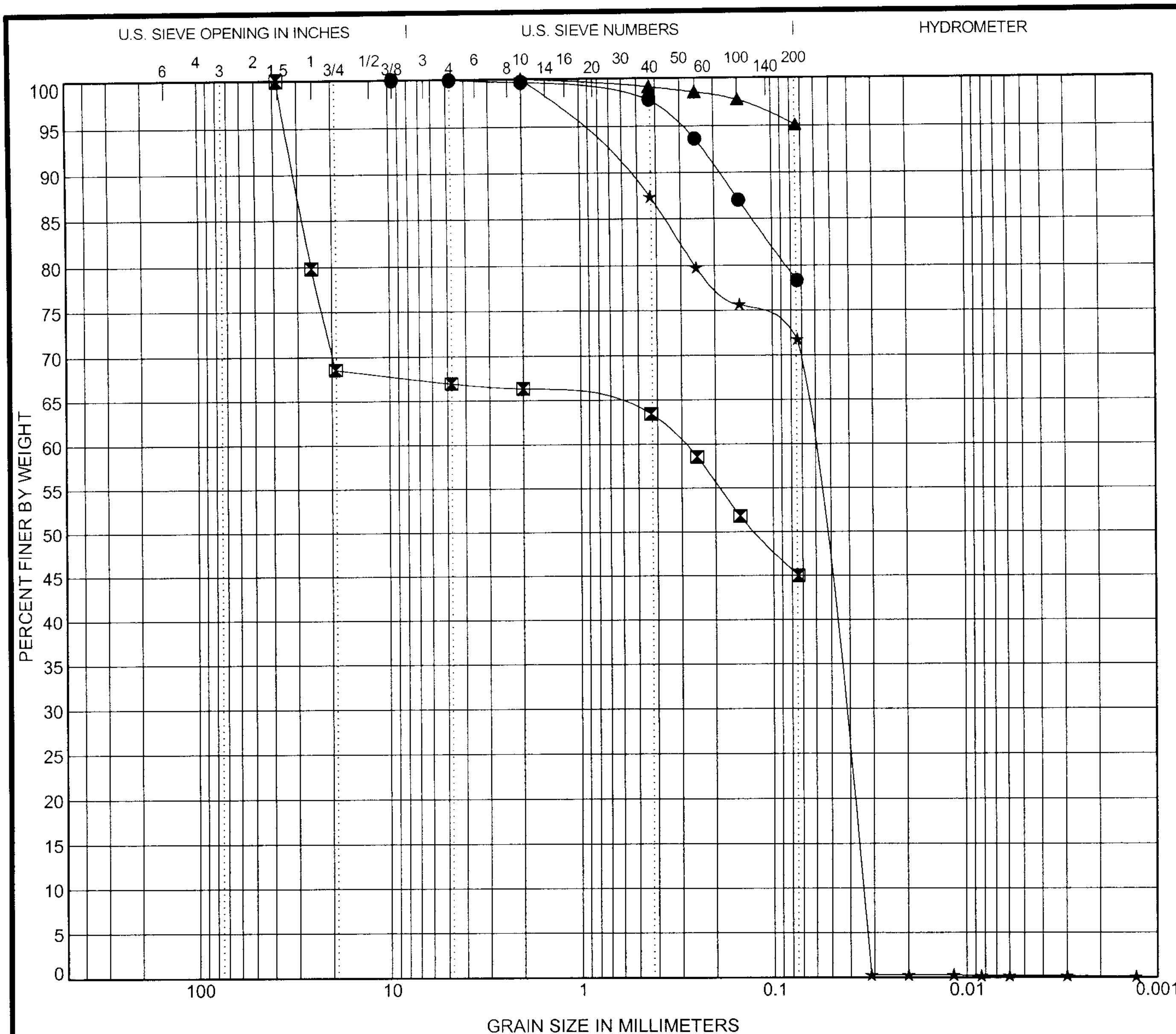

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring No.		Depth	Classification	LL	PL	PI	Cc	Cu
●	B-5	at	4.0	LEAN CLAY with SAND(CL)	39	19	20		
⧗	B-5	at	9.0	CLAYEY GRAVEL with SAND(GC)	27	16	11		
▲	B-5	at	34.0	LEAN CLAY(CL)	36	21	15		
★	B-5	at	39.0	LEAN CLAY with SAND(CL)	24	16	8	0.89	1.83

	Boring No.		Depth	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-5	at	4.0	9.52				0.0	21.4	78.5	
⧗	B-5	at	9.0	38.1	0.293			33.1	21.8	45.1	
▲	B-5	at	34.0	2				0.0	4.8	95.2	
★	B-5	at	39.0	2	0.064	0.045	0.035	0.0	28.1	71.7	0.2

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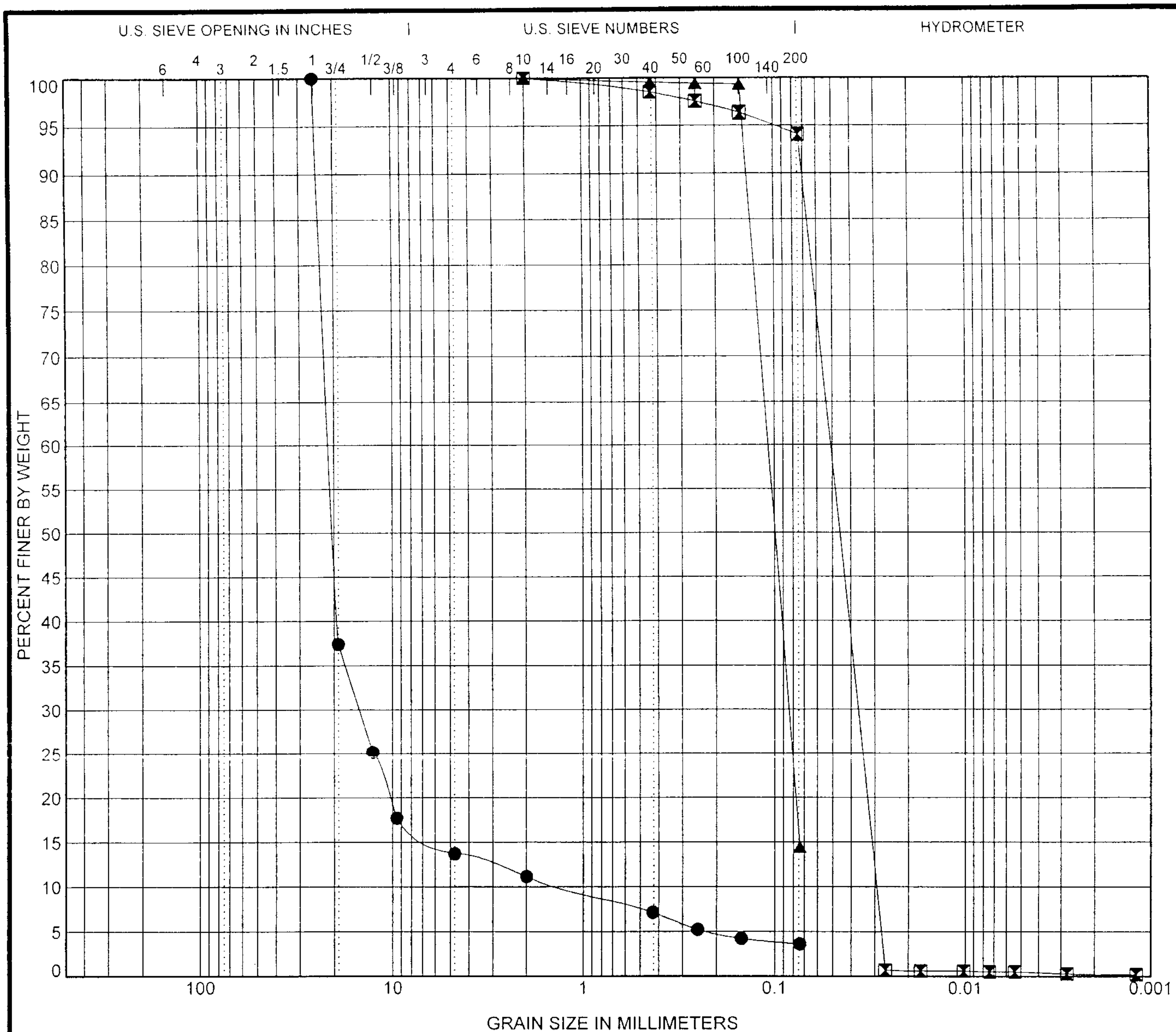

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring No.		Depth	Classification	LL	PL	PI	Cc	Cu
●	B-6	at	14.0	POORLY GRADED GRAVEL(GP)	NP	NP	NP	8.20	16.48
⧗	B-6	at	34.0	SILT(ML)	NP	NP	NP	0.90	1.73
▲	B-6	at	74.0	CLAYEY SAND(SC)	44	22	22		

	Boring No.		Depth	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-6	at	14.0	25.4	21.169	14.927	1.284	86.3	10.1	3.6	
⧗	B-6	at	34.0	2	0.051	0.037	0.029	0.0	5.9	93.7	0.5
▲	B-6	at	74.0	2	0.108	0.084		0.0	83.9	16.1	

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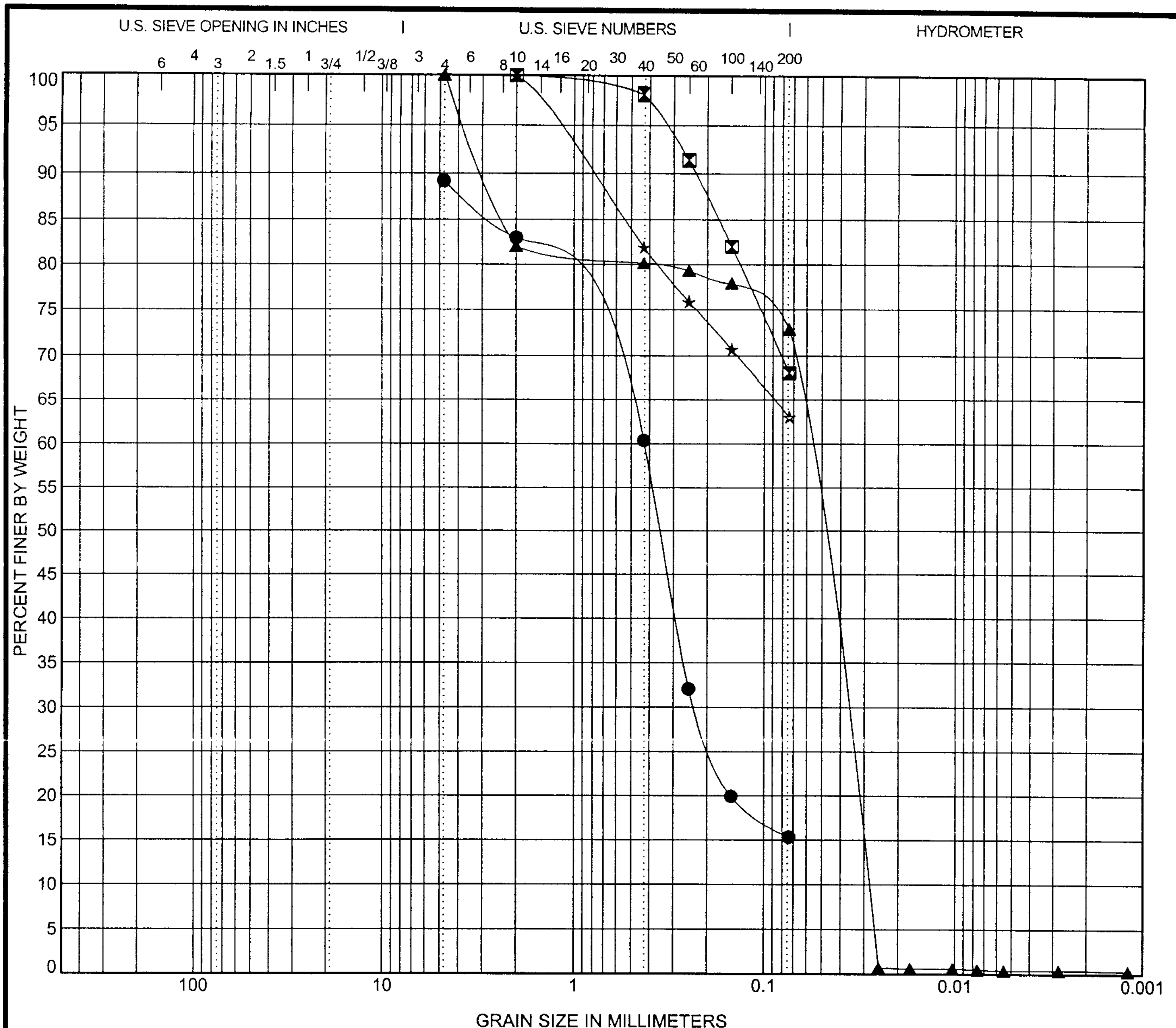

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring No.		Depth	Classification	LL	PL	PI	Cc	Cu
●	B-7	at	14.0	SILTY SAND(SM)	NP	NP	NP		
⊠	B-7	at	39.0	SANDY LEAN CLAY(CL)	27	15	12		
▲	B-7	at	54.0	LEAN CLAY with SAND(CL)	48	18	30	0.86	2.11
★	B-7	at	64.0	SANDY FAT CLAY(CH)	52	23	29		

	Boring No.		Depth	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-7	at	14.0	4.76	0.427	0.229		0.0	73.8	15.4	
⊠	B-7	at	39.0	2				0.0	31.6	68.4	
▲	B-7	at	54.0	4.76	0.061	0.039	0.029	0.0	27.0	72.5	0.4
★	B-7	at	64.0	4.76				0.0	36.8	63.2	

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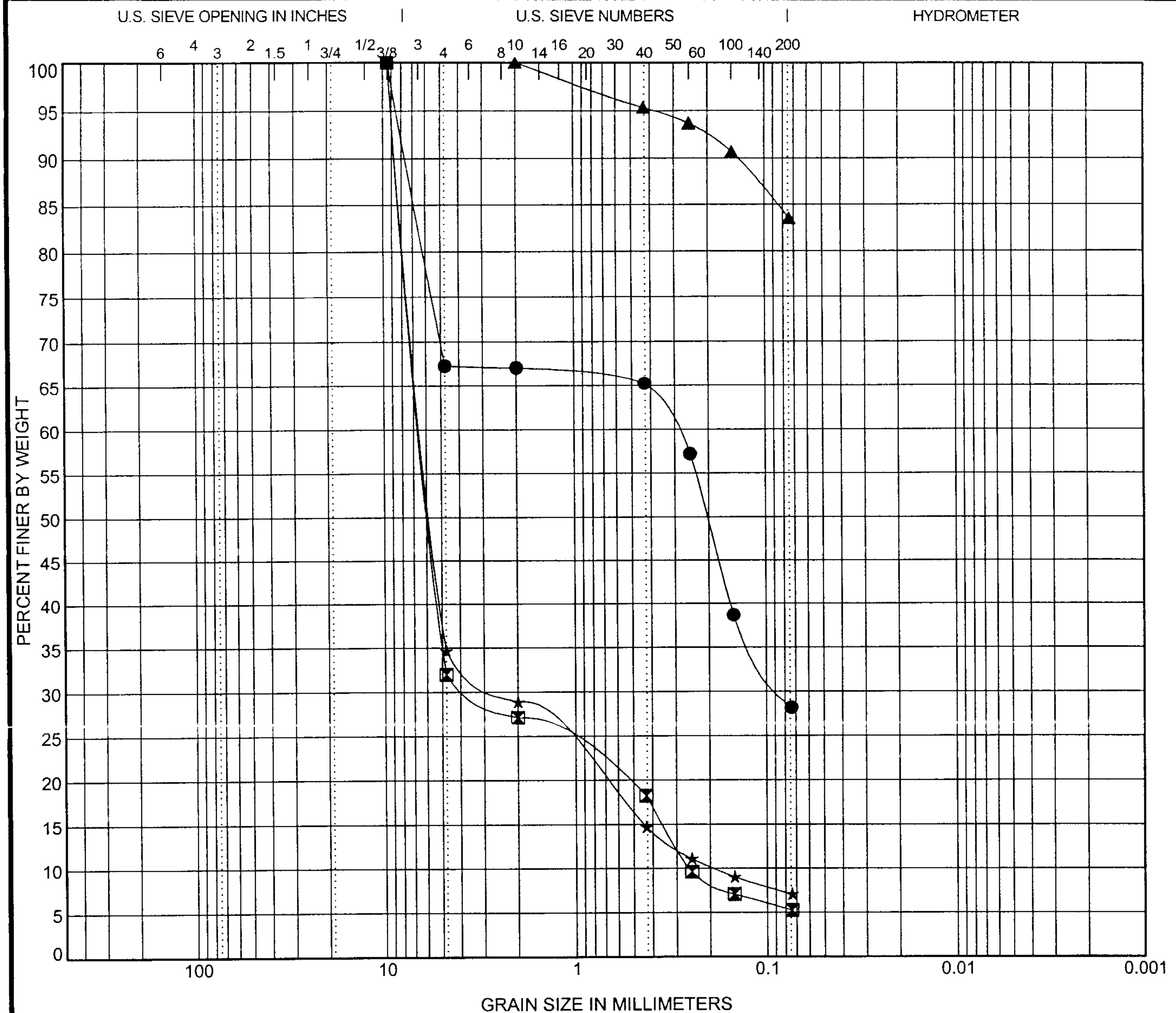

	Boring No.		Depth	Classification	LL	PL	PI	Cc	Cu
●	B-8	at	9.0	SILTY, CLAYEY SAND with GRAVEL(SC-SM)	22	16	6		
⊠	B-8	at	24.0	POORLY GRADED GRAVEL with SILT and SAND(GP-GM)	NP	NP	NP	6.92	24.72
▲	B-8	at	39.0						
★	B-8	at	49.0	POORLY GRADED GRAVEL with SILT and SAND(GP-GM)	45	32	13	4.73	32.80

	Boring No.		Depth	D100	D60	D30	D10	%Gravel	%Sand	%Silt / %Clay
●	B-8	at	9.0	9.52	0.302	0.083		32.7	38.9	28.4
⊠	B-8	at	24.0	9.52	6.333	3.351	0.256	68.0	26.7	5.3
▲	B-8	at	39.0	2				0.0	16.4	83.6
★	B-8	at	49.0	9.52	6.228	2.364	0.19	65.4	27.5	7.1

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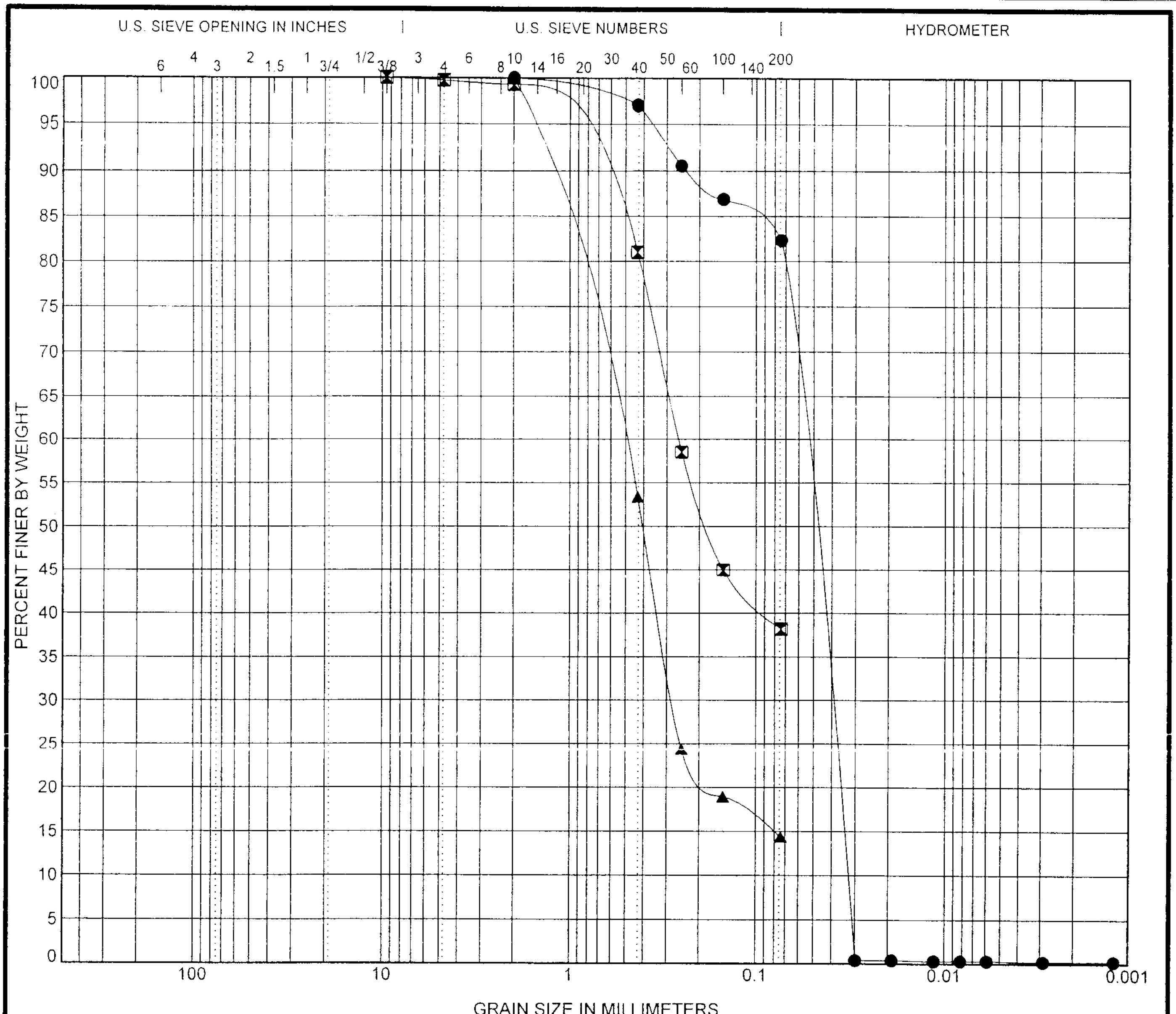

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring No.		Depth	Classification	LL	PL	PI	Cc	Cu
●	B-9	at	39.0	SILTY CLAY with SAND(CL-ML)	22	16	6	0.90	1.74
⧗	B-9	at	44.0	SILTY, CLAYEY SAND(SC-SM)	21	16	5		
▲	B-9	at	59.0	CLAYEY SAND(SC)	32	21	11		

	Boring No.		Depth	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-9	at	39.0	2	0.058	0.041	0.033	0.0	17.6	82.1	0.3
⧗	B-9	at	44.0	9.52	0.259			0.3	61.4	38.3	
▲	B-9	at	59.0	2	0.535	0.278		0.0	85.6	14.4	

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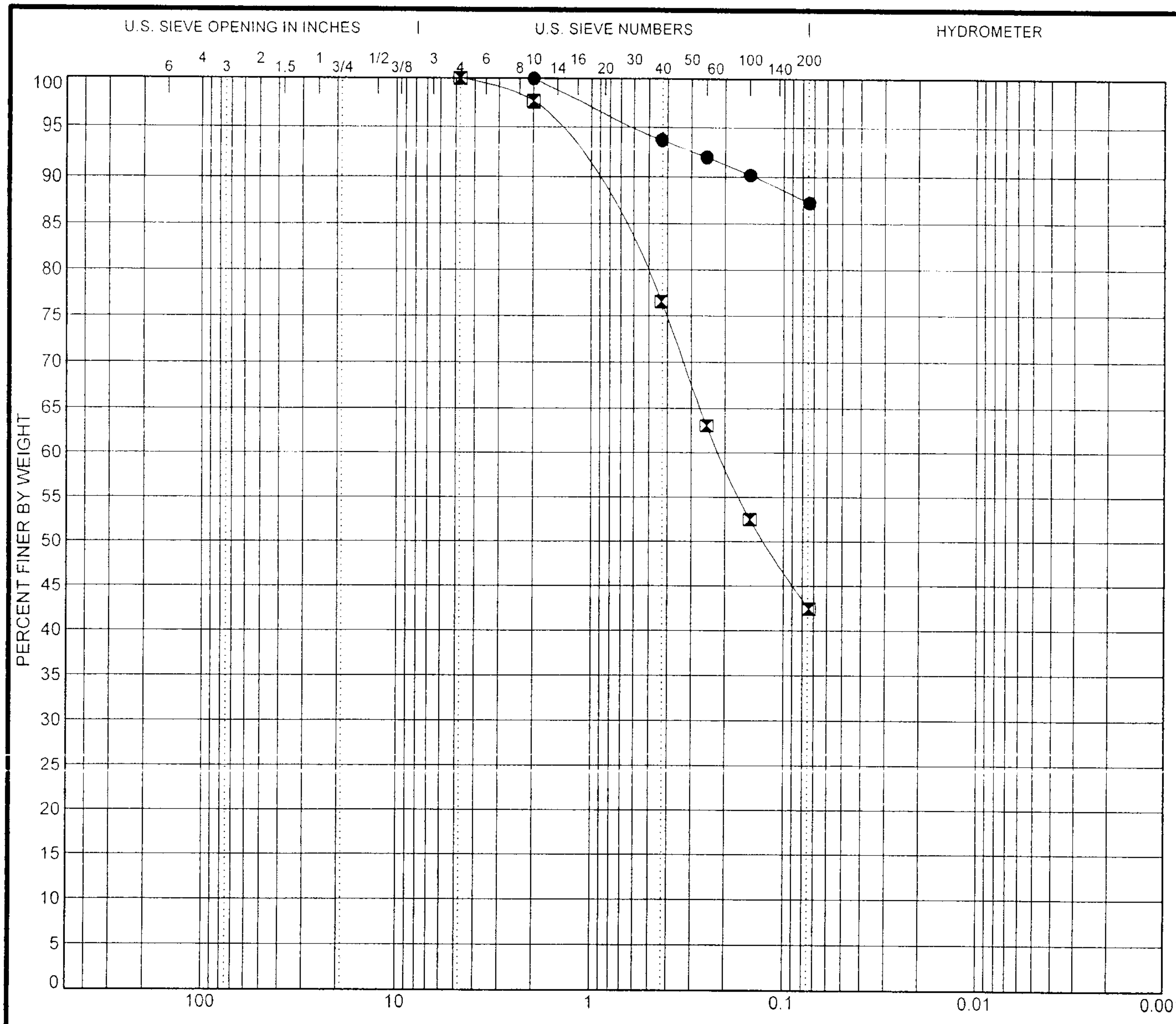

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring No.		Depth	Classification	LL	PL	PI	Cc	Cu
●	B-10	at	39.0	LEAN CLAY(CL)	40	23	17		
⧗	B-10	at	44.0	CLAYEY SAND(SC)	30	19	11		

	Boring No.		Depth	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-10	at	39.0	2				0.0	12.7	87.3	
⧗	B-10	at	44.0	4.76	0.216			0.0	57.4	42.6	

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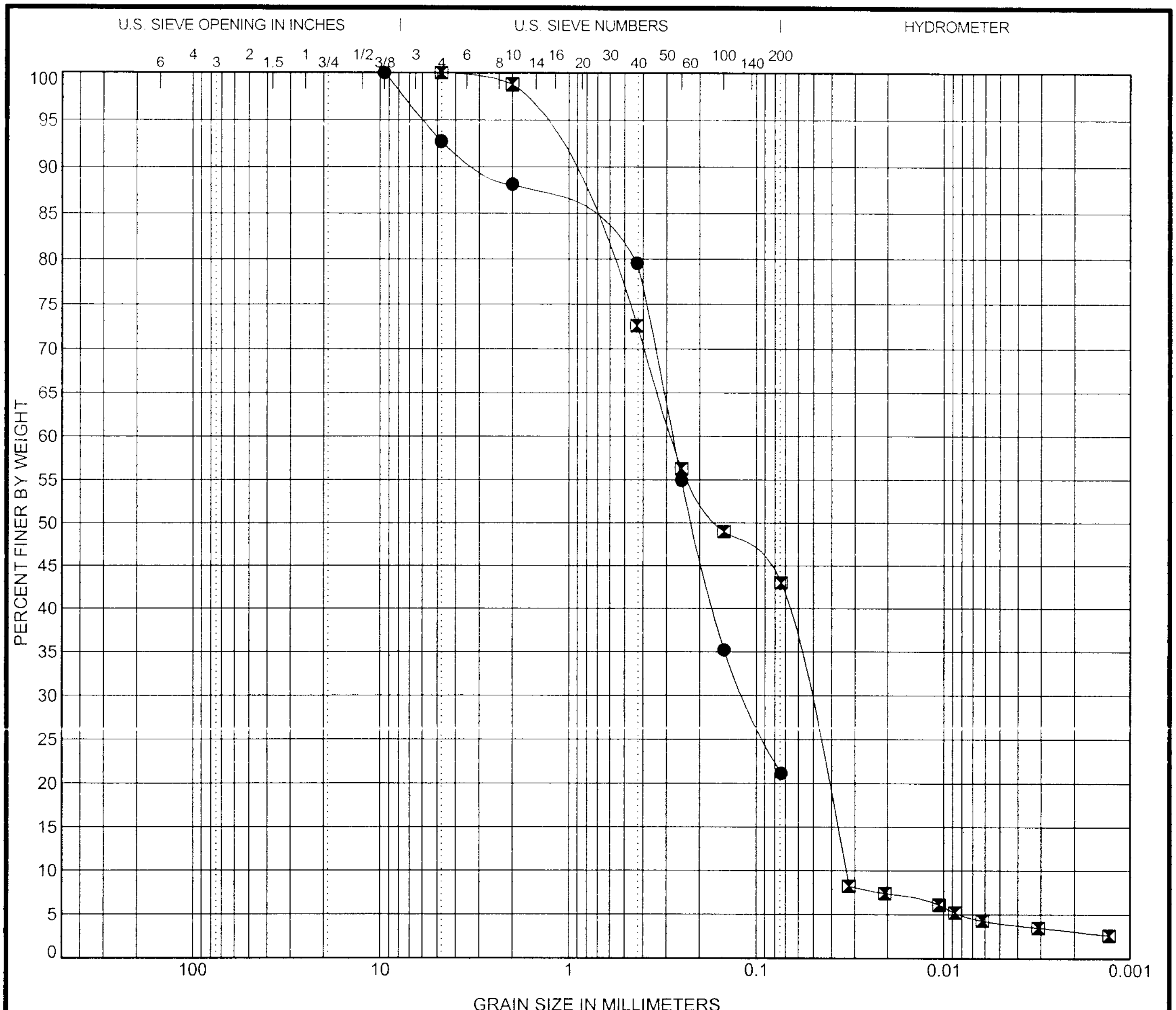

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring No.		Depth	Classification	LL	PL	PI	Cc	Cu
● B-11	at	14.0	SILTY, CLAYEY SAND(SC-SM)	21	16	5		
⧗ B-11	at	39.0	CLAYEY SAND(SC)	29	17	12	0.31	8.39

Boring No.		Depth	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-11	at	14.0	9.52	0.28	0.115		7.2	71.3	21.4	
⧗ B-11	at	39.0	4.76	0.283	0.054	0.034	0.0	56.9	39.0	4.1

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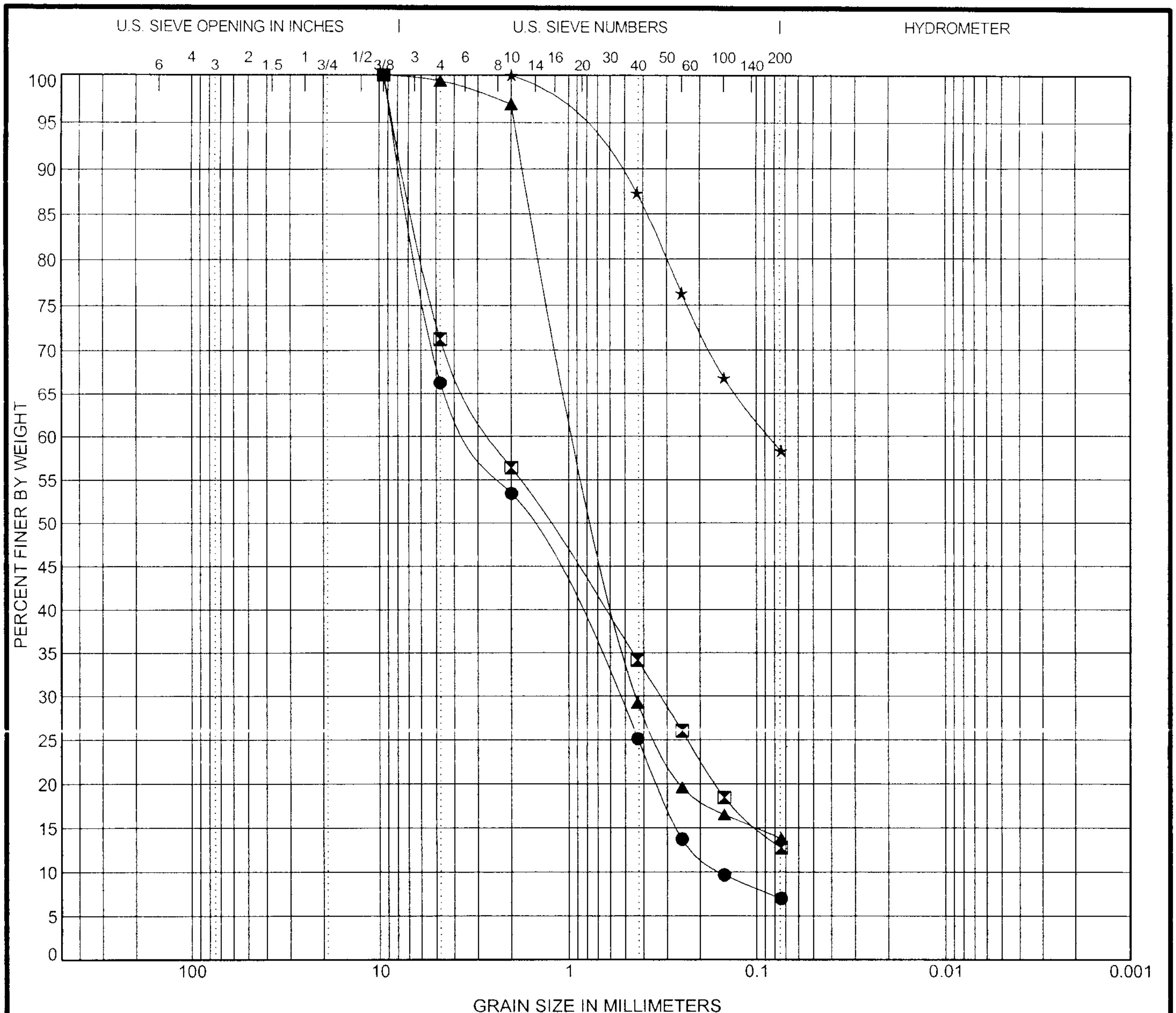

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring No.		Depth	Classification	LL	PL	PI	Cc	Cu
●	B-12	at	14.0	POORLY GRADED SAND with SILT and GRAVEL(SP-SM)	NP	NP	NP	0.65	20.04
⧗	B-12	at	29.0	SILTY SAND with GRAVEL(SM)	NP	NP	NP		
▲	B-12	at	49.0	CLAYEY SAND(SC)	25	15	10		
☆	B-12	at	64.0	SANDY ELASTIC SILT(MH)	56	31	25		

	Boring No.		Depth	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-12	at	14.0	9.52	3.116	0.56	0.155	33.8	59.2	7.0	
⧗	B-12	at	29.0	9.52	2.471	0.326		28.8	58.3	12.9	
▲	B-12	at	49.0	9.52	0.865	0.438		0.7	85.5	13.9	
★	B-12	at	64.0	2	0.085			0.0	41.5	58.5	

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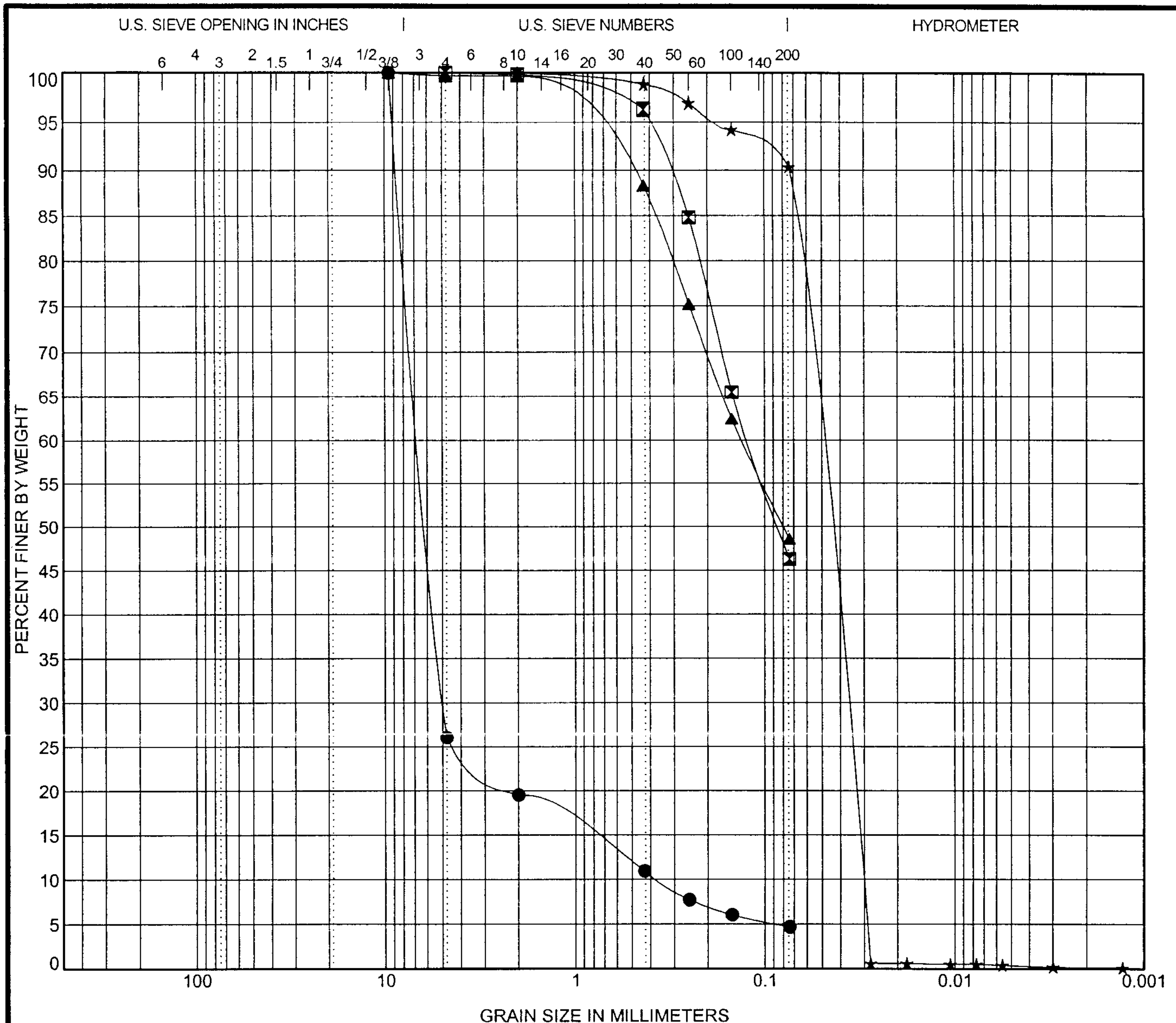

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring No.		Depth	Classification	LL	PL	PI	Cc	Cu
●	B-13	at	19.0	POORLY GRADED GRAVEL with SAND(GP)	NP	NP	NP	10.14	17.79
⊠	B-13	at	44.0	CLAYEY SAND(SC)	27	17	10		
▲	B-13	at	64.0	SILTY SAND(SM)	49	32	17		
☆	B-13	at	69.0	ELASTIC SILT(MH)	52	34	18	0.90	1.73

	Boring No.		Depth	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-13	at	19.0	9.52	6.544	4.94	0.368	74.0	21.3	4.7	
⊠	B-13	at	44.0	4.76	0.122			0.0	53.4	46.6	
▲	B-13	at	64.0	9.52	0.132			0.3	50.8	48.8	
★	B-13	at	69.0	2	0.053	0.038	0.031	0.0	9.6	90.1	0.4

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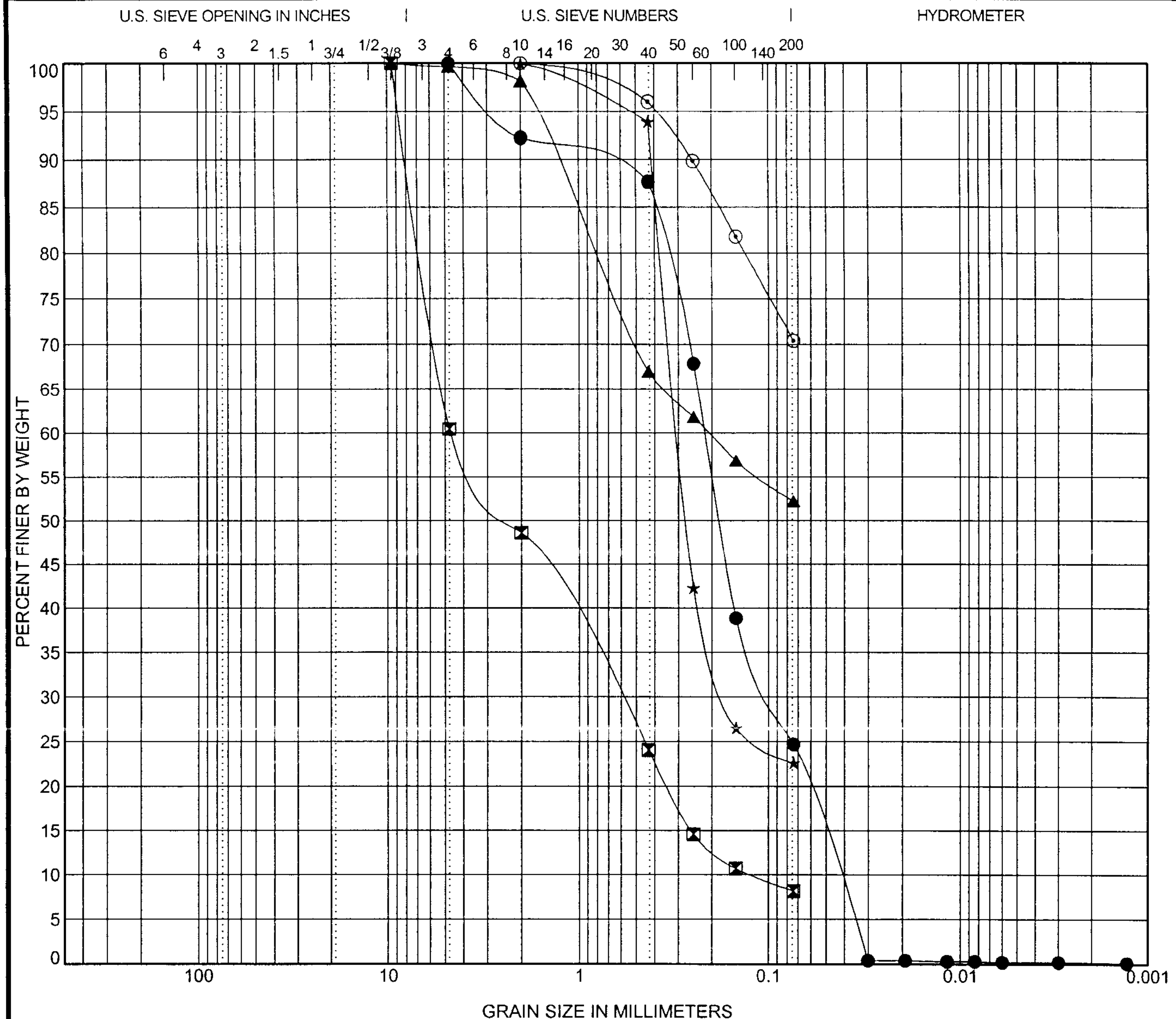

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring No.		Depth	Classification	LL	PL	PI	Cc	Cu
●	B-14	at	9.0	SILTY SAND(SM)	NP	NP	NP	0.99	5.05
⊠	B-14	at	24.0	POORLY GRADED SAND with SILT and GRAVEL(SP-SM)	NP	NP	NP	0.69	37.41
▲	B-14	at	44.0	SANDY LEAN CLAY(CL)	27	16	11		
☆	B-14	at	54.0	SILTY SAND(SM)	NP	NP	NP		
⊙	B-14	at	64.0	ELASTIC SILT with SAND(MH)	55	37	18		

	Boring No.		Depth	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-14	at	9.0	4.76	0.217	0.096	0.043	0.0	75.0	24.8	0.2
⊠	B-14	at	24.0	9.52	4.607	0.625	0.123	39.6	52.2	8.2	
▲	B-14	at	44.0	9.52	0.207			0.4	47.3	52.3	
★	B-14	at	54.0	4.76	0.301	0.167		0.0	77.3	22.7	
⊙	B-14	at	64.0	2				0.0	29.4	70.6	

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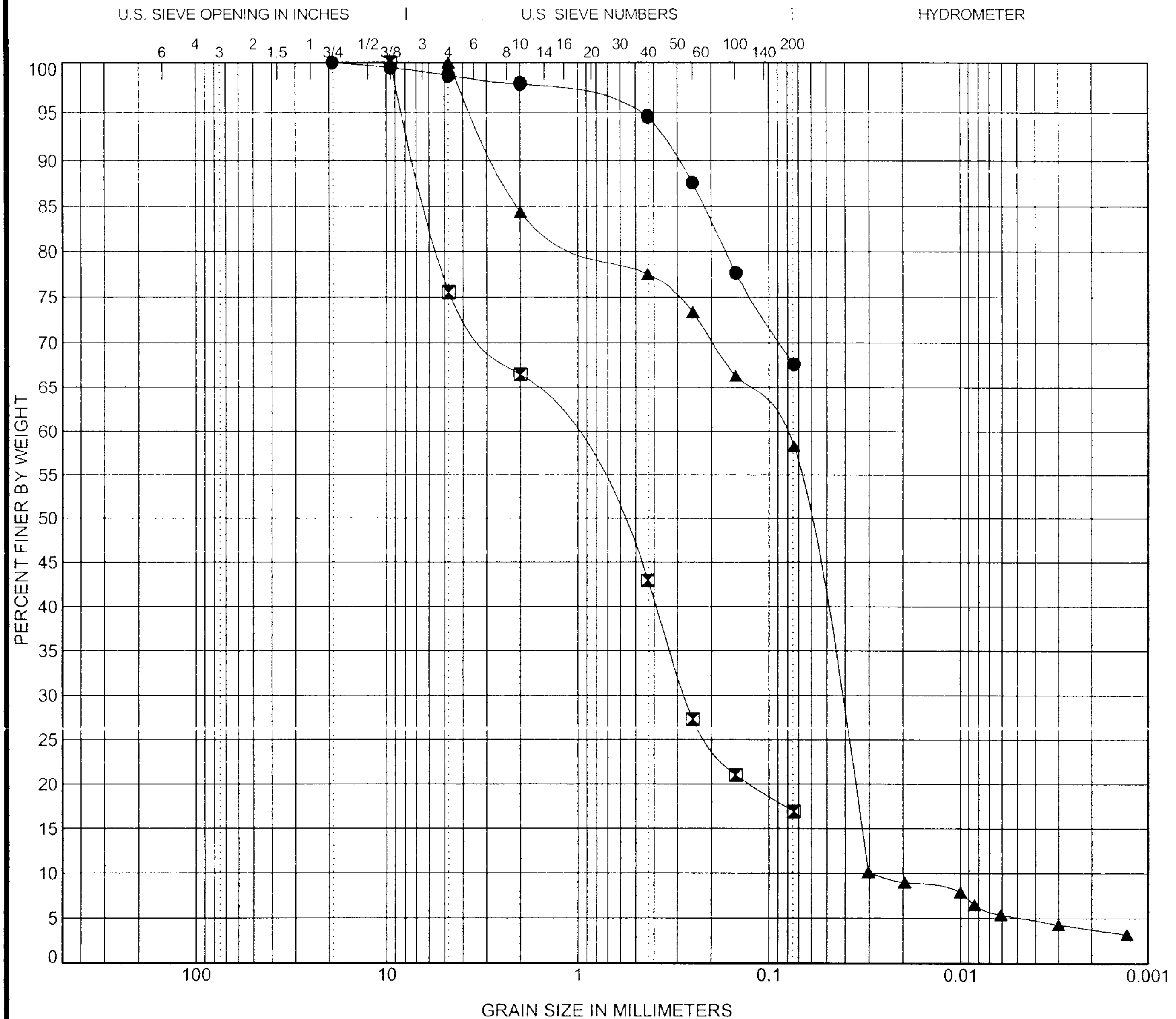

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring No.		Depth	Classification	LL	PL	PI	Cc	Cu
● B-15	at	4.0	SANDY LEAN CLAY(CL)	30	17	13		
⊠ B-15	at	19.0	SILTY SAND with GRAVEL(SM)	NP	NP	NP		
▲ B-15	at	39.0	SANDY LEAN CLAY(CL)	28	18	10	0.77	2.94

Boring No.		Depth	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-15	at	4.0	19.1				1.3	30.8	67.8	
⊠ B-15	at	19.0	9.52	1.31	0.275		24.5	58.5	17.0	
▲ B-15	at	39.0	4.76	0.086	0.044	0.029	0.0	41.5	53.3	5.1

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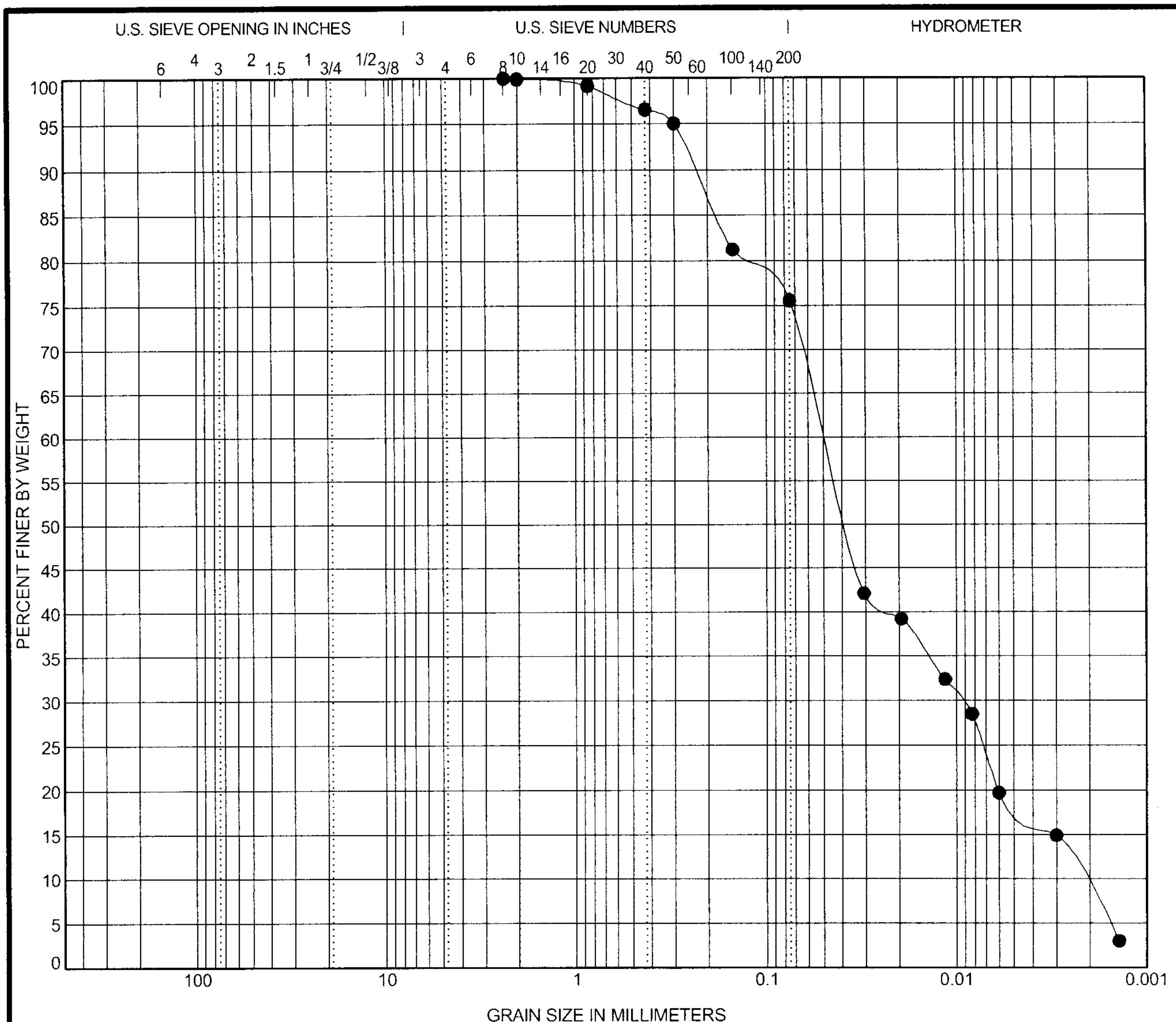

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring No.		Depth	Classification	LL	PL	PI	Cc	Cu
●	B-15	at	35.0	LEAN CLAY with SAND(CL)	30	15	15	0.82	22.55

	Boring No.		Depth	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-15	at	35.0	2.36	0.049	0.009	0.002	0.0	24.4	57.1	18.4

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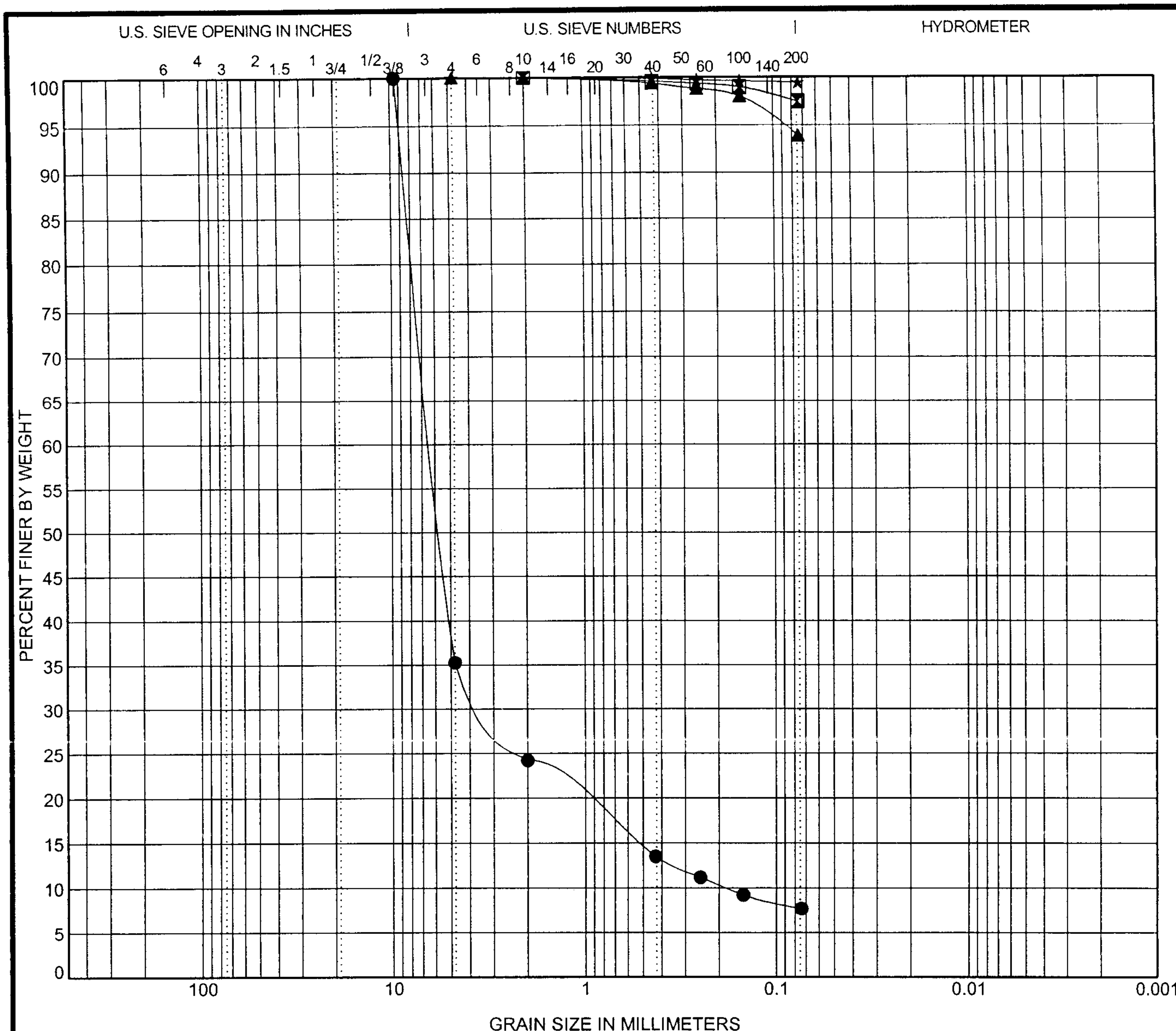

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring No.		Depth	Classification	LL	PL	PI	Cc	Cu
●	B-16	at	19.0	POORLY GRADED GRAVEL with SILT and SAND(GP-GM)	NP	NP	NP	8.75	33.93
⊠	B-16	at	34.0	FAT CLAY(CH)	58	27	31		
▲	B-16	at	59.0	FAT CLAY(CH)	56	26	30		
★	B-16	at	69.0	LEAN CLAY(CL)	42	20	22		

	Boring No.		Depth	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-16	at	19.0	9.52	6.204	3.15	0.183	64.8	27.5	7.7	
⊠	B-16	at	34.0	2				0.0	2.5	97.5	
▲	B-16	at	59.0	4.76				0.0	6.0	94.0	
★	B-16	at	69.0	4.76				0.0	0.6	99.4	

US GRAIN SIZE BORING LOGS.GPJ F&R.GDT 6/28/07

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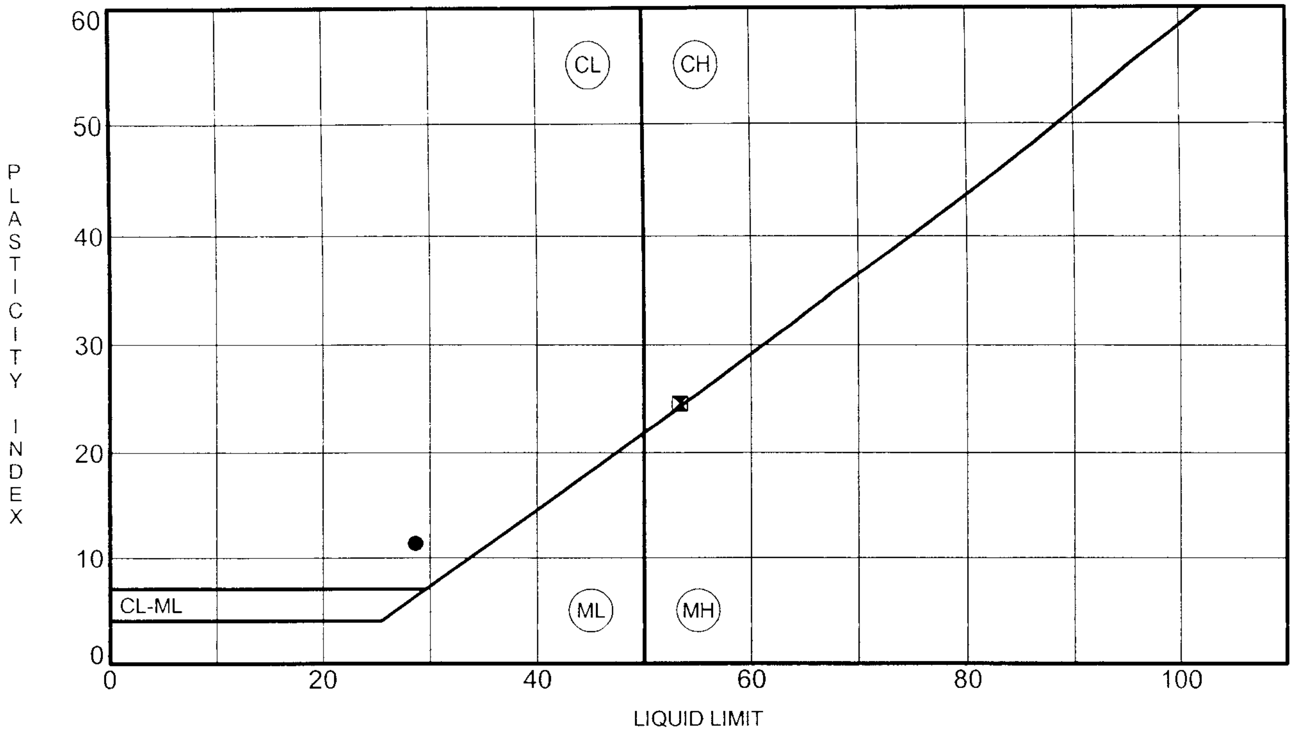
GRAIN SIZE DISTRIBUTION

Report No.: H68-134G
Client: HO+K
Project: DC Crime Labs
Location: 4th and School Streets, SW DC
Date: July 2007



Boring No.	Depth	LL	PL	PI	Fines	Classification
● B-1	at 44.0	29	17	12	40	CLAYEY SAND(SC),{A-6}
⊠ B-1	at 69.0	53	29	24	73	ELASTIC SILT with SAND(MH),{A-7-6}

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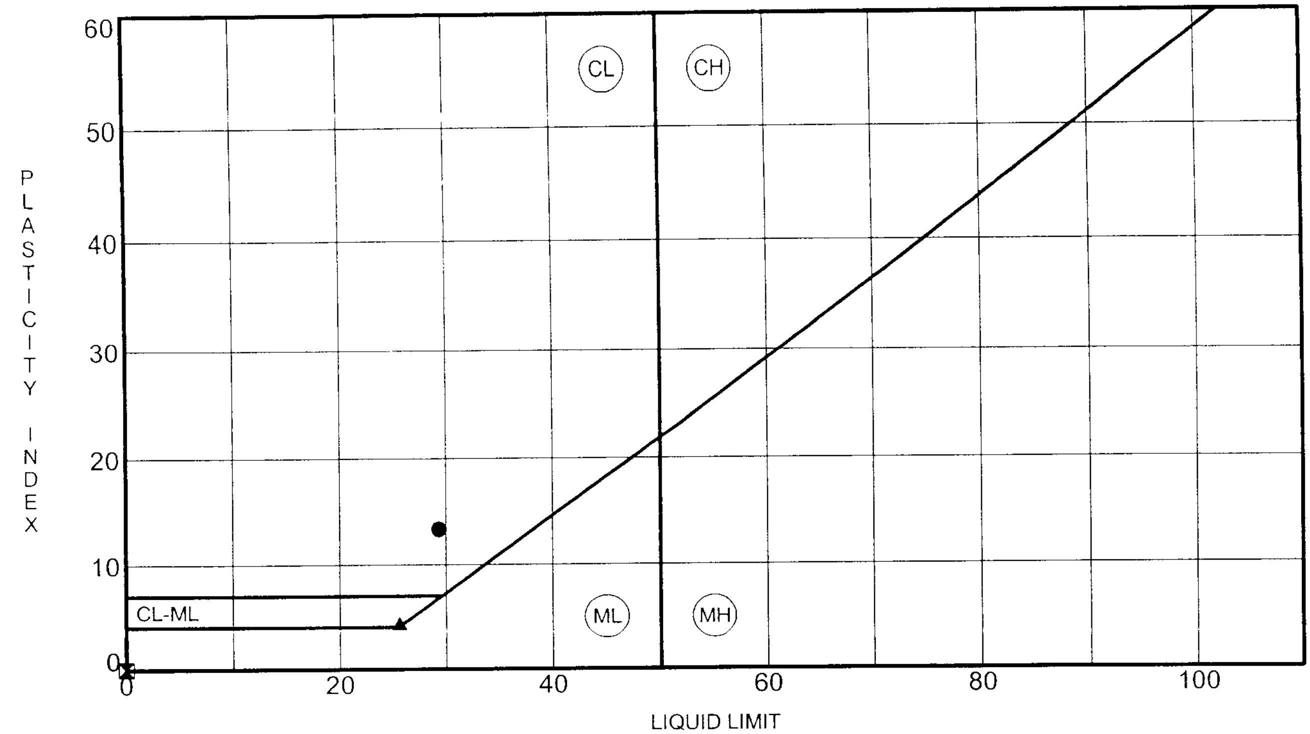
ATTERBERG LIMITS' RESULTS

Report No.: H68-134G
Client: HO+K
Project: DC Crime Labs
Location: 4th and School Streets, SW DC
Date: July 2007



Boring No.		Depth	LL	PL	PI	Fines	Classification
●	B-2	at 4.0	29	16	13	59	SANDY LEAN CLAY(CL),{A-6}
⊠	B-2	at 14.0	NP	NP	NP	12	POORLY GRADED SAND with SILT and GRAVEL(SP-SM),{A-1-b}
▲	B-2	at 54.0	26	21	5	17	SILTY, CLAYEY SAND(SC-SM),{A-2-4}

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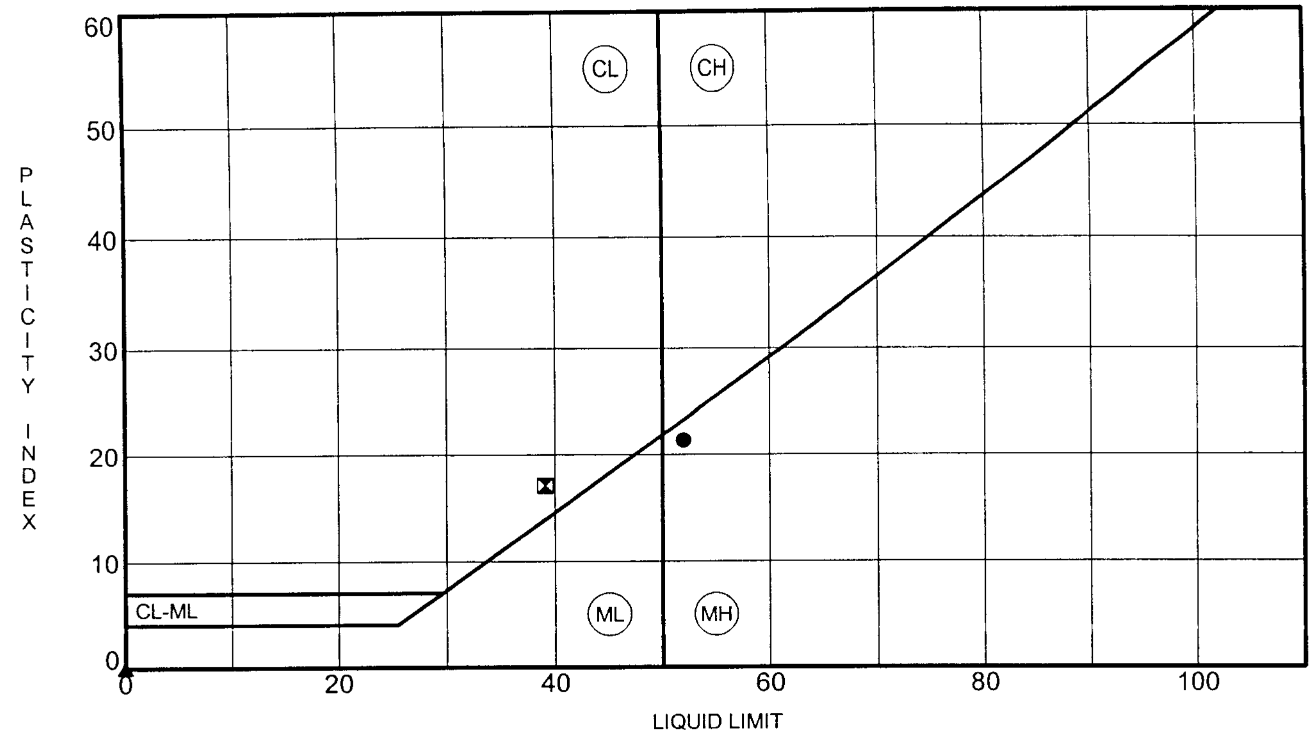
ATTERBERG LIMITS' RESULTS

Report No.: H68-134G
Client: HO+K
Project: DC Crime Labs
Location: 4th and School Streets, SW DC
Date: July 2007



Boring No.		Depth	LL	PL	PI	Fines	Classification
●	B-3	at 16.0	52	31	21	14	SILTY SAND with GRAVEL(SM),{A-2-7}
⊠	B-3	at 39.0	39	22	17	28	CLAYEY SAND(SC),{A-2-6}
▲	B-3	at 59.0	NP	NP	NP	10	WELL-GRADED SAND with SILT and GRAVEL(SW-SM),{A-1-b}

US ATTERBERG LIMITS BORING LOGS.GPJ F&R.GDT 6/28/07

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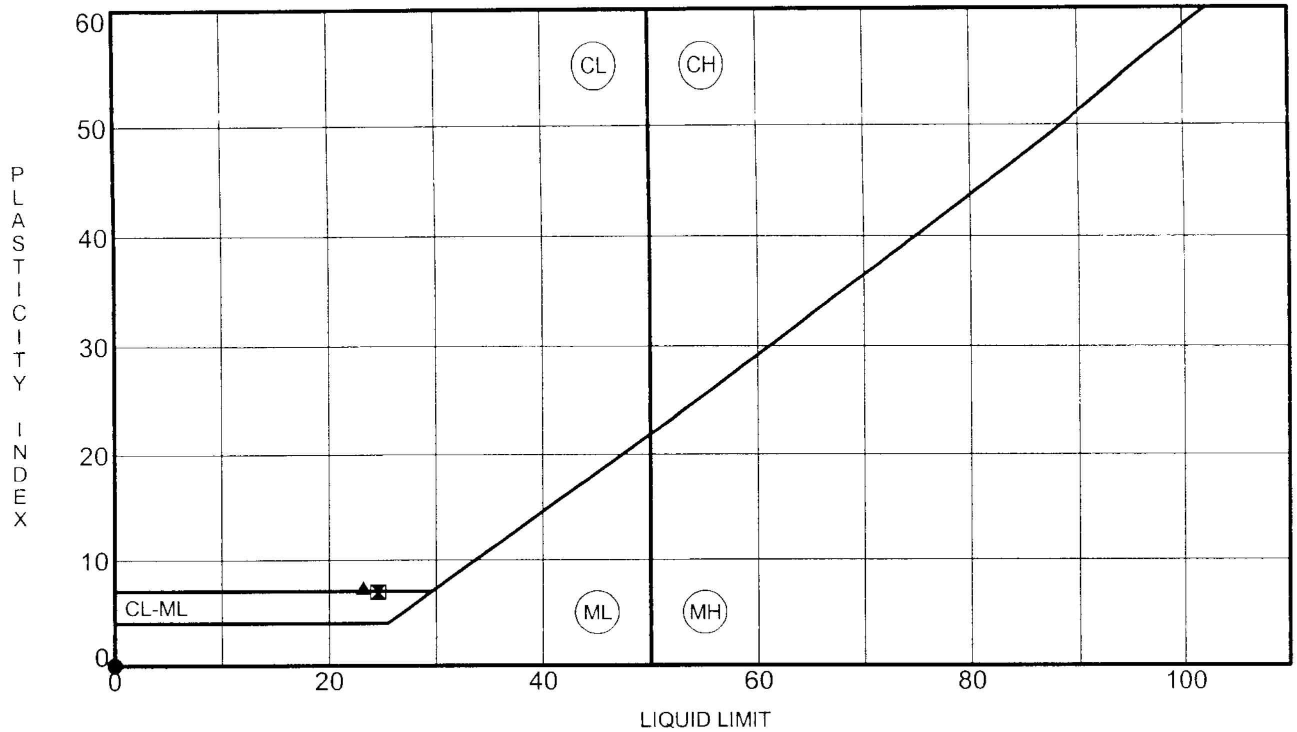
ATTERBERG LIMITS' RESULTS

Report No.: H68-134G
Client: HO+K
Project: DC Crime Labs
Location: 4th and School Streets, SW DC
Date: July 2007



	Boring No.	Depth	LL	PL	PI	Fines	Classification
●	B-4	at 24.0	NP	NP	NP	6	POORLY GRADED GRAVEL with SILT and SAND(GP-GM),{A-1-a}
⧗	B-4	at 39.0	25	18	7	46	SILTY, CLAYEY SAND(SC-SM),{A-4}
▲	B-4	at 44.0	23	16	7	28	SILTY, CLAYEY SAND(SC-SM),{A-2-4}

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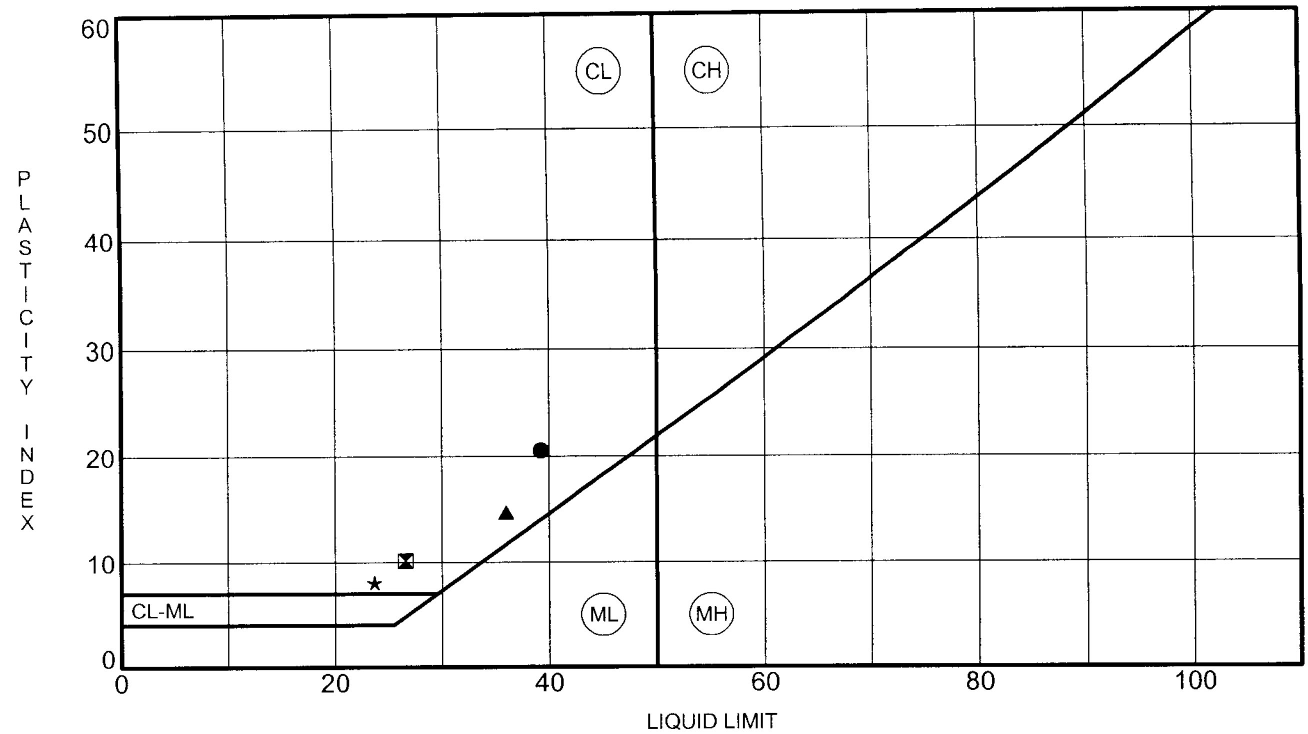
ATTERBERG LIMITS' RESULTS

Report No.: H68-134G
Client: HO+K
Project: DC Crime Labs
Location: 4th and School Streets, SW DC
Date: July 2007



Boring No.		Depth	LL	PL	PI	Fines	Classification
●	B-5	at 4.0	39	19	20	79	LEAN CLAY with SAND(CL),{A-6}
⊠	B-5	at 9.0	27	16	11	45	CLAYEY GRAVEL with SAND(GC),{A-6}
▲	B-5	at 34.0	36	21	15	95	LEAN CLAY(CL),{A-6}
★	B-5	at 39.0	24	16	8	72	LEAN CLAY with SAND(CL),{A-4}

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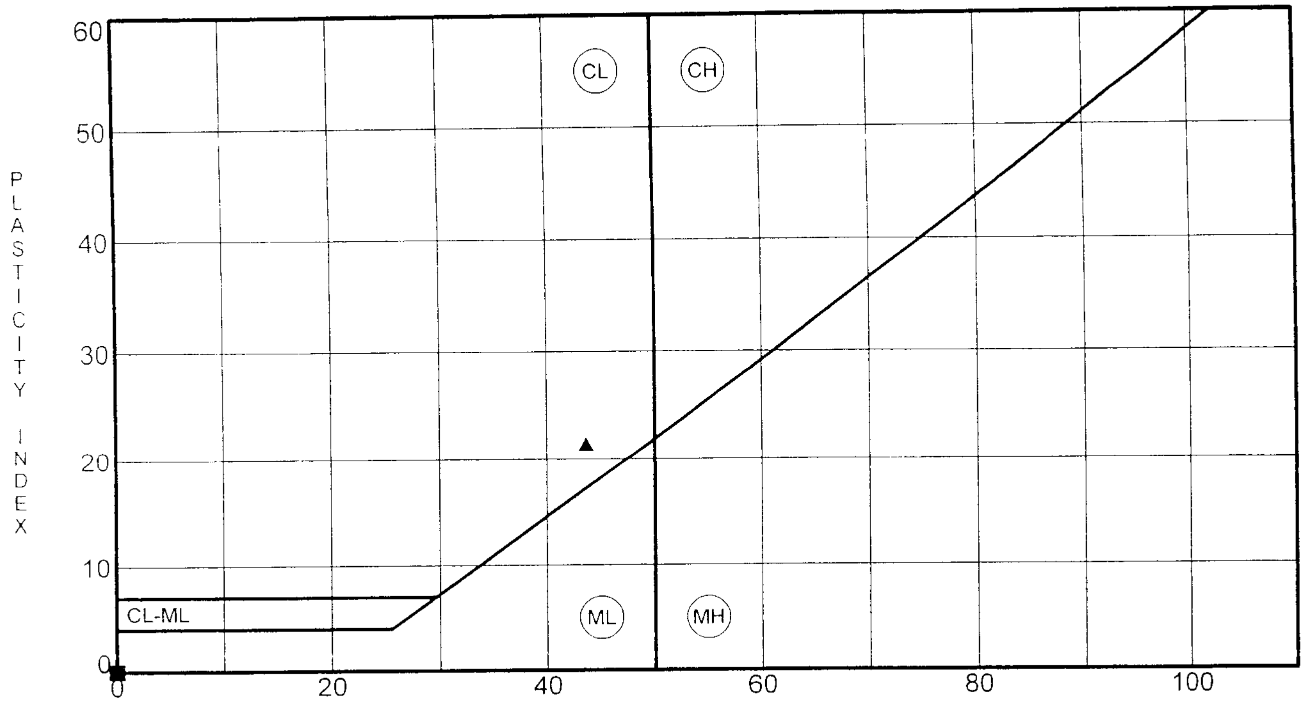
ATTERBERG LIMITS' RESULTS

Report No.: H68-134G
Client: HO+K
Project: DC Crime Labs
Location: 4th and School Streets, SW DC
Date: July 2007



Boring No.		Depth	LL	PL	PI	Fines	Classification
●	B-6	at 14.0	NP	NP	NP	4	POORLY GRADED GRAVEL(GP),{A-1-a}
⊠	B-6	at 34.0	NP	NP	NP	94	SILT(ML),{A-4}
▲	B-6	at 74.0	44	22	22	16	CLAYEY SAND(SC),{A-2-7}

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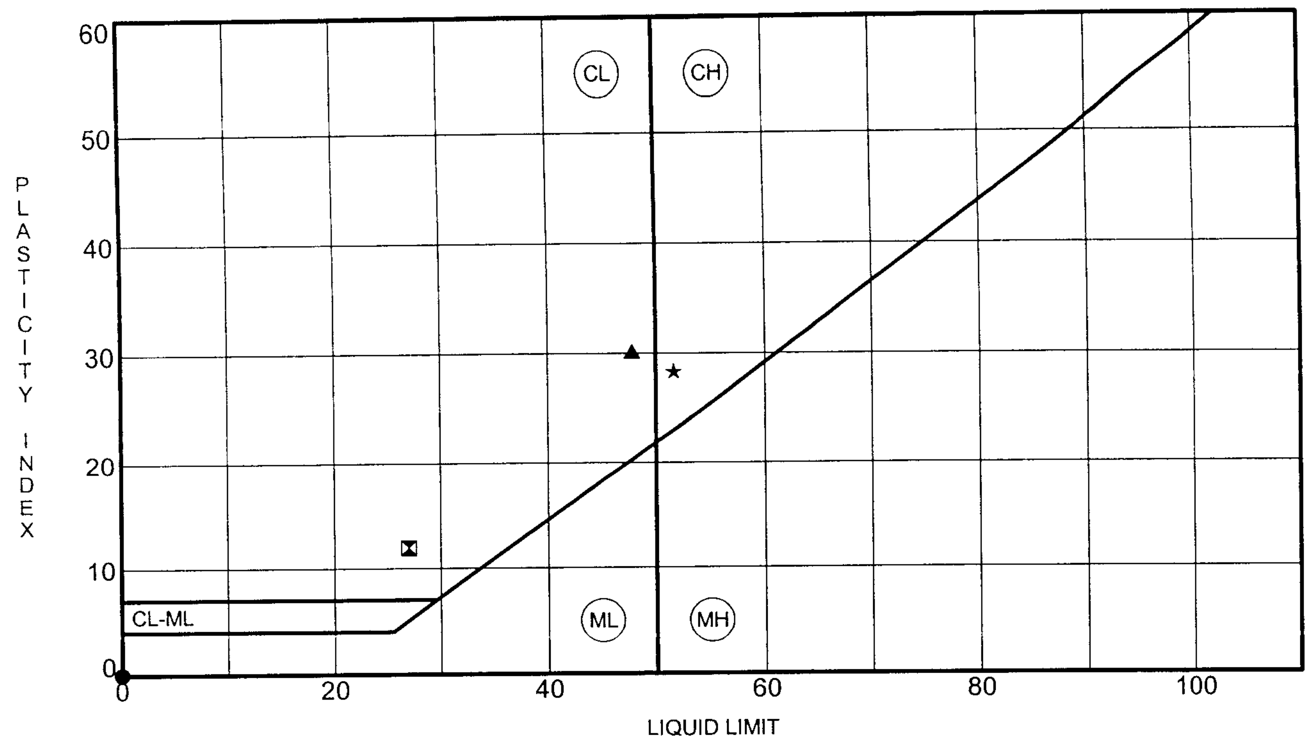
ATTERBERG LIMITS' RESULTS

Report No.: H68-134G
Client: HO+K
Project: DC Crime Labs
Location: 4th and School Streets, SW DC
Date: July 2007



	Boring No.	Depth	LL	PL	PI	Fines	Classification
●	B-7	at 14.0	NP	NP	NP	15	SILTY SAND(SM),{A-2-4}
⊠	B-7	at 39.0	27	15	12	68	SANDY LEAN CLAY(CL),{A-6}
▲	B-7	at 54.0	48	18	30	73	LEAN CLAY with SAND(CL),{A-7-6}
★	B-7	at 64.0	52	23	29	63	SANDY FAT CLAY(CH),{A-7-6}

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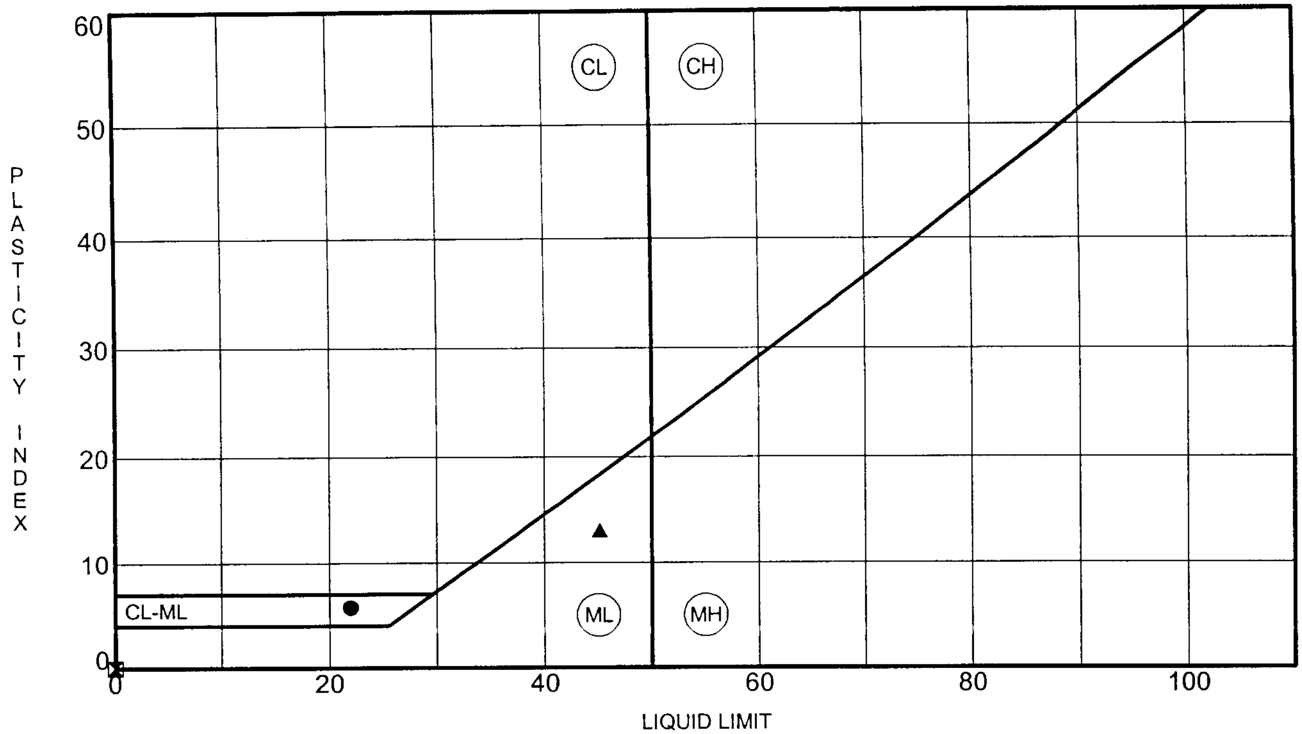
ATTERBERG LIMITS' RESULTS

Report No.: H68-134G
Client: HO+K
Project: DC Crime Labs
Location: 4th and School Streets, SW DC
Date: July 2007



	Boring No.	Depth	LL	PL	PI	Fines	Classification
●	B-8	at 9.0	22	16	6	28	SILTY, CLAYEY SAND with GRAVEL(SC-SM),{A-2-4}
⊠	B-8	at 24.0	NP	NP	NP	5	POORLY GRADED GRAVEL with SILT and SAND(GP-GM),{A-1-a
▲	B-8	at 49.0	45	32	13	7	POORLY GRADED GRAVEL with SILT and SAND(GP-GM),{A-2-7

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ATTERBERG LIMITS' RESULTS

Report No.: H68-134G
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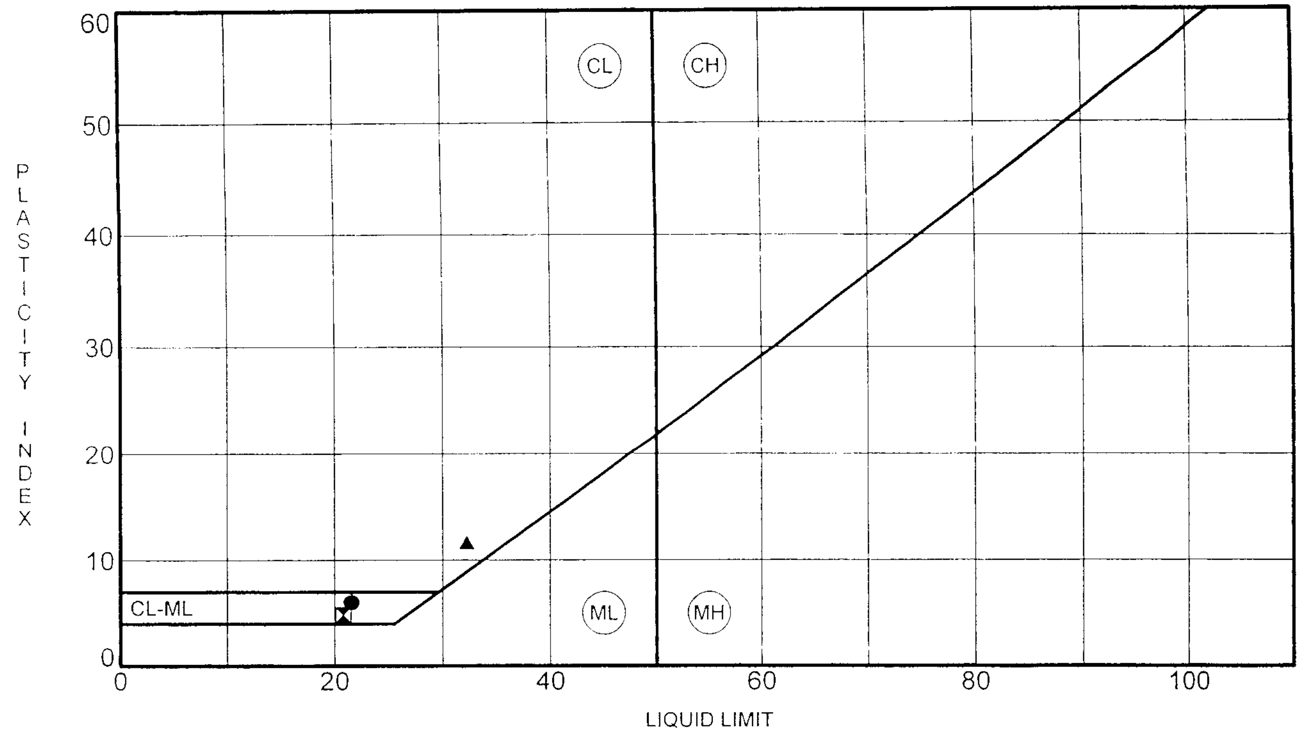

Boring No.	Depth	LL	PL	PI	Fines	Classification
● B-9	at 39.0	22	16	6	82	SILTY CLAY with SAND(CL-ML),{A-4}
⧗ B-9	at 44.0	21	16	5	36	SILTY, CLAYEY SAND(SC-SM),{A-4}
▲ B-9	at 59.0	32	21	11	14	CLAYEY SAND(SC),{A-2-6}

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ATTERBERG LIMITS' RESULTS

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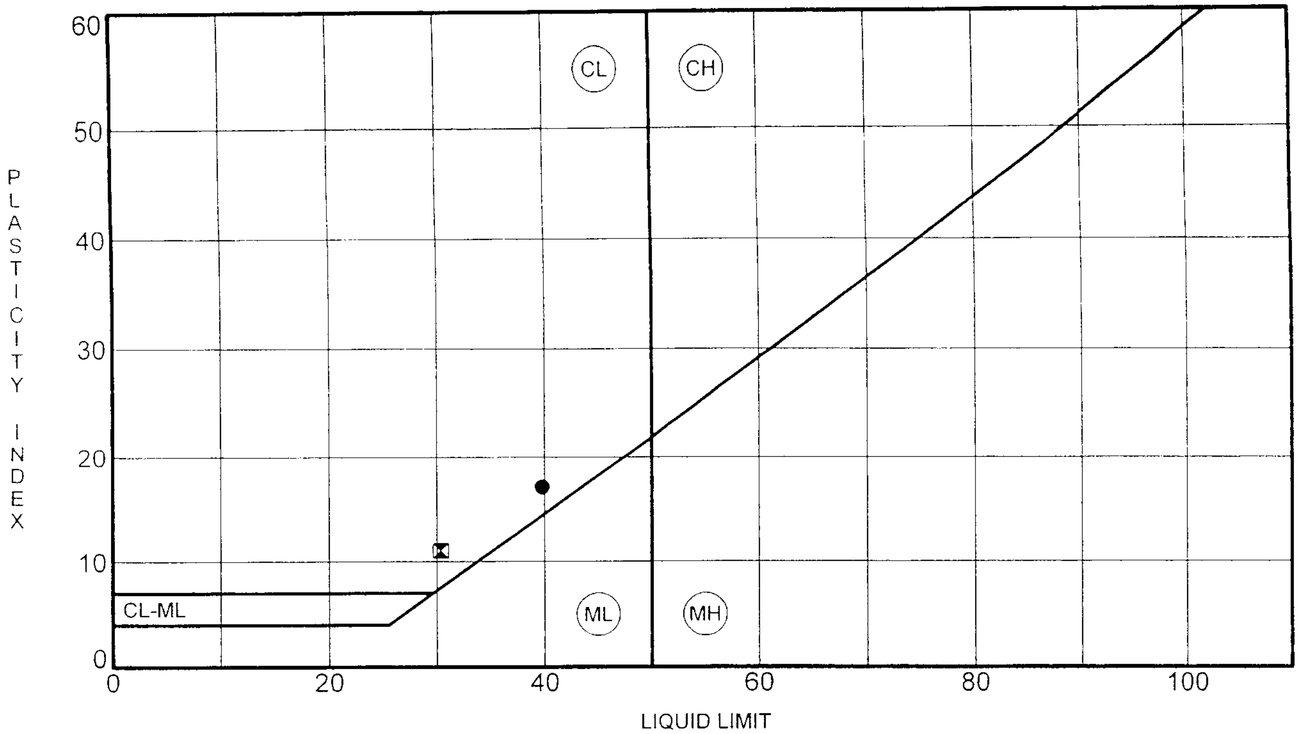
Project: DC Crime Labs
Location: 4th and School Streets, SW DC
Date: July 2007

US ATTERBERG LIMITS BORING LOGS.GPJ F&R.GDT 7/5/07



Boring No.		Depth	LL	PL	PI	Fines	Classification
●	B-10	at 39.0	40	23	17	87	LEAN CLAY(CL),{A-6}
⧗	B-10	at 44.0	30	19	11	43	CLAYEY SAND(SC),{A-6}

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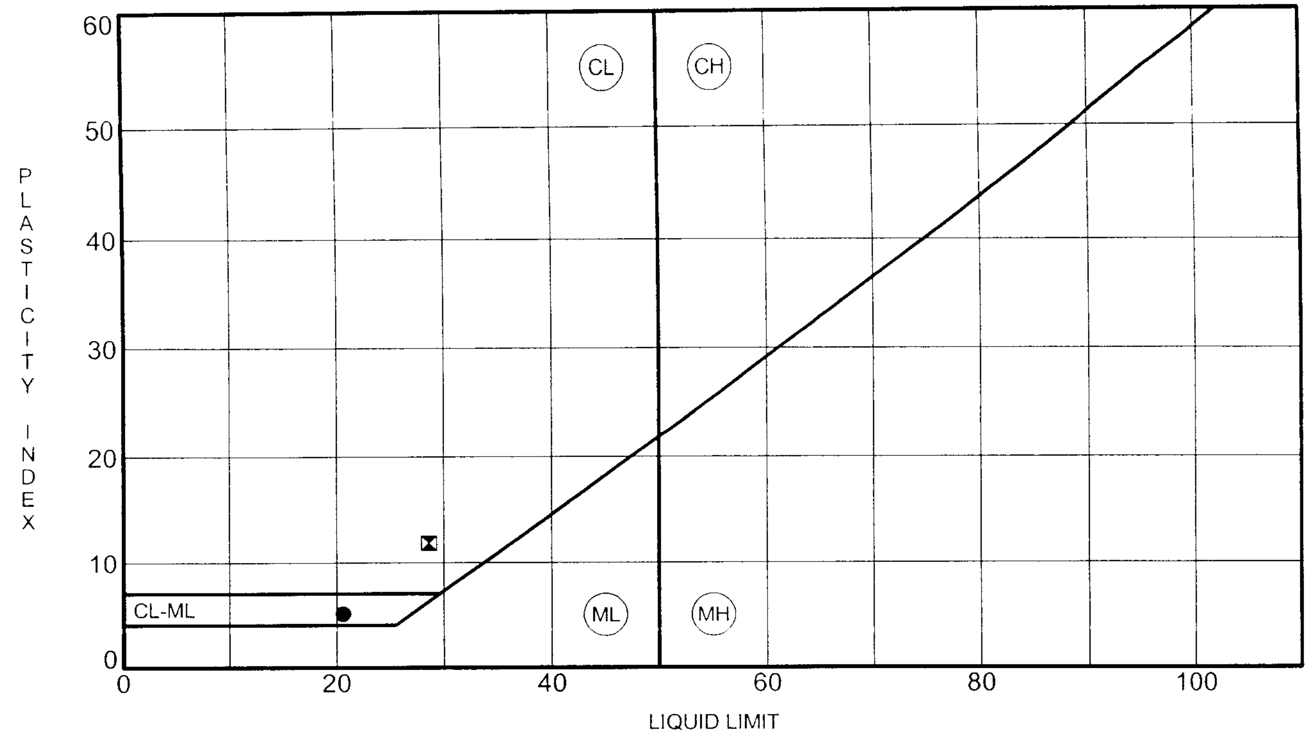
ATTERBERG LIMITS' RESULTS

Report No.: H68-134G
Client: HO+K
Project: DC Crime Labs
Location: 4th and School Streets, SW DC
Date: July 2007



Boring No.	Depth	LL	PL	PI	Fines	Classification
● B-11	at 14.0	21	16	5	21	SILTY, CLAYEY SAND(SC-SM),{A-2-4}
⧗ B-11	at 39.0	29	17	12	43	CLAYEY SAND(SC),{A-6}

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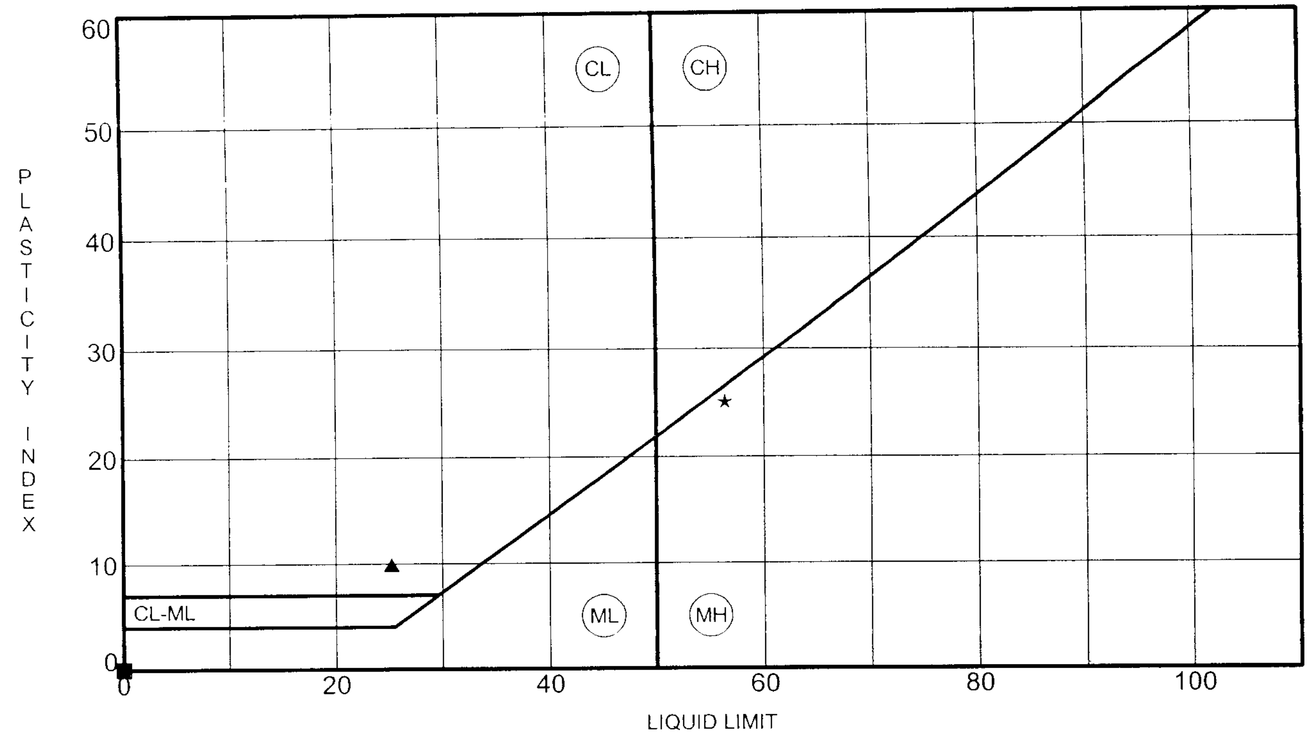
ATTERBERG LIMITS' RESULTS

Report No.: H68-134G
Client: HO+K
Project: DC Crime Labs
Location: 4th and School Streets, SW DC
Date: July 2007



Boring No.		Depth	LL	PL	PI	Fines	Classification
●	B-12	at 14.0	NP	NP	NP	7	POORLY GRADED SAND with SILT and GRAVEL(SP-SM),{A-1-b}
⧗	B-12	at 29.0	NP	NP	NP	13	SILTY SAND with GRAVEL(SM),{A-1-b}
▲	B-12	at 49.0	25	15	10	14	CLAYEY SAND(SC),{A-2-4}
★	B-12	at 64.0	56	31	25	58	SANDY ELASTIC SILT(MH),{A-7-5}

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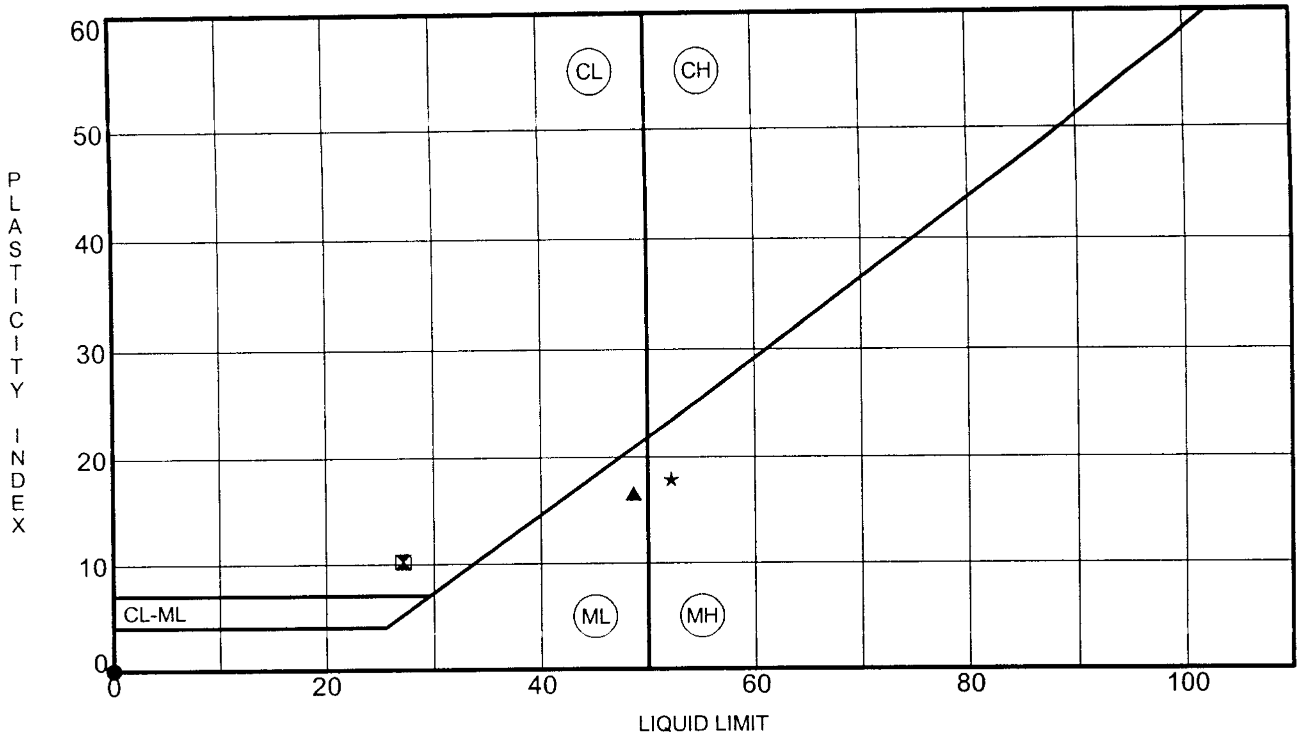
ATTERBERG LIMITS' RESULTS

Report No.: H68-134G
Client: HO+K
Project: DC Crime Labs
Location: 4th and School Streets, SW DC
Date: July 2007



Boring No.		Depth	LL	PL	PI	Fines	Classification
●	B-13	at 19.0	NP	NP	NP	5	POORLY GRADED GRAVEL with SAND(GP),{A-1-a}
⊠	B-13	at 44.0	27	17	10	47	CLAYEY SAND(SC),{A-4}
▲	B-13	at 64.0	49	32	17	49	SILTY SAND(SM),{A-7-5}
★	B-13	at 69.0	52	34	18	90	ELASTIC SILT(MH),{A-7-5}

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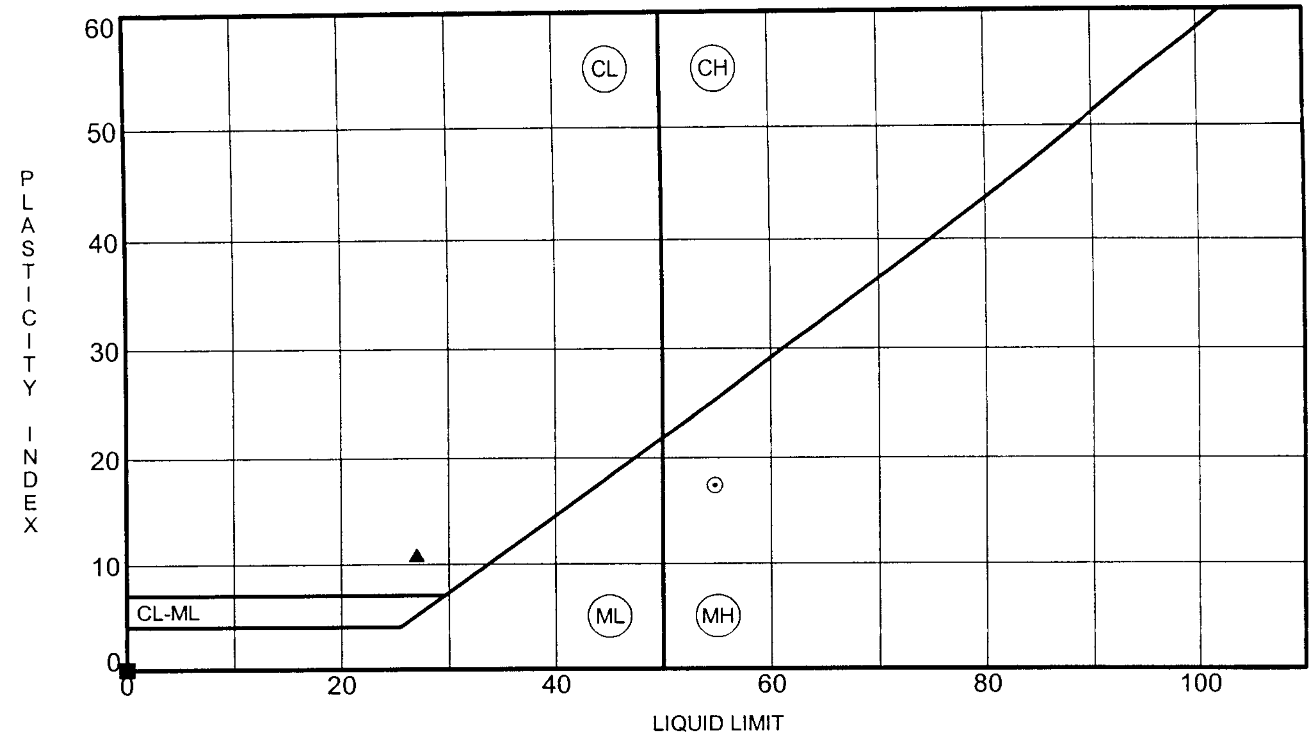
ATTERBERG LIMITS' RESULTS

Report No.: H68-134G
Client: HO+K
Project: DC Crime Labs
Location: 4th and School Streets, SW DC
Date: July 2007



	Boring No.	Depth	LL	PL	PI	Fines	Classification
●	B-14	at 9.0	NP	NP	NP	25	SILTY SAND(SM),{A-2-4}
⌧	B-14	at 24.0	NP	NP	NP	8	POORLY GRADED SAND with SILT and GRAVEL(SP-SM),{A-1-a}
▲	B-14	at 44.0	27	16	11	52	SANDY LEAN CLAY(CL),{A-6}
★	B-14	at 54.0	NP	NP	NP	23	SILTY SAND(SM),{A-2-4}
⊙	B-14	at 64.0	55	37	18	71	ELASTIC SILT with SAND(MH),{A-7-5}

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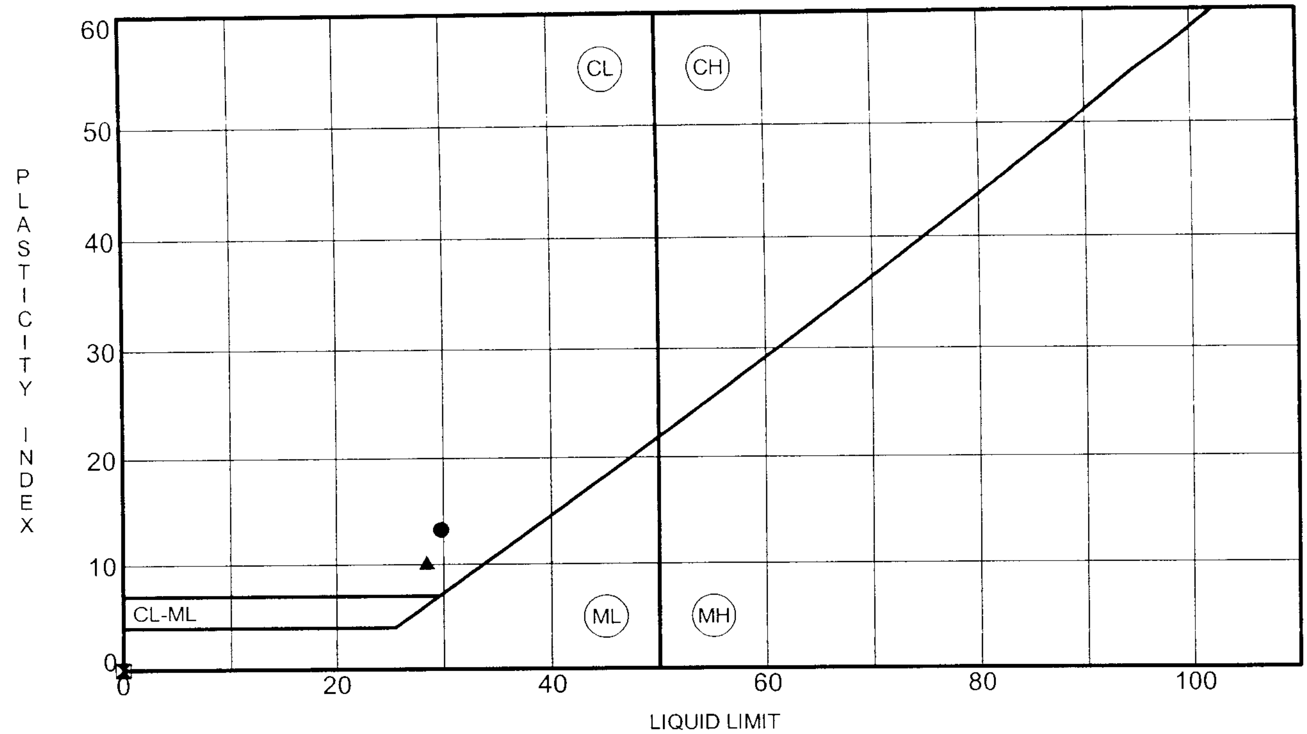
ATTERBERG LIMITS' RESULTS

Report No.: H68-134G
Client: HO+K
Project: DC Crime Labs
Location: 4th and School Streets, SW DC
Date: July 2007



	Boring No.	Depth	LL	PL	PI	Fines	Classification
●	B-15	at 4.0	30	17	13	68	SANDY LEAN CLAY(CL),{A-6}
⧗	B-15	at 19.0	NP	NP	NP	17	SILTY SAND with GRAVEL(SM),{A-1-b}
▲	B-15	at 39.0	28	18	10	58	SANDY LEAN CLAY(CL),{A-4}

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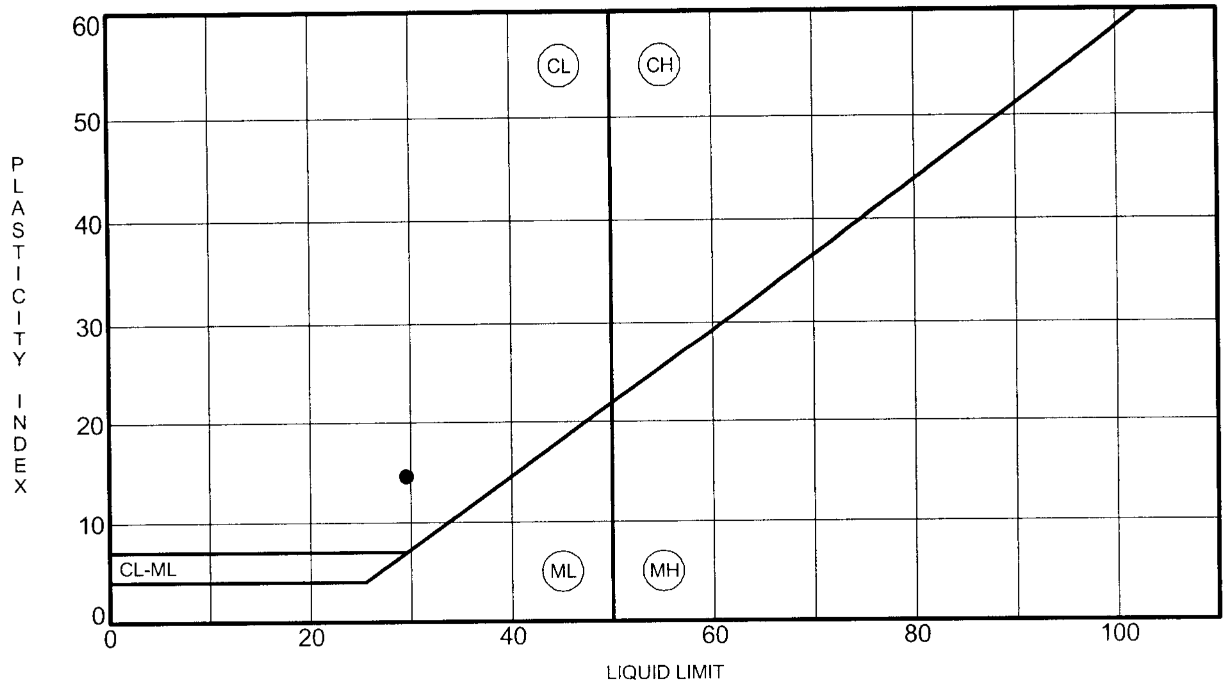
ATTERBERG LIMITS' RESULTS

Report No.: H68-134G
Client: HO+K
Project: DC Crime Labs
Location: 4th and School Streets, SW DC
Date: July 2007

US ATTERBERG LIMITS BORING LOGS.GPJ F&R.GDT 7/9/07



	Boring No.	Depth	LL	PL	PI	Fines	Classification
●	B-15	at 35.0	30	15	15	76	LEAN CLAY with SAND(CL),{A-6}

US ATTERBERG LIMITS H68-134G.GPJ F&R.GDT 7/18/07

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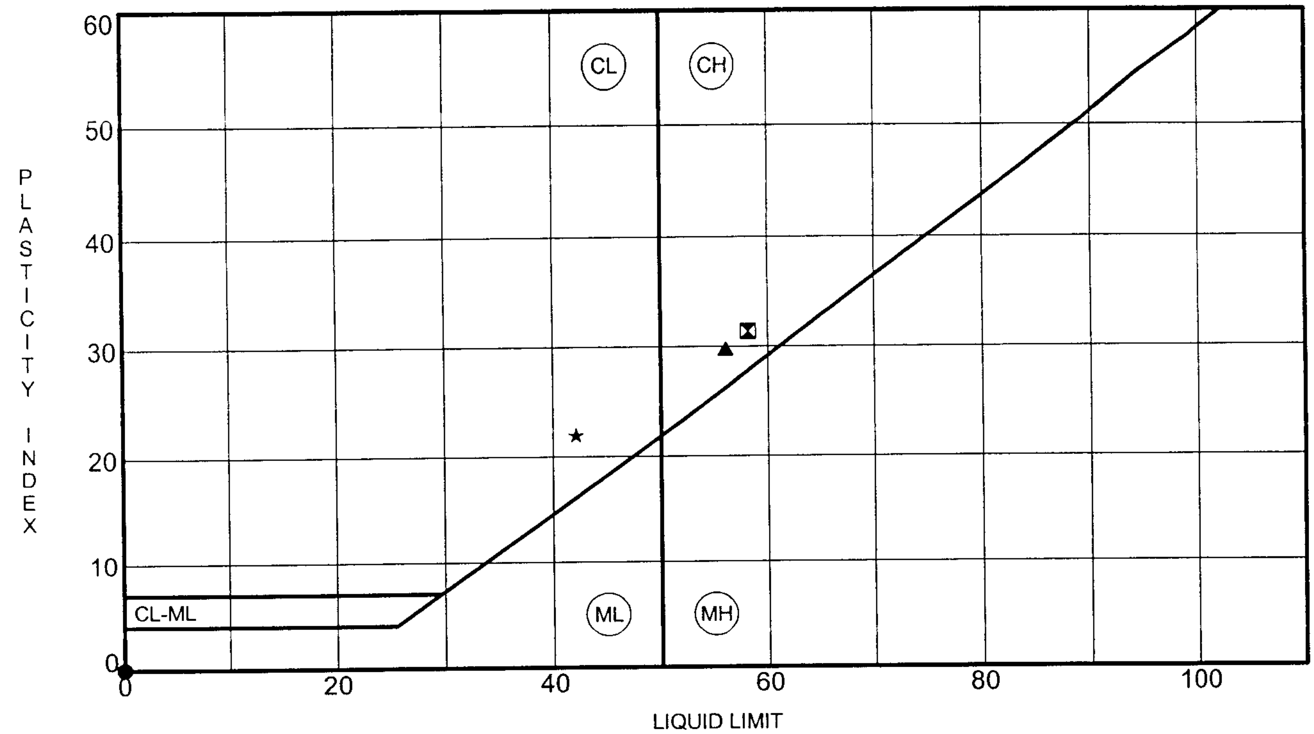
ATTERBERG LIMITS' RESULTS

Report No.: H68-134G
Client: HOK
Project: DC Crime Lab
Location: Washington, D.C.
Date: May 2007



	Boring No.	Depth	LL	PL	PI	Fines	Classification
●	B-16	at 19.0	NP	NP	NP	8	POORLY GRADED GRAVEL with SILT and SAND(GP-GM),{A-1-a}
⊠	B-16	at 34.0	58	27	31	97	FAT CLAY(CH),{A-7-6}
▲	B-16	at 59.0	56	26	30	94	FAT CLAY(CH),{A-7-6}
★	B-16	at 69.0	42	20	22	99	LEAN CLAY(CL),{A-7-6}

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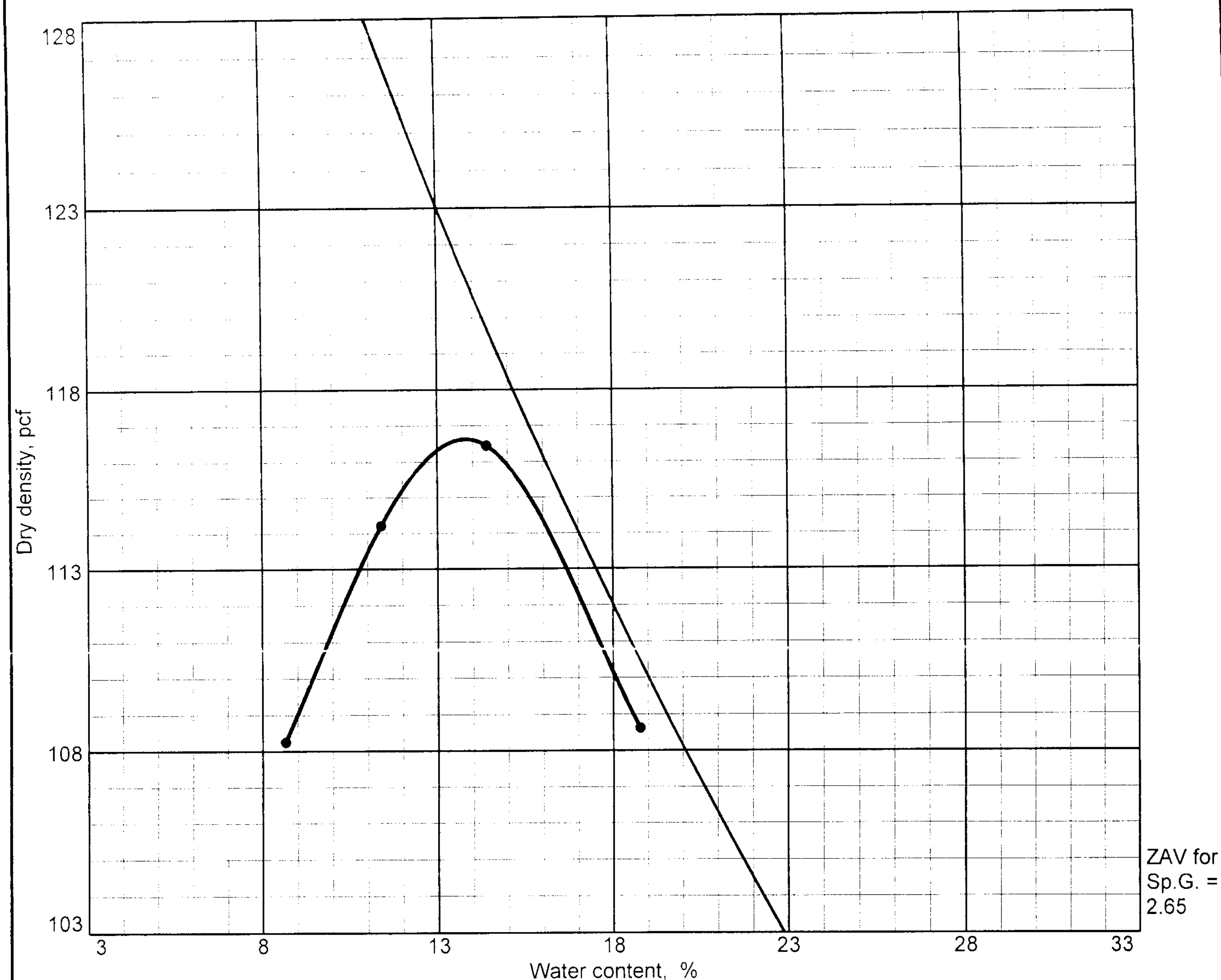
ATTERBERG LIMITS' RESULTS

Report No.: H68-134G
Client: HO+K
Project: DC Crime Labs
Location: 4th and School Streets, SW DC
Date: July 2007

COMPACTION TEST REPORT



Test specification: ASTM D 698-00a Method A Standard
Oversize correction applied to each point

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
1	CL	A-6	13.8	2.65	29	13		

ROCK CORRECTED TEST RESULTS	UNCORRECTED	MATERIAL DESCRIPTION
Maximum dry density = 116.6 pcf	116.6 pcf	BROWN SANDY LEAN CLAY
Optimum moisture = 13.8 %	13.8 %	

Project No. H68-134G **Client:** HOK
Project: DC-CLF

● **Source:** TEST BORINGS **Sample No.:** B-2 **Elev./Depth:** 1

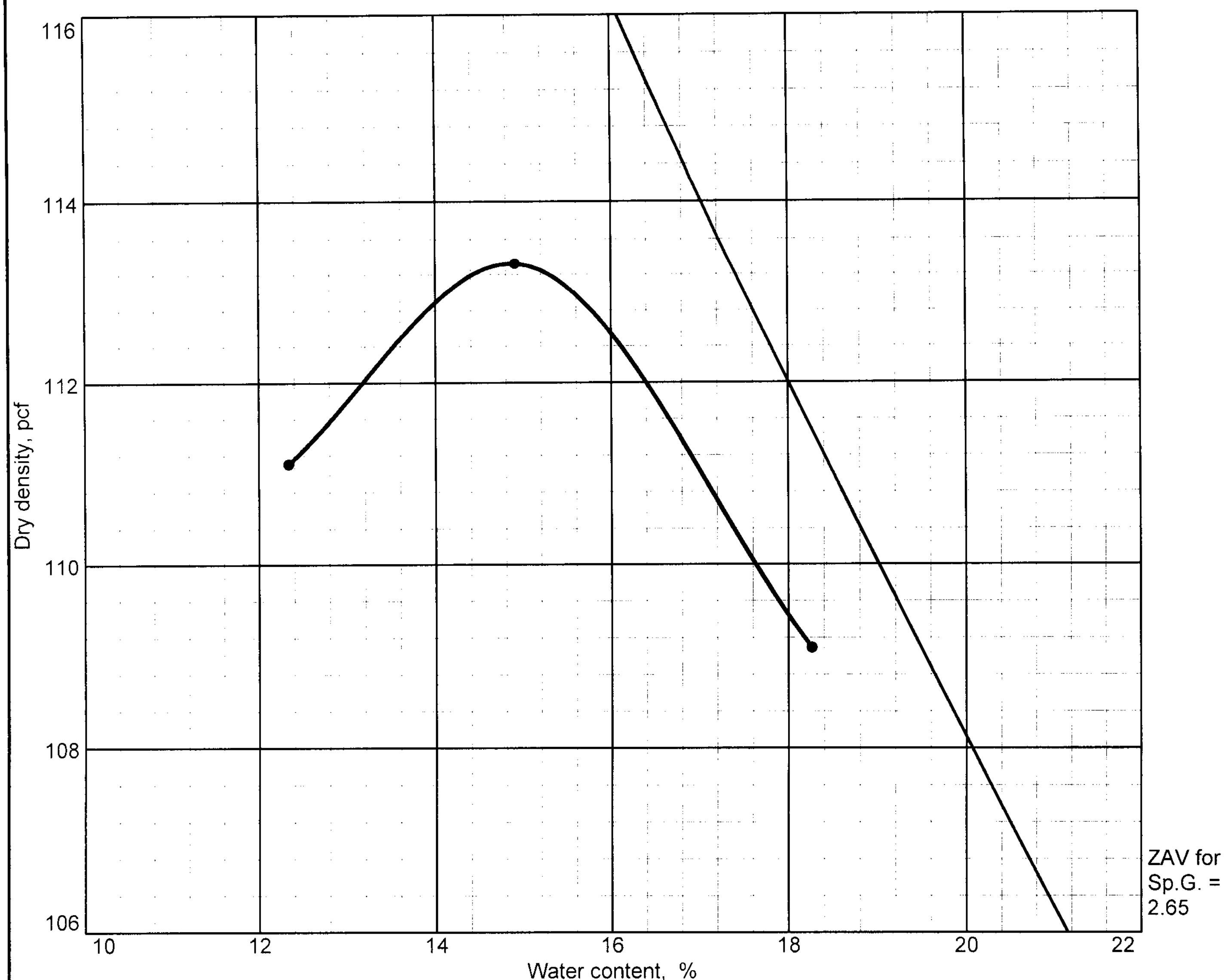
Remarks:
CONTROL # 101369

COMPACTION TEST REPORT

FROEHLING & ROBERTSON, INC.

Plate

COMPACTION TEST REPORT



Test specification: ASTM D 698-00a Method A Standard
Oversize correction applied to each point

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
2-8	CL	A-4	44.9	2.65	39	20	0.0	21.6

ROCK CORRECTED TEST RESULTS	UNCORRECTED	MATERIAL DESCRIPTION
Maximum dry density = 113.3 pcf	113.3 pcf	DARK BROWN LEAN CLAY W/ SAND
Optimum moisture = 14.9 %	14.9 %	

Project No. H68-134G **Client:** HOK
Project: DC-CLF

● **Source:** **Sample No.:** B-5 **Elev./Depth:** 2-8

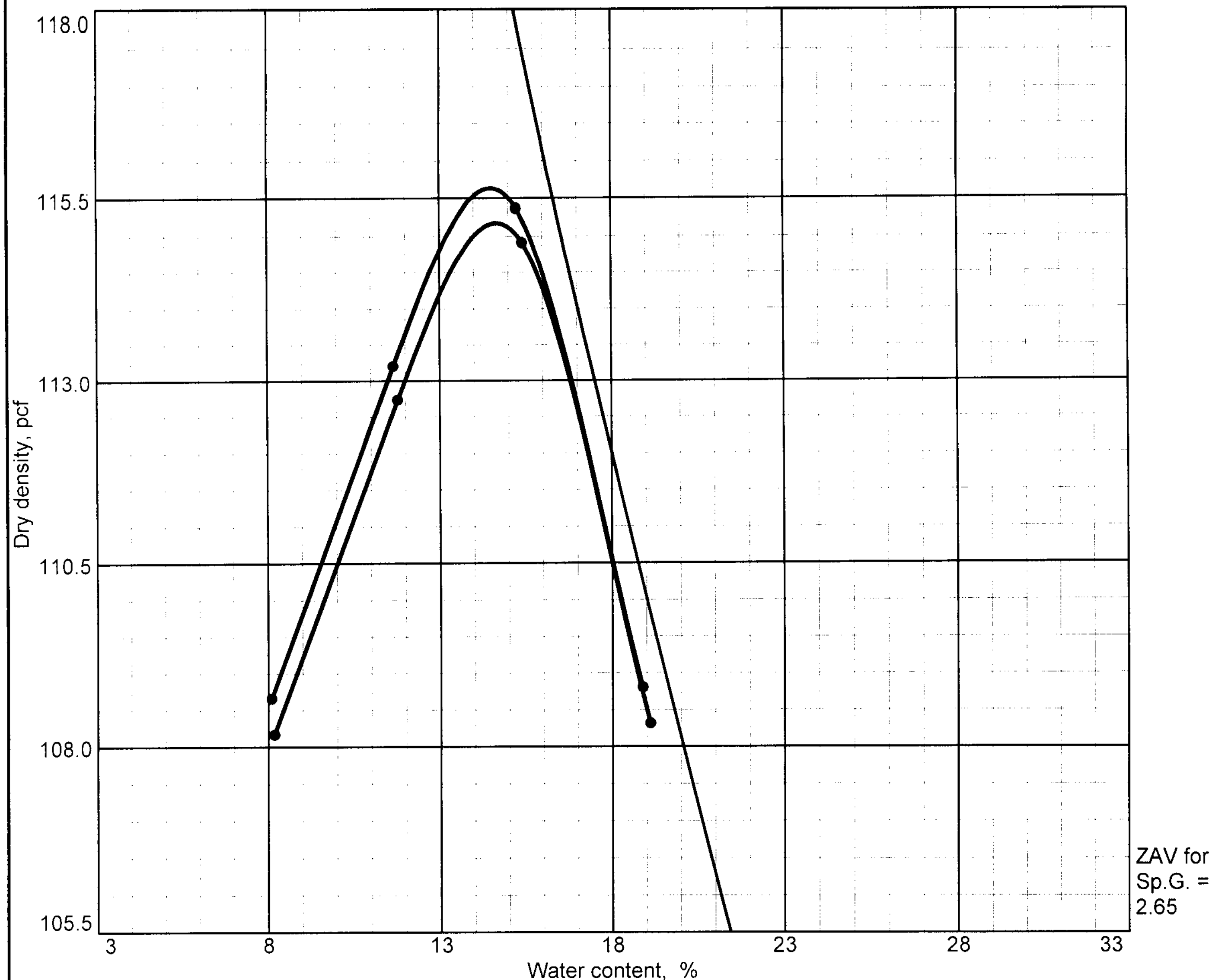
Remarks:
CONTROL #101378

COMPACTION TEST REPORT

FROEHLING & ROBERTSON, INC.

Plate

COMPACTION TEST REPORT



Test specification: ASTM D 698-00a Method A Standard
Oversize correction applied to each point

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
1	CL	A-6	15.2	2.65	30	13	1.3	31.4

ROCK CORRECTED TEST RESULTS	UNCORRECTED	MATERIAL DESCRIPTION
Maximum dry density = 115.6 pcf	115.2 pcf	BROWN SANDY LEAN CLAY
Optimum moisture = 14.5 %	14.7 %	

Project No. H68-134G **Client:** HOK
Project: DC-CLF

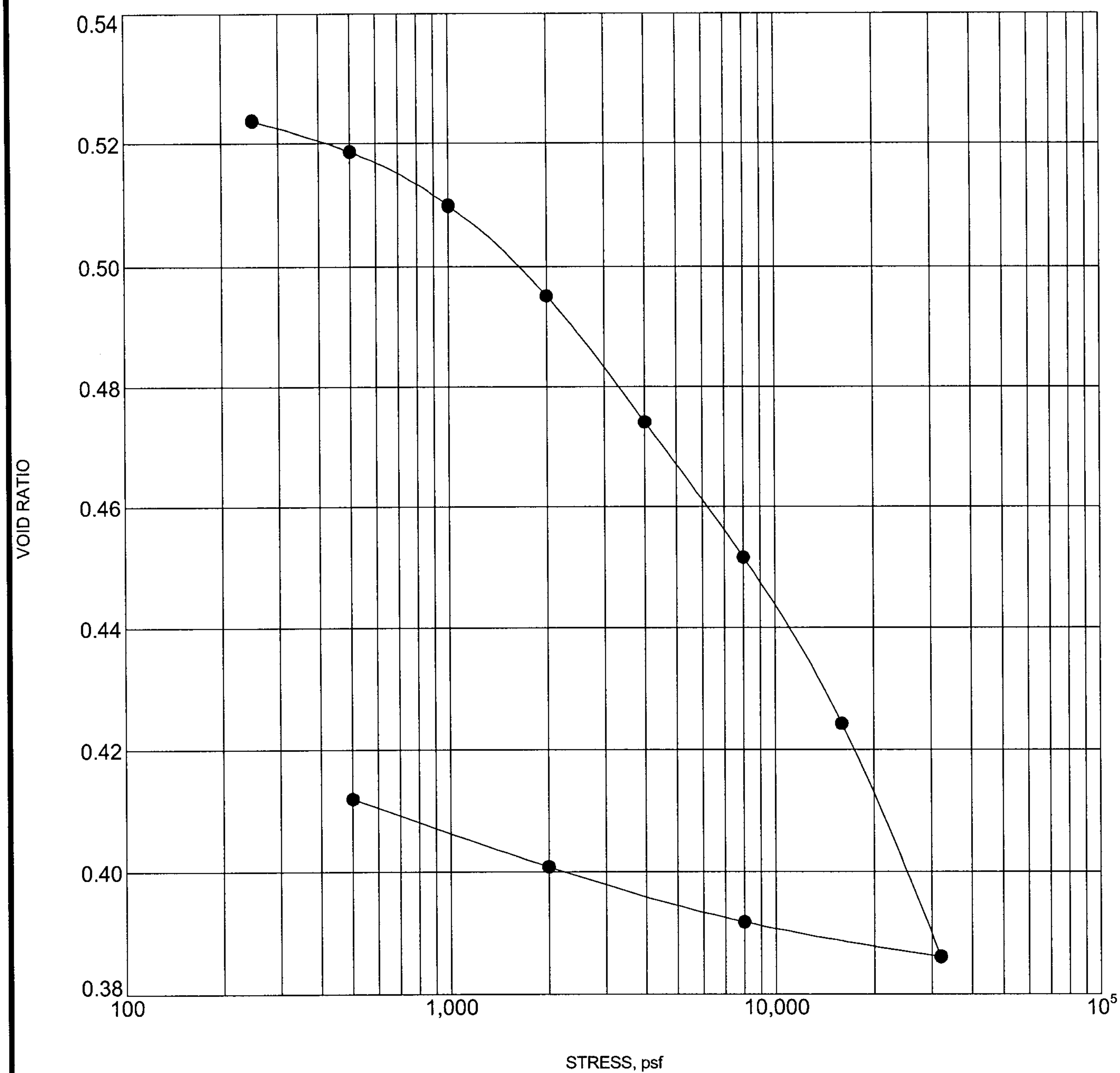
● **Source:** **Sample No.:** B-15 **Elev./Depth:** 1

Remarks:
CONTROL #101369

COMPACTION TEST REPORT

FROEHLING & ROBERTSON, INC.

Plate



	Specimen Identification		Classification	γ_d	MC%
●	**B-4**	**33.0**	**SANDY LEAN CLAY(CL)**	**109**	**19**

US CONSOL VOID RATIO H68-134G.GPJ F&R.GDT 5/24/07

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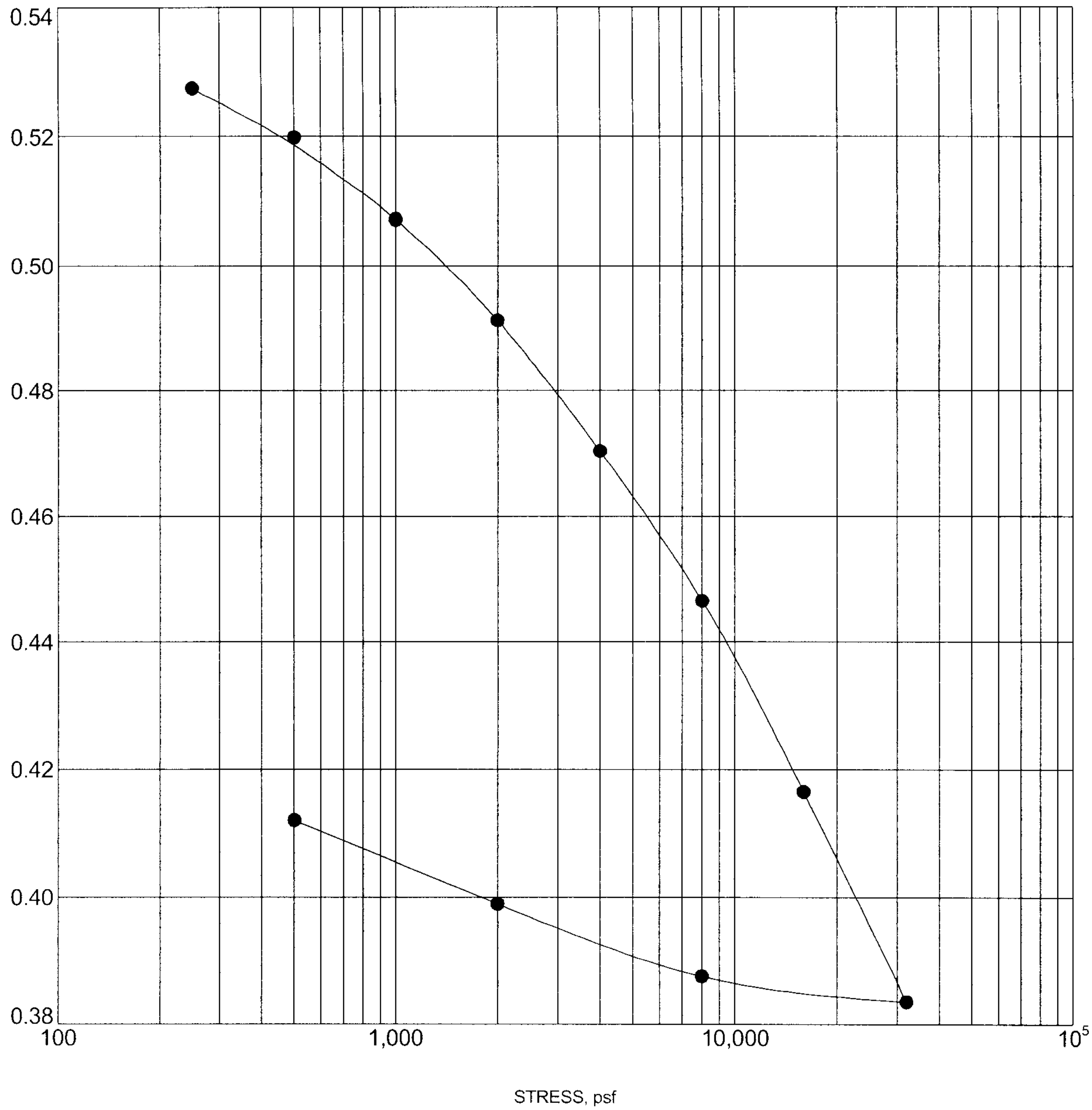
"OVER ONE HUNDRED YEARS OF SERVICE"

CONSOLIDATION TEST

Report No.: H68-134G
Client: HOK
Project: DC Crime Lab
Location: Washington, D.C.
Date: May 2007



Specimen Identification			Classification	γ_d	MC%
●	**B-15**	**35.0**	**LEAN CLAY with SAND(CL)**	**112**	**21**

US CONSOL VOID RATIO H68-134G.GPJ F&R.GDT 7/18/07

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CONSOLIDATION TEST

Report No.: H68-134G
Client: HOK
Project: DC Crime Lab
Location: Washington, D.C.
Date: May 2007

MACTEC

MACTEC Engineering and Consulting, Inc.
21740 Beaumeade Circle, Suite 150
Ashburn, Virginia 20147
(703) 729-1416

Summary of Soil Classification Test Data

PROJECT NAME: **DC Police Consolidated Labs**

PROJECT NUMBER: **3554-07-xxxx**

DATE: **5/11/2007**

SAMPLE			SOIL DESCRIPTION	SOIL CLASS.	% RETAINED NO. 4 SIEVE	% FINER NO. 200 SIEVE	NAT. MOIST. (%)	ATTERBERG LIMITS			G_S
ID	DEPTH (ft.)	TYPE						L.L.	P.L.	P.I.	
B-5	34.0-36.0	Tube	Gray lean CLAY	CL	0.0	91.1	22.8	48	25	23	2.652
B-16	33.0-35.0	Tube	Gray elastic SILT	MH	0.0	97.5	35.3	51	29	22	2.644

NOTES:
1. Soil classification and testing in accordance with USCS, ASTM D2487, D421, D422 & D4318 and Proctor and CBR testing in accordance with ASTM D1557 and D1883 respectively.
2. L.L.= Liquid Limit; P.L.= Plastic Limit; P.I. = Plasticity Index; N.P.= Non-Plastic; N.L.L.=No Liquid Limit
3. Soil color determined from Munsell Soil Chart
4. Description based on visual classifications
5. MDD.= Max. Dry Density
6. OMC.= Optimum Moisture Content
7. CBR.= California Bearing Ratio
8. Consolidation
9. Direct Shear Test

Reviewed By: Manager, Laboratory Services

MACTEC

MACTEC ENGINERING AND CONSULTING, INC.
21740 Beaumeade Circle, Suite 150
Ashburn, VA 20147

Sieve Analysis Test Report

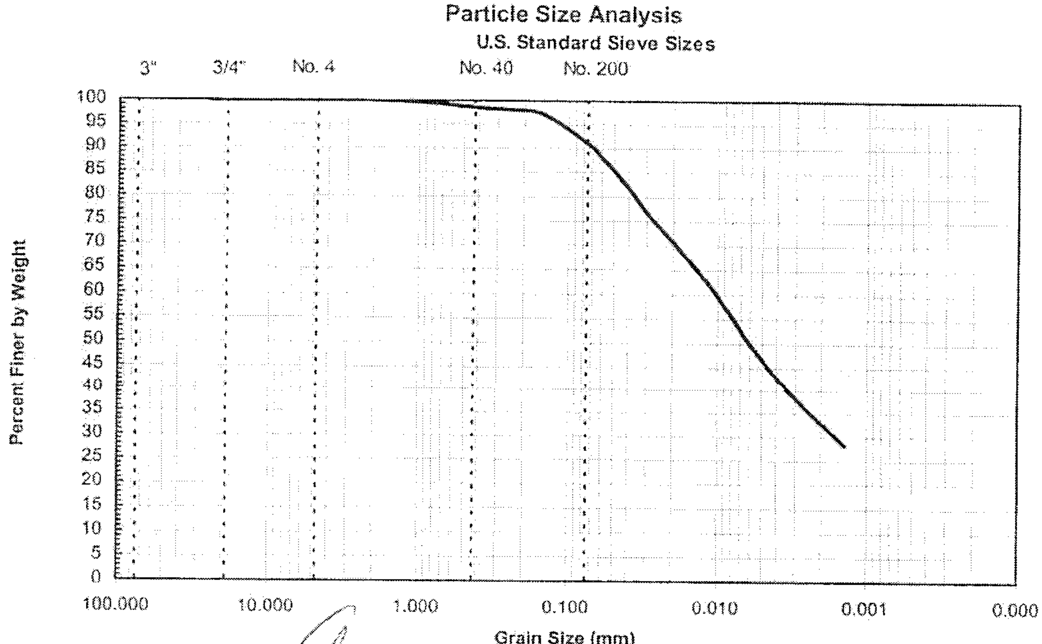
Hydrometer/Sieve
ASTM D422

Project Name:	DC Police Consolidated Labs
Project Number:	3554-07-xxxx
Report Date:	5/11/07
Sample Number:	B-5 @ 34.0'-36.0'

Sieve and Hydrometer

Particle Size	Units	Cumulative Wt. Retained (g)	Wt. Retained Each Sieve (g)	Cumulative % Passing
25.0	mm	0.00	0.0	100.0
19.0	mm	0.00	0.0	100.0
9.5	mm	0.00	0.0	100.0
4.8	mm	0.00	0.0	100.0
2.0	mm	0.00	0.0	100.0
850	um	0.71	0.7	99.5
425	um	1.96	1.3	98.6
250	um	2.64	0.7	98.1
150	um	4.00	1.4	97.2
75	um	12.64	8.6	91.1
57	um			87.4
42	um			82.8
30	um			76.8
20	um			70.7
12	um			62.6
8.5	um			56.6
6.2	um			50.5
3.1	um			38.9
1.4	um			28.3
Wt. of Soil, g		141.72	50.00	

Particle Size Analysis



Reviewed by:

MACTEC

MACTEC ENGINERING AND CONSULTING, INC.
21740 Beaumeade Circle, Suite 150
Ashburn, VA 20147

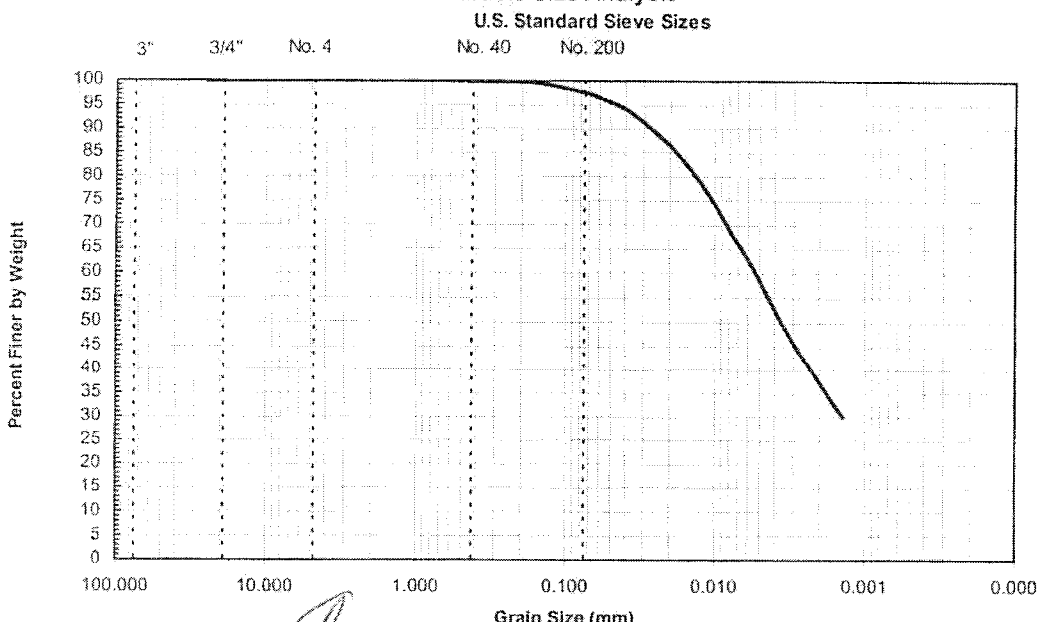
Sieve Analysis Test Report
Hydrometer/Sieve
ASTM D422

Project Name: DC Police Consolidated Labs
Project Number: 3554-07-xxxx
Report Date: 5/11/07
Sample Number: B-16 @ 33.0'-35.0'

Sieve and Hydrometer

Particle Size	Units	Cumulative Wt. Retained (g)	Wt. Retained Each Sieve (g)	Cumulative % Passing
25.0	mm	0.00	0.0	100.0
19.0	mm	0.00	0.0	100.0
9.5	mm	0.00	0.0	100.0
4.8	mm	0.00	0.0	100.0
2.0	mm	0.00	0.0	100.0
850	um	0.04	0.0	100.0
425	um	0.11	0.1	99.9
250	um	0.22	0.1	99.8
150	um	0.48	0.3	99.5
75	um	2.36	1.9	97.5
55	um			96.0
39	um			94.0
28	um			90.5
18	um			85.0
11	um			76.5
8.0	um			69.0
5.8	um			62.0
3.0	um			46.0
1.4	um			30.0
Wt. of Soil, g		93.18	50.00	

Particle Size Analysis



Reviewed by: ____________

MACTEC
Mactec Engineering and Consulting, Inc.
21740 Beaumeade Circle, Suite 150
Ashburn, VA 20147
(703) 729 1416

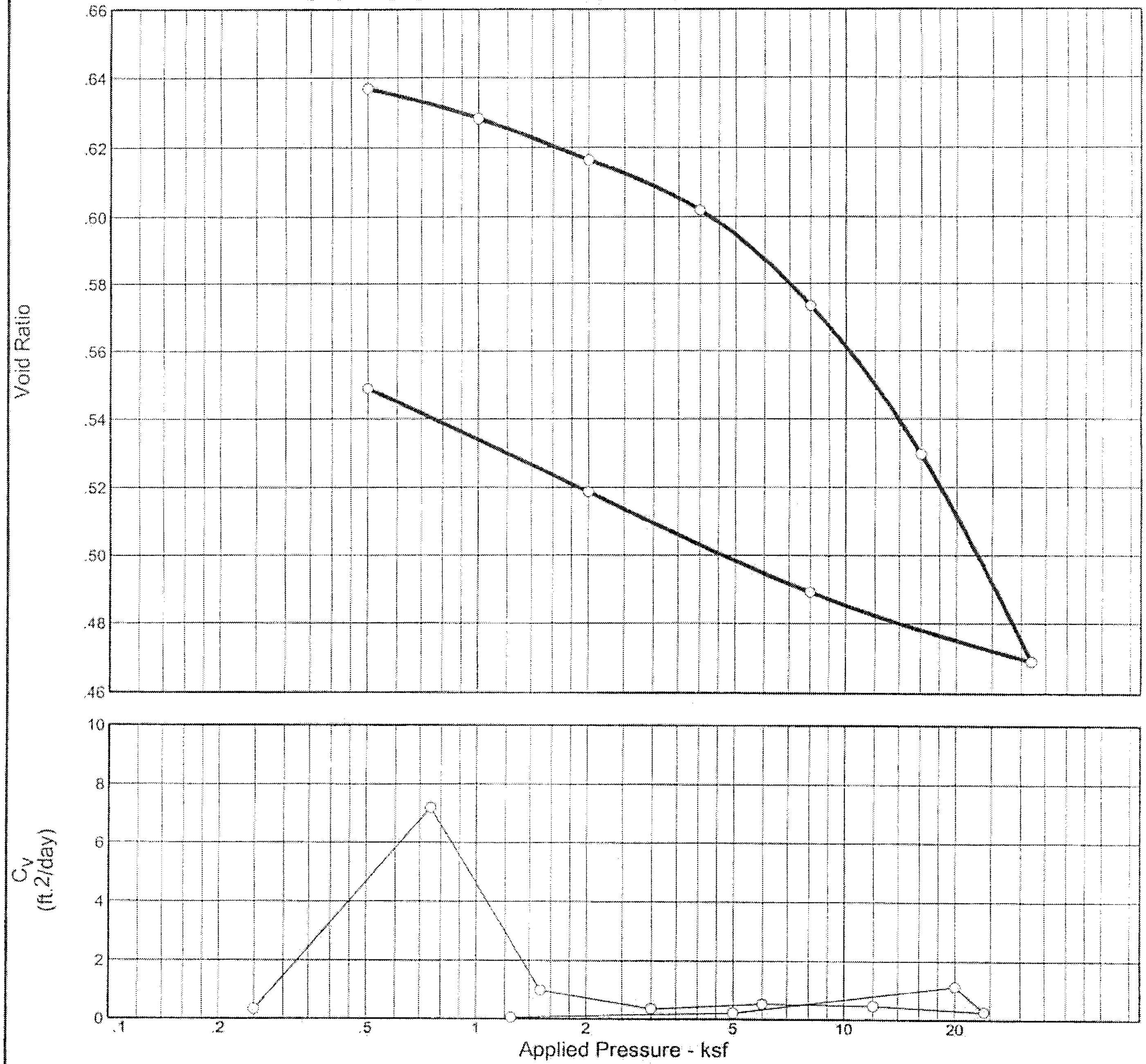
ASTM D854

Project Name: DC Consolidated Labs
Project Number: 3554-07-xxxx
Date: 5/11/2007

Sample I.D	Sample Type	Gs
B-5	Tube	2.652
B-16	Tube	2.644

Reviewed by: ____________

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
92.9 %	22.8 %	100.3	48	23	2.652	4.44	8.15	0.20	0.04	0.650

MATERIAL DESCRIPTION	USCS	AASHTO
Gray lean CLAY	CL	A-7-6

Project No. 355407XXXX **Client:** Froehling & Robertson, Inc.

Project: DC Police Consolidated Labs

Location: B-5 @ 34.0'-36.0'

MACTEC, Inc.

Ashburn, VA

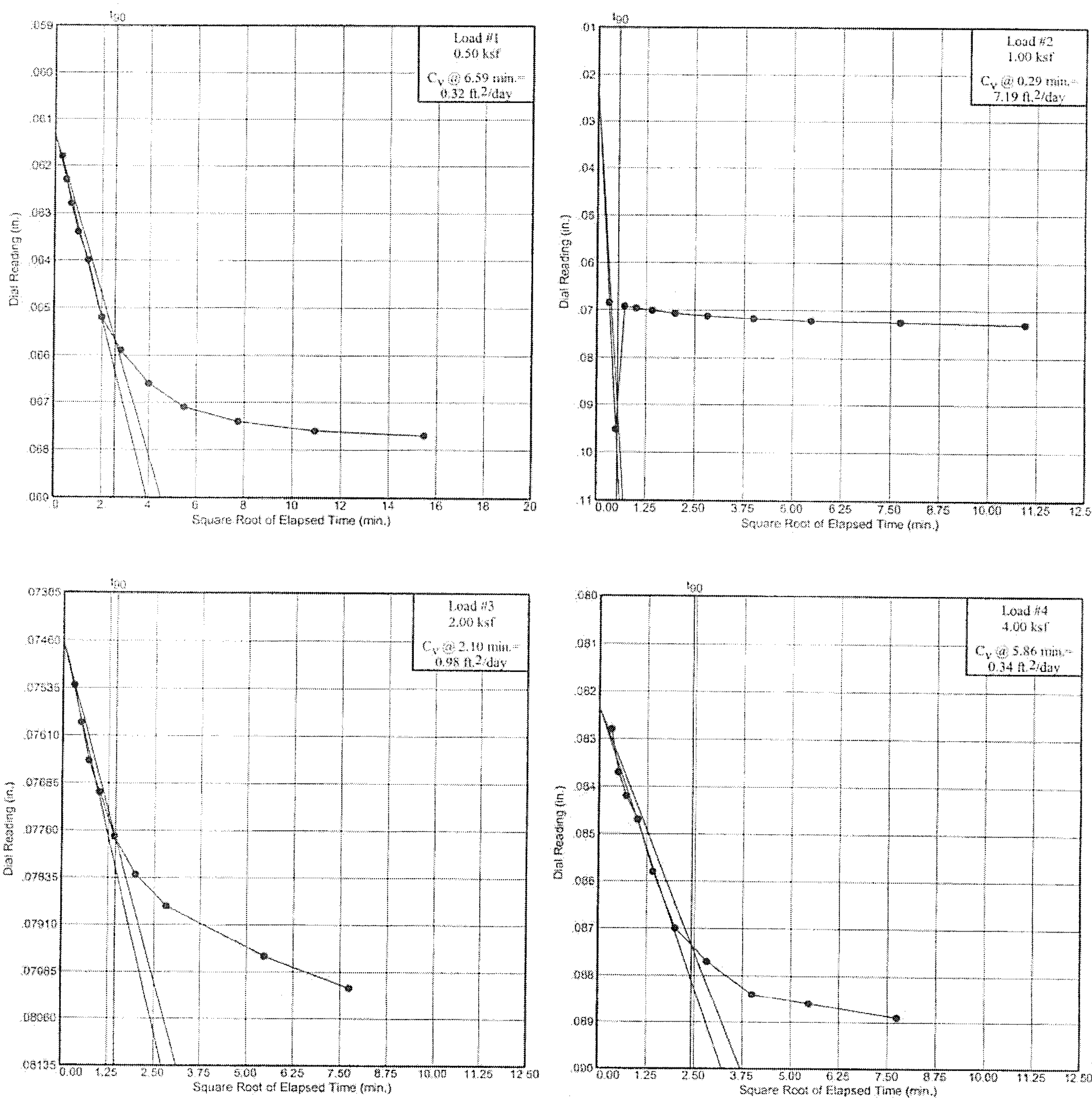
Remarks:

Figure 1

Dial Reading vs. Time

Project No.: 355407XXXX
Project: DC Police Consolidated Labs

Location: B-5 @ 34.0'-36.0'



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Ashburn, VA

Figure 2

Dial Reading vs. Time

Project No.: 355407XXXX
Project: DC Police Consolidated Labs

Location: B-5 @ 34.0'-36.0'

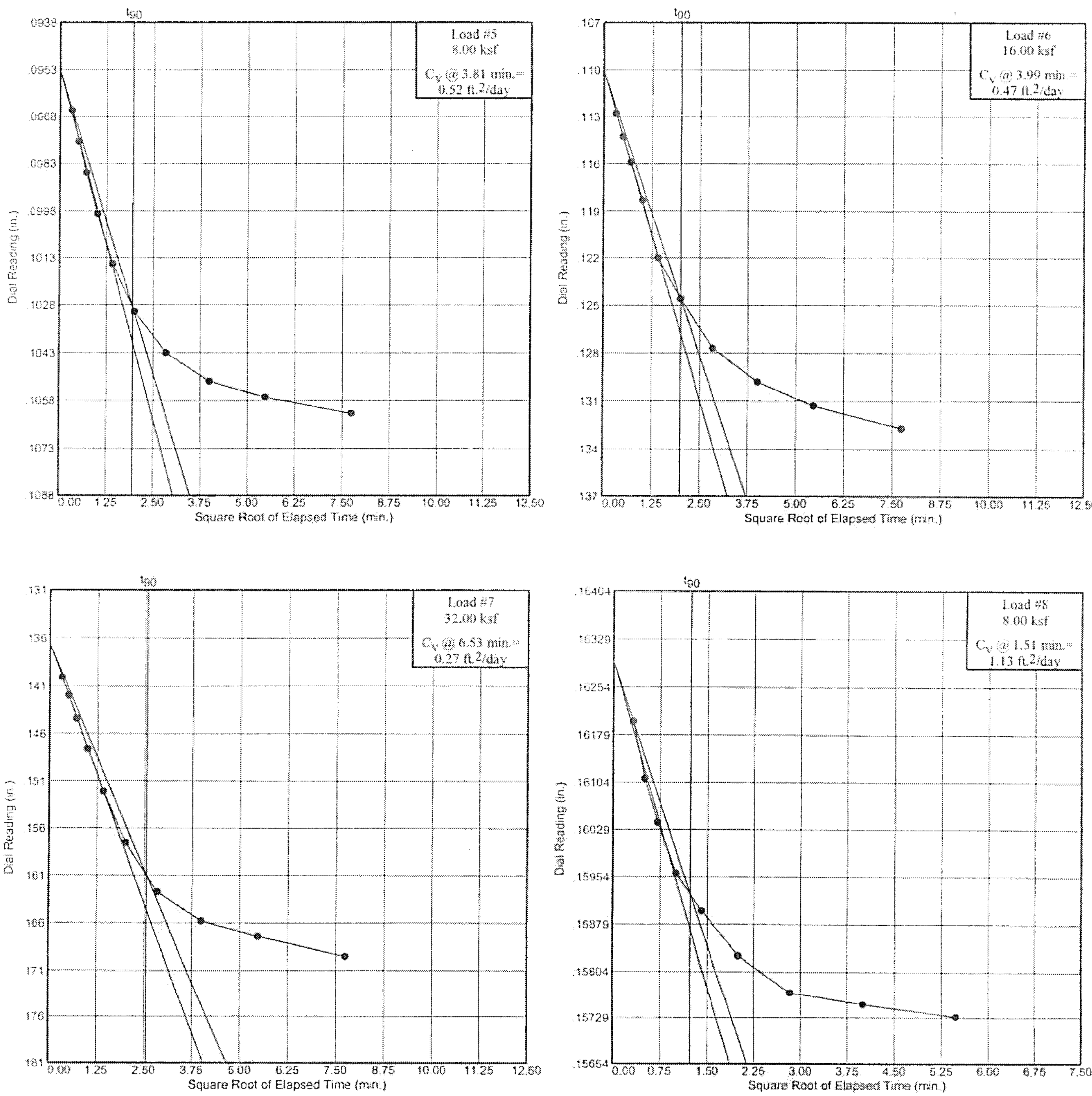

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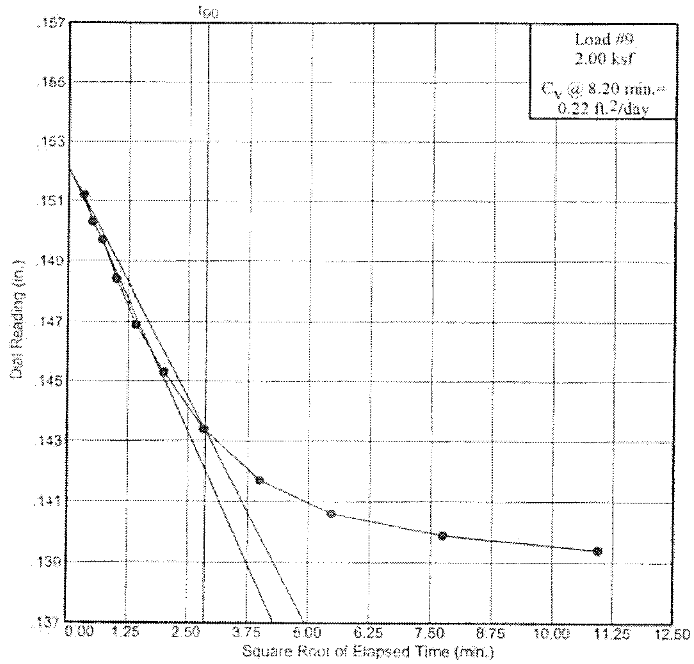
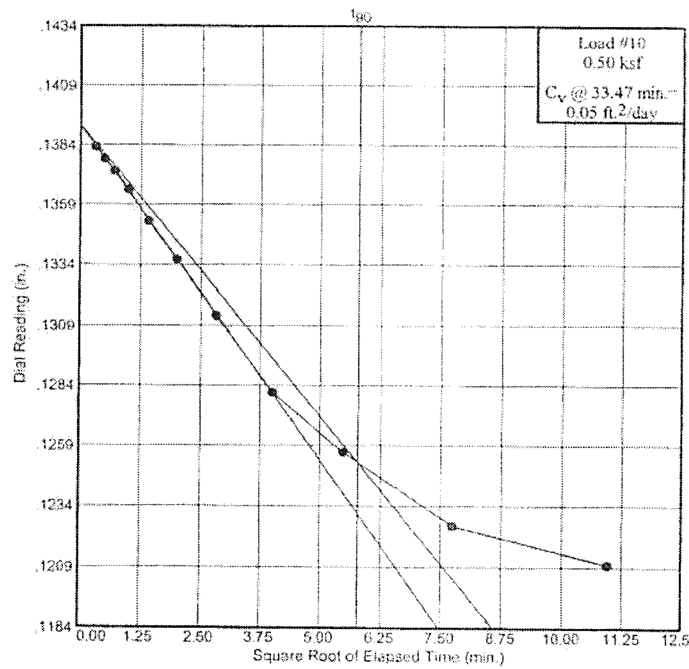
Figure 3

Dial Reading vs. Time

Project No.: 355407XXXX
Project: DC Police Consolidated Labs

Location: B-5 @ 34.0'-36.0'





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Ashburn, VA

Figure 4

CONSOLIDATION TEST DATA

Client: Froehling & Robertson, Inc.
Project: DC Police Consolidated Labs
Project Number: 355407XXXX

Sample Data

Source:
Sample No.:
Elev. or Depth: Sample Length(in./cm.):
Location: B-5 @ 34.0'-36.0'
Description: Gray lean CLAY
Liquid Limit: 48 Plasticity Index: 23
USCS: CL AASHTO: A-7-6 Figure No.: 1
Testing Remarks:

Test Specimen Data

TOTAL SAMPLE	BEFORE TEST	AFTER TEST
Wet w+t = 182.88 g.	Consolidometer # = 1	Wet w+t = 164.60 g.
Dry w+t = 150.59 g.		Dry w+t = 137.65 g.
Tare Wt. = 8.87 g.	Spec. Gravity = 2.652	Tare Wt. = 9.06 g.
Height = 1.00 in.	Height = 1.00 in.	
Diameter = 2.50 in.	Diameter = 2.50 in.	
Weight = 159.00 g.	Defl. Table = Reference Set (inches/ksf)	
Moisture = 22.8 %	Ht. Solids = 0.6065 in.	Moisture = 21.0 %
Wet Den. = 123.2 pcf	Dry Wt. = 129.39 g.*	Dry Wt. = 128.59 g.
Dry Den. = 100.3 pcf	Void Ratio = 0.650	Void Ratio = 0.549
Ovrbrdn. = 4.44 ksf	Saturation = 92.9 %	

* Initial dry weight used in calculations

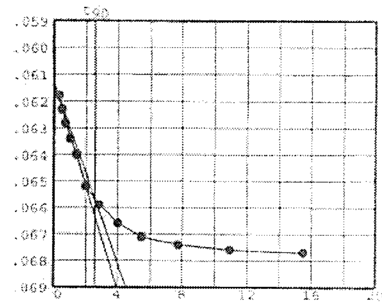
End-of-Load Summary

Pressure (ksf)	Final Dial (in.)	Machine Defl. (in.)	C_v (ft.^{2}/day)	C_α	Void Ratio	% Compression /Swell
start	0.05950				0.650	
0.50	0.06810	0.00040	0.32		0.637	0.8 Comprs.
1.00	0.07370	0.00080	7.19		0.628	1.3 Comprs.
2.00	0.08170	0.00160	0.98		0.616	2.1 Comprs.
4.00	0.09130	0.00240	0.34		0.602	2.9 Comprs.
8.00	0.10620	0.00000	0.52		0.573	4.7 Comprs.
16.00	0.13270	0.00000	0.47		0.530	7.3 Comprs.
32.00	0.16950	0.00000	0.27		0.469	11.0 Comprs.
8.00	0.15730	0.00000	1.13		0.489	9.8 Comprs.
2.00	0.14100	0.00160	0.22		0.519	8.0 Comprs.
0.50	0.12140	0.00040	0.05		0.549	6.1 Comprs.

C_c = 0.20 P_c = 8.15 ksf C_r = 0.04

Pressure: 0.50 ksf | TEST READINGS | Load No. 1

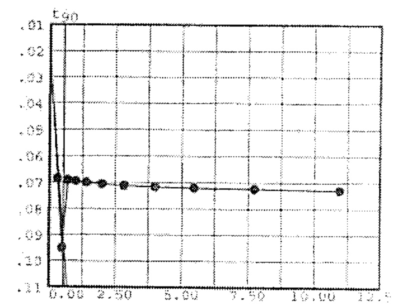
No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.05950	11	60.00	0.06780
2	0.10	0.06220	12	120.00	0.06800
3	0.25	0.06270	13	240.00	0.06810
4	0.50	0.06320			
5	1.00	0.06380			
6	2.00	0.06440			
7	4.00	0.06560			
8	8.00	0.06630			
9	16.00	0.06700			
10	30.00	0.06750			



Void Ratio = 0.637 Compression = 0.8 %
D_0 = 0.06132 D_{90} = 0.06568 D_{100} = 0.06616
C_v at 6.6 min. = 0.32 ft.^{2}/day

Pressure: 1.00 ksf | TEST READINGS | Load No. 2

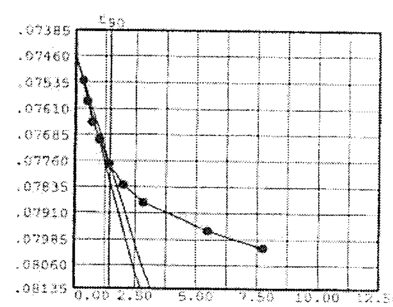
No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.06810	11	60.00	0.07320
2	0.10	0.06930	12	120.00	0.07370
3	0.25	0.09600			
4	0.50	0.07000			
5	1.00	0.07040			
6	2.00	0.07090			
7	4.00	0.07150			
8	8.00	0.07200			
9	16.00	0.07250			
10	30.00	0.07290			



Void Ratio = 0.628 Compression = 1.3 %
D_0 = 0.02256 D_{90} = 0.09048 D_{100} = 0.09802
C_v at 0.3 min. = 7.19 ft.^{2}/day

Pressure: 2.00 ksf | TEST READINGS | Load No. 3

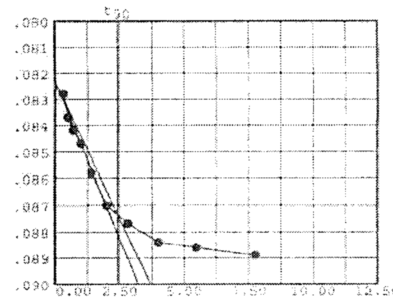
No.	Elapsed Time	Dial Reading
1	0.00	0.07370
2	0.10	0.07690
3	0.25	0.07750
4	0.50	0.07810
5	1.00	0.07860
6	2.00	0.07930
7	4.00	0.07990
8	8.00	0.08040
9	30.00	0.08120
10	60.00	0.08170



Void Ratio = 0.616 Compression = 2.1 %
D_0 = 0.07461 D_{90} = 0.07774 D_{100} = 0.07808
C_v at 2.1 min. = 0.98 ft.^{2}/day

Pressure: 4.00 ksf | **TEST READINGS** | **Load No. 4**

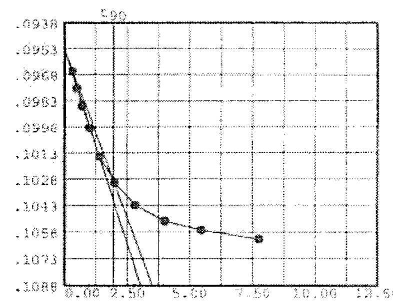
No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.08170	11	60.00	0.09130
2	0.10	0.08520			
3	0.25	0.08610			
4	0.50	0.08660			
5	1.00	0.08710			
6	2.00	0.08820			
7	4.00	0.08940			
8	8.00	0.09010			
9	16.00	0.09080			
10	30.00	0.09100			



Void Ratio = 0.602 Compression = 2.9 %
D_0 = 0.08234 D_{90} = 0.08736 D_{100} = 0.08791
C_v at 5.9 min. = 0.34 ft.^{2}/day

Pressure: 8.00 ksf | **TEST READINGS** | **Load No. 5**

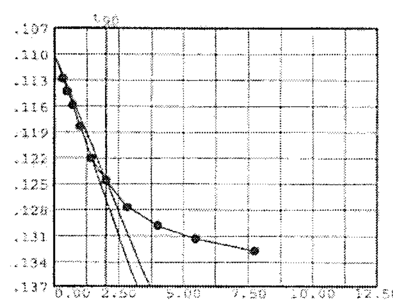
No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.09130	11	60.00	0.10620
2	0.10	0.09660			
3	0.25	0.09760			
4	0.50	0.09860			
5	1.00	0.09990			
6	2.00	0.10150			
7	4.00	0.10300			
8	8.00	0.10430			
9	16.00	0.10520			
10	30.00	0.10570			



Void Ratio = 0.573 Compression = 4.7 %
D_0 = 0.09535 D_{90} = 0.10288 D_{100} = 0.10371
C_v at 3.8 min. = 0.52 ft.^{2}/day

Pressure: 16.00 ksf | **TEST READINGS** | **Load No. 6**

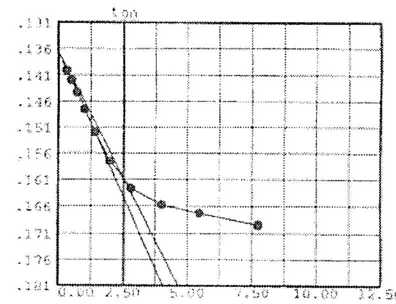
No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.10620	11	60.00	0.13270
2	0.10	0.11280			
3	0.25	0.11430			
4	0.50	0.11590			
5	1.00	0.11830			
6	2.00	0.12200			
7	4.00	0.12460			
8	8.00	0.12770			
9	16.00	0.12980			
10	30.00	0.13130			



Void Ratio = 0.530 Compression = 7.3 %
D_0 = 0.11009 D_{90} = 0.12459 D_{100} = 0.12621
C_v at 4.0 min. = 0.47 ft.^{2}/day

Pressure: 32.00 ksf | TEST READINGS | Load No. 7

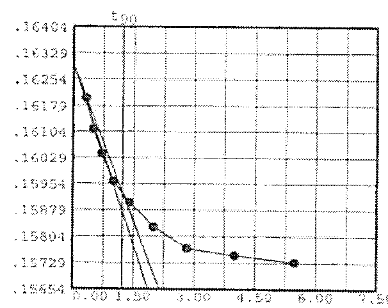
No.	Elapsed Time	Dial Reading
1	0.00	0.13270
2	0.10	0.14010
3	0.25	0.14200
4	0.50	0.14440
5	1.00	0.14760
6	2.00	0.15210
7	4.00	0.15750
8	8.00	0.16270
9	16.00	0.16580
10	30.00	0.16740
11	60.00	0.16950



Void Ratio = 0.469 Compression = 11.0 %
D_0 = 0.13660 D_{90} = 0.16099 D_{100} = 0.16370
C_v at 6.5 min. = 0.27 ft.^{2}/day

Pressure: 8.00 ksf | TEST READINGS | Load No. 8

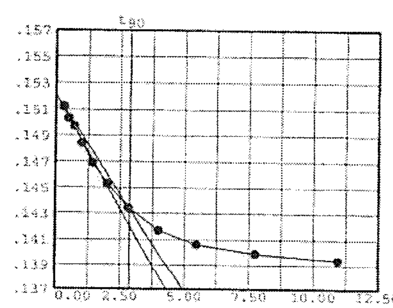
No.	Elapsed Time	Dial Reading
1	0.00	0.16950
2	0.10	0.16200
3	0.25	0.16110
4	0.50	0.16040
5	1.00	0.15960
6	2.00	0.15900
7	4.00	0.15830
8	8.00	0.15770
9	16.00	0.15750
10	30.00	0.15730



Void Ratio = 0.489 Compression = 9.8 %
D_0 = 0.16295 D_{90} = 0.15927 D_{100} = 0.15886
C_v at 1.5 min. = 1.13 ft.^{2}/day

Pressure: 2.00 ksf | TEST READINGS | Load No. 9

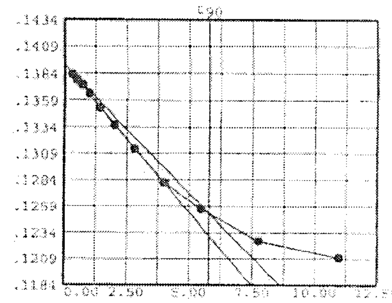
No.	Elapsed Time	Dial Reading
1	0.00	0.15730
2	0.10	0.15280
3	0.25	0.15190
4	0.50	0.15130
5	1.00	0.15000
6	2.00	0.14850
7	4.00	0.14690
8	8.00	0.14500
9	16.00	0.14330
10	30.00	0.14220
11	60.00	0.14150
12	120.00	0.14100



Void Ratio = 0.519 Compression = 8.0 %
D_0 = 0.15212 D_{90} = 0.14335 D_{100} = 0.14237
C_v at 8.2 min. = 0.22 ft.^{2}/day

Pressure: 0.50 ksf | TEST READINGS | Load No. 10

No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.14100	11	60.00	0.12300
2	0.10	0.13870	12	120.00	0.12140
3	0.25	0.13820			
4	0.50	0.13770			
5	1.00	0.13690			
6	2.00	0.13560			
7	4.00	0.13400			
8	8.00	0.13170			
9	16.00	0.12850			
10	30.00	0.12600			

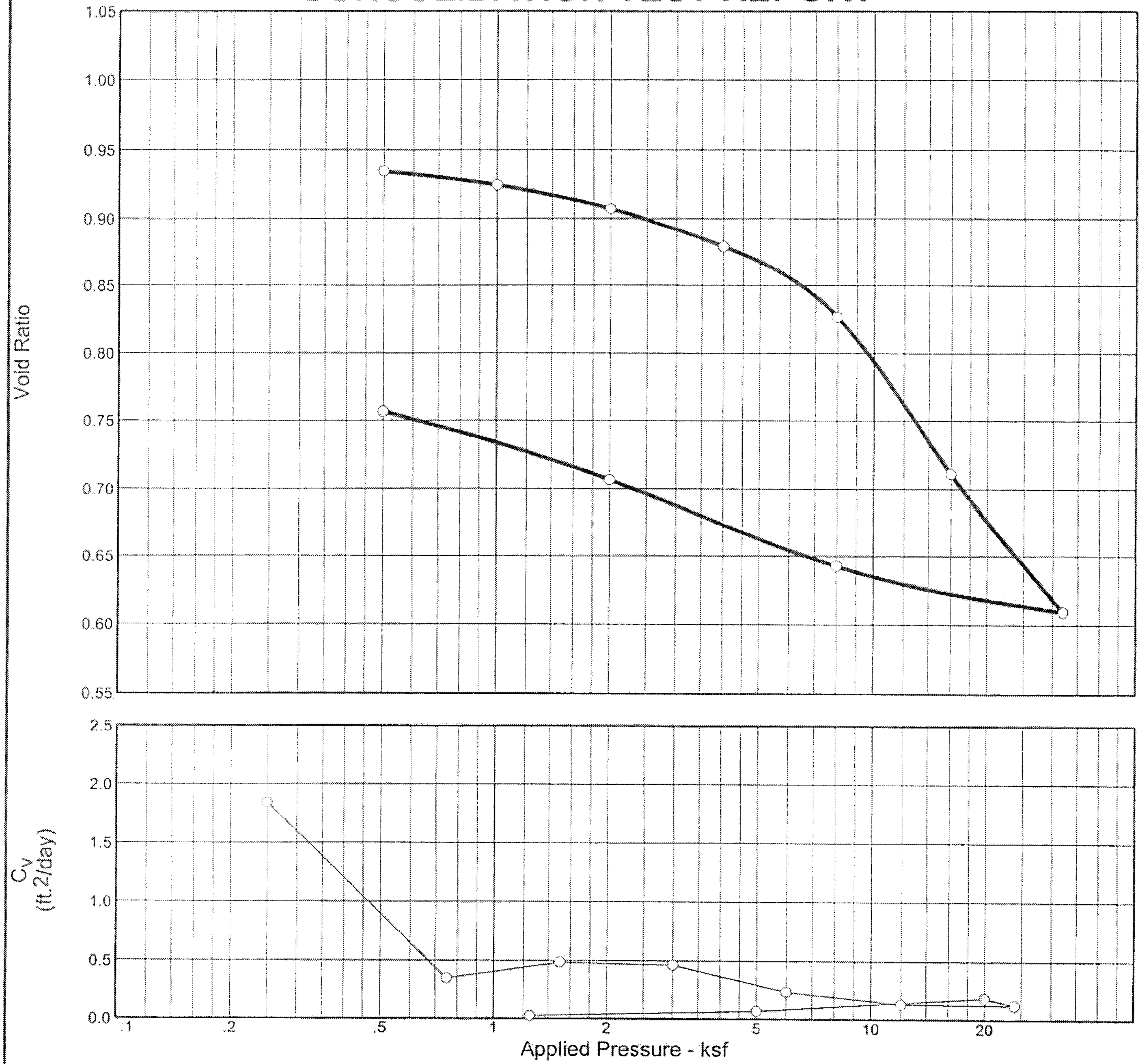


Void Ratio = 0.549 Compression = 6.1 %

D_0 = 0.13921 D_{90} = 0.12519 D_{100} = 0.12364

C_v at 33.5 min. = 0.05 ft.^{2}/day

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
100.0 %	35.3 %	85.3	51	22	2.644	4.44	5.91	0.33	0.08	0.935

MATERIAL DESCRIPTION	USCS	AASHTO
Gray elastic SILT	MH	A-7-5

Project No. 355407XXXX **Client:** Froehling & Robertson, Inc.

Project: DC Police Consolidated Labs

Location: B-16 @ 33.0'-35.0'

MACTEC, Inc.

Ashburn, VA

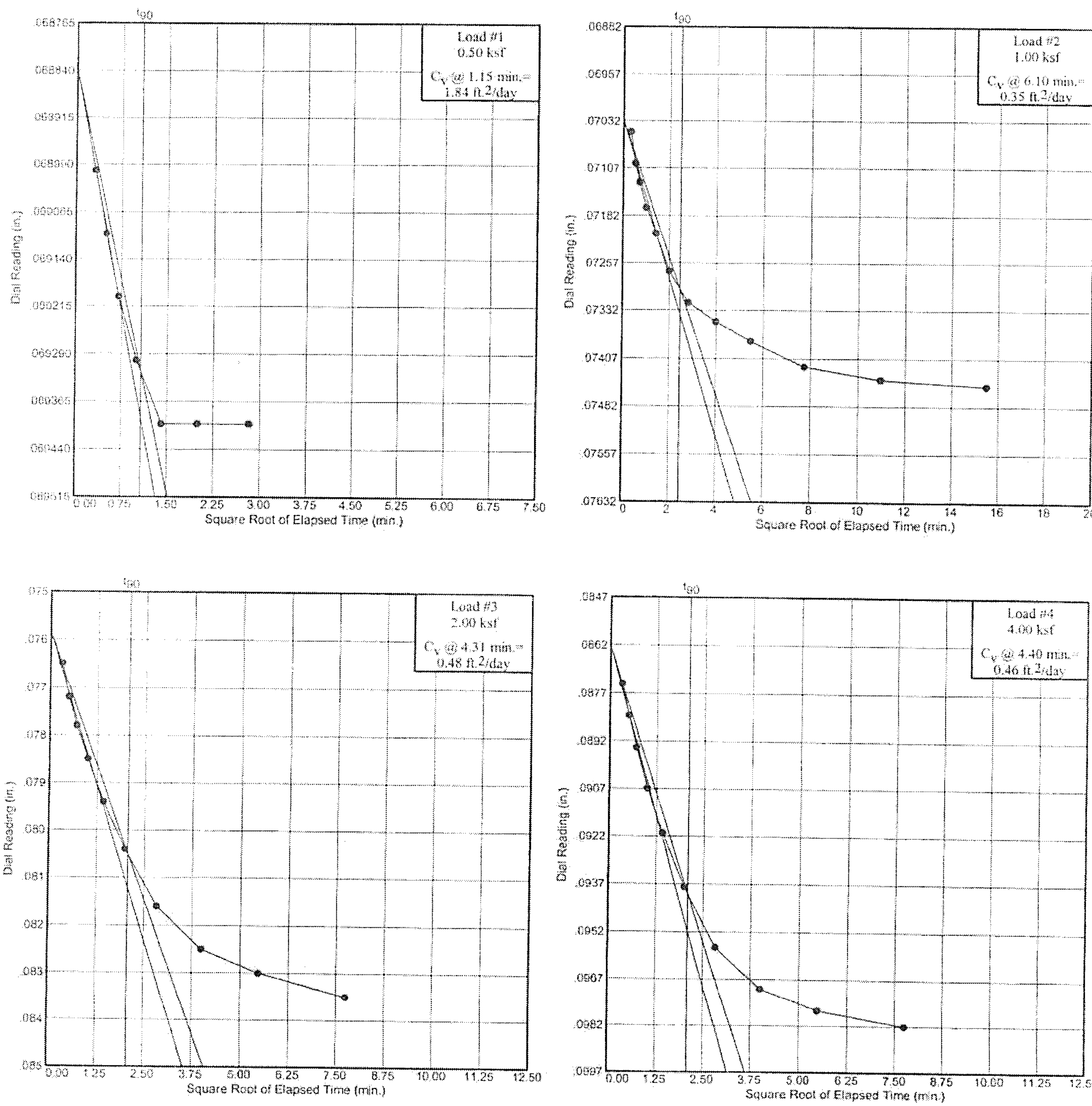
Remarks:

Figure 1

Dial Reading vs. Time

Project No.: 355407XXXX
Project: DC Police Consolidated Labs

Location: B-16 @ 33.0'-35.0'



MACTEC, Inc.

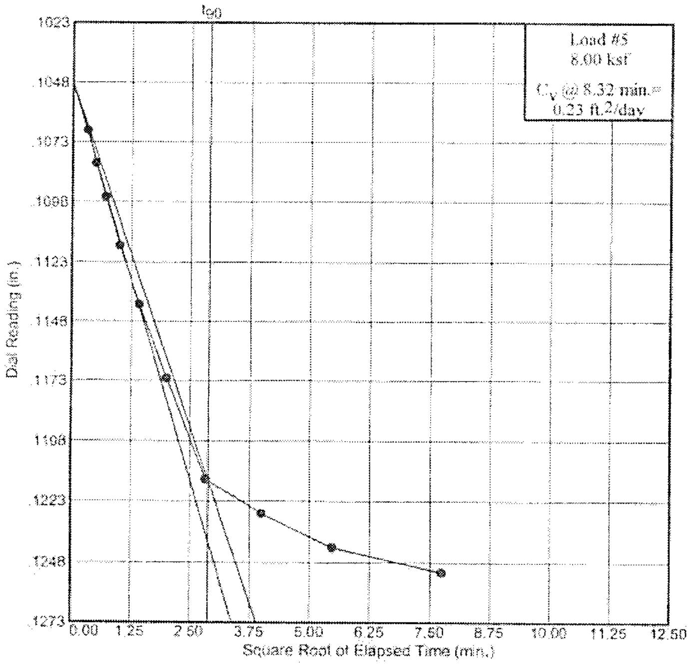
Ashburn, VA

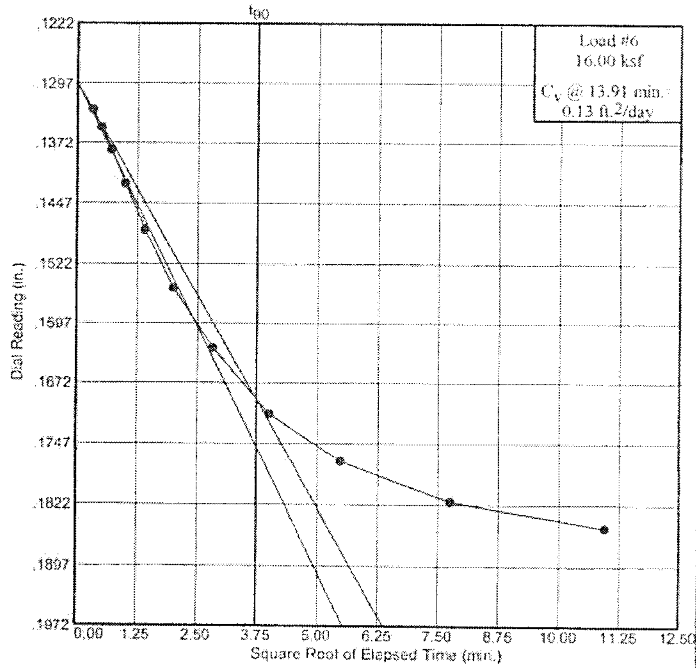
Figure 2

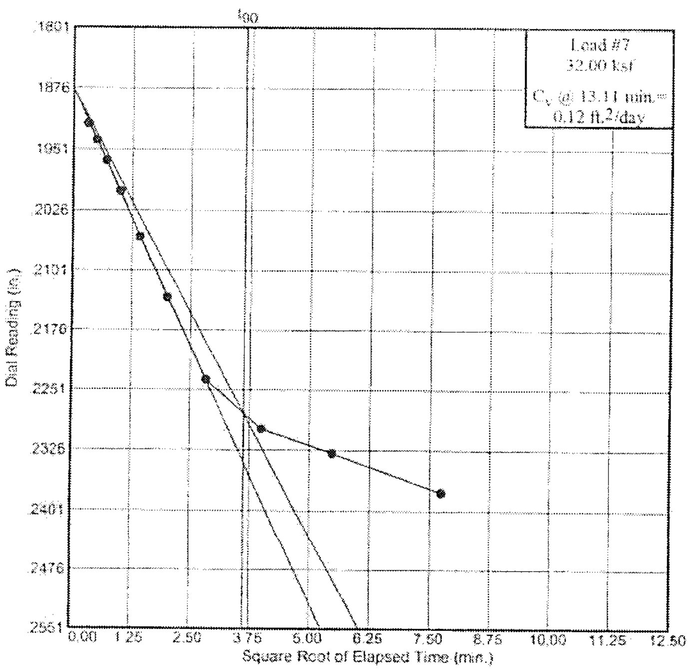
Dial Reading vs. Time

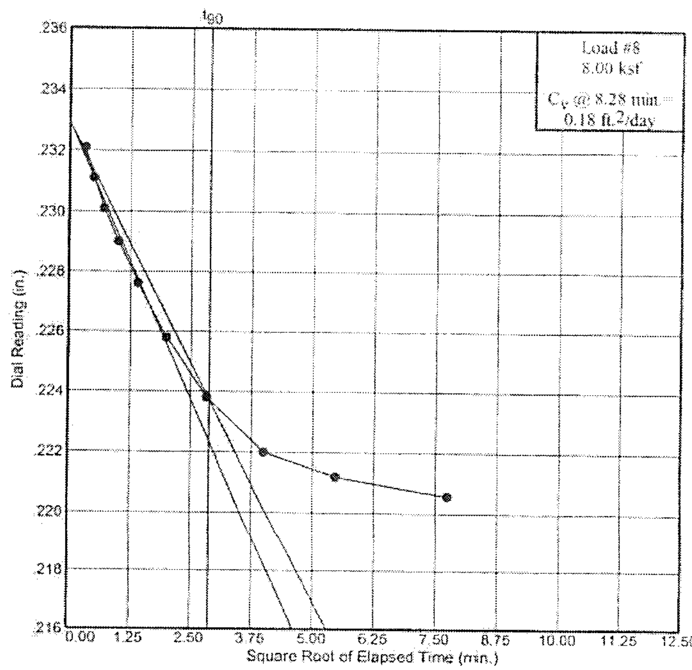
Project No.: 355407XXXX
Project: DC Police Consolidated Labs

Location: B-16 @ 33.0'-35.0'









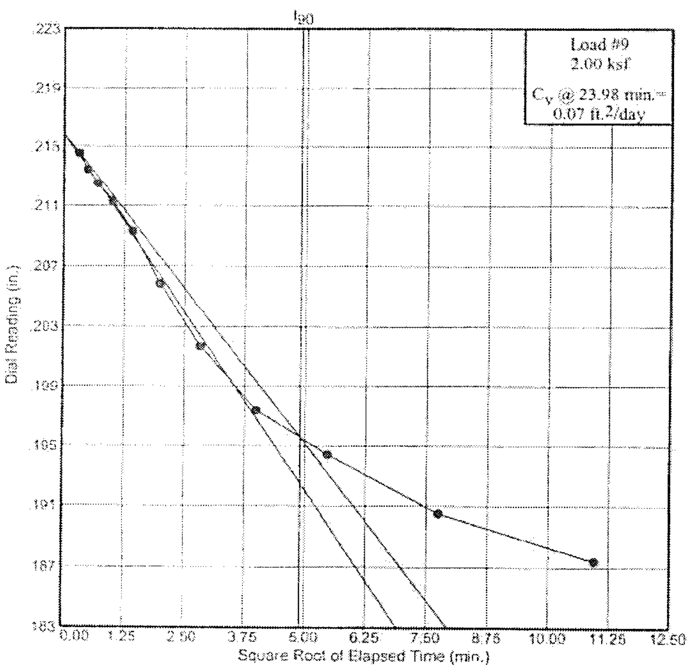
MACTEC, Inc.
Ashburn, VA

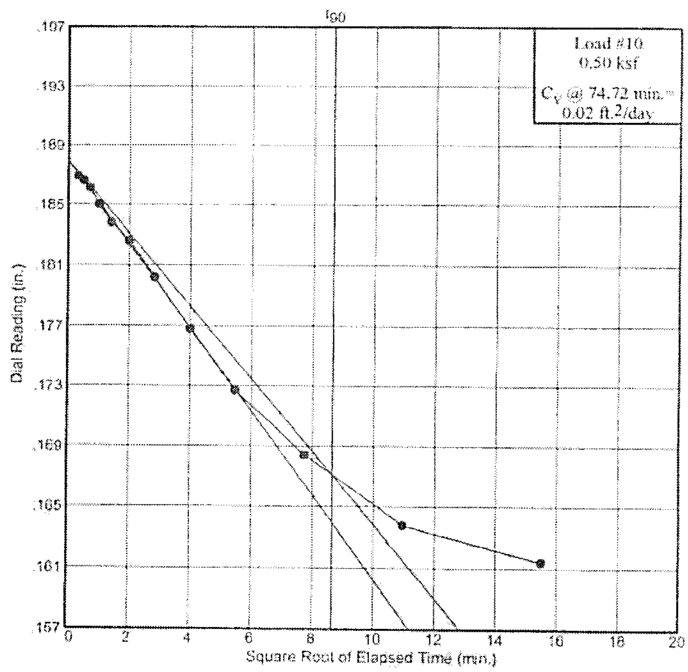
Figure 3

Dial Reading vs. Time

Project No.: 355407XXXX
Project: DC Police Consolidated Labs

Location: B-16 @ 33.0'-35.0'





MACTEC, Inc.
Ashburn, VA

Figure 4

CONSOLIDATION TEST DATA

Client: Froehling & Robertson, Inc.
Project: DC Police Consolidated Labs
Project Number: 355407XXXX

Sample Data

Source:
Sample No.:
Elev. or Depth: Sample Length(in./cm.):
Location: B-16 @ 33.0'-35.0'
Description: Gray elastic SILT
Liquid Limit: 51 Plasticity Index: 22
USCS: MH AASHTO: A-7-5 Figure No.: 1
Testing Remarks:

Test Specimen Data

TOTAL SAMPLE	BEFORE TEST	AFTER TEST
Wet w+t = 134.98 g.	Consolidometer # = 1	Wet w+t = 150.18 g.
Dry w+t = 102.05 g.		Dry w+t = 116.01 g.
Tare Wt. = 8.87 g.	Spec. Gravity = 2.644	Tare Wt. = 7.98 g.
Height = 1.00 in.	Height = 1.00 in.	
Diameter = 2.50 in.	Diameter = 2.50 in.	
Weight = 148.85 g.	Defl. Table = Reference Set (inches/ksf)	
Moisture = 35.3 %	Ht. Solids = 0.5179 in.	Moisture = 31.6 %
Wet Den. = 115.5 pcf	Dry Wt. = 110.16 g.*	Dry Wt. = 108.03 g.
Dry Den. = 85.3 pcf	Void Ratio = 0.935	Void Ratio = 0.757
Ovrbrdn. = 4.44 ksf	Saturation = 100.0 %	

* Initial dry weight used in calculations

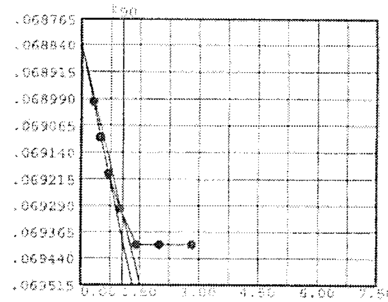
End-of-Load Summary

Pressure (ksf)	Final Dial (in.)	Machine Defl. (in.)	C_v ($ft.^2$/day)	C_α	Void Ratio	% Compression /Swell
start	0.06930				0.935	
0.50	0.06980	0.00040	1.84		0.934	0.0 Comprs.
1.00	0.07530	0.00080	0.35		0.925	0.5 Comprs.
2.00	0.08510	0.00160	0.48		0.907	1.4 Comprs.
4.00	0.10060	0.00240	0.46		0.879	2.9 Comprs.
8.00	0.12520	0.00000	0.23		0.827	5.6 Comprs.
16.00	0.18500	0.00000	0.13		0.711	11.5 Comprs.
32.00	0.23780	0.00000	0.12		0.609	16.8 Comprs.
8.00	0.22060	0.00000	0.18		0.642	15.1 Comprs.
2.00	0.18900	0.00160	0.07		0.707	11.8 Comprs.
0.50	0.16180	0.00040	0.02		0.757	9.2 Comprs.

C_c = 0.33 P_c = 5.91 ksf C_r = 0.08

Pressure: 0.50 ksf — TEST READINGS — Load No. 1

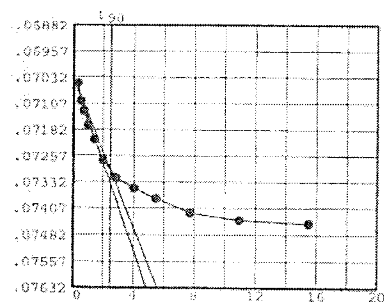
No.	Elapsed Time	Dial Reading
1	0.00	0.06930
2	0.10	0.06940
3	0.25	0.06950
4	0.50	0.06960
5	1.00	0.06970
6	2.00	0.06980
7	4.00	0.06980
8	8.00	0.06980



Void Ratio = 0.934   Compression = 0.0 %
D_0 = 0.06884 D_{90} = 0.06932 D_{100} = 0.06937
C_v at 1.2 min. = 1.84 ft.^{2}/day

Pressure: 1.00 ksf — TEST READINGS — Load No. 2

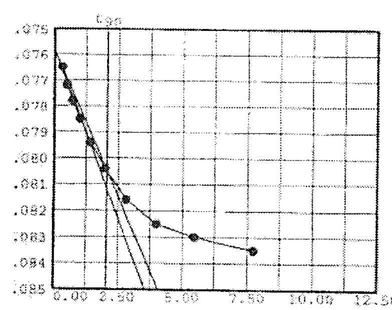
No.	Elapsed Time	Dial Reading
1	0.00	0.06980
2	0.10	0.07130
3	0.25	0.07180
4	0.50	0.07210
5	1.00	0.07250
6	2.00	0.07290
7	4.00	0.07350
8	8.00	0.07400
9	16.00	0.07430
10	30.00	0.07460
11	60.00	0.07500
12	120.00	0.07520
13	240.00	0.07530



Void Ratio = 0.925   Compression = 0.5 %
D_0 = 0.07032 D_{90} = 0.07298 D_{100} = 0.07328
C_v at 6.1 min. = 0.35 ft.^{2}/day

Pressure: 2.00 ksf — TEST READINGS — Load No. 3

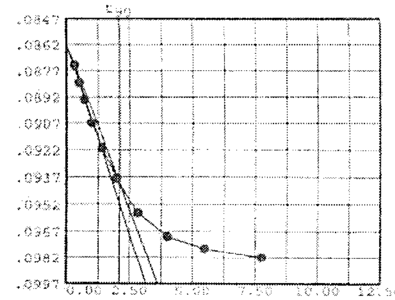
No.	Elapsed Time	Dial Reading
1	0.00	0.07530
2	0.10	0.07810
3	0.25	0.07880
4	0.50	0.07940
5	1.00	0.08010
6	2.00	0.08100
7	4.00	0.08200
8	8.00	0.08320
9	16.00	0.08410
10	30.00	0.08460
11	60.00	0.08510



Void Ratio = 0.907   Compression = 1.4 %
D_0 = 0.07584 D_{90} = 0.08051 D_{100} = 0.08103
C_v at 4.3 min. = 0.48 ft.^{2}/day

Pressure: 4.00 ksf | TEST READINGS | Load No. 4

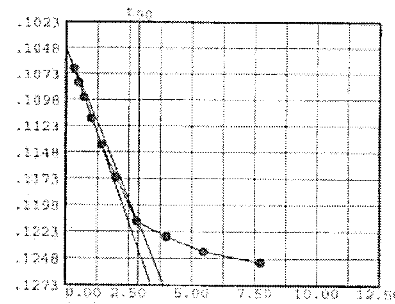
No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.08510	11	60.00	0.10060
2	0.10	0.08980			
3	0.25	0.09080			
4	0.50	0.09180			
5	1.00	0.09310			
6	2.00	0.09450			
7	4.00	0.09620			
8	8.00	0.09810			
9	16.00	0.09940			
10	30.00	0.10010			



Void Ratio = 0.879 Compression = 2.9 %
D_0 = 0.08624 D_{90} = 0.09402 D_{100} = 0.09489
C_v at 4.4 min. = 0.46 ft.^{2}/day

Pressure: 8.00 ksf | TEST READINGS | Load No. 5

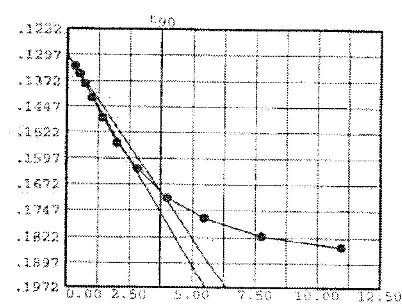
No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.10060	11	60.00	0.12520
2	0.10	0.10680			
3	0.25	0.10820			
4	0.50	0.10960			
5	1.00	0.11160			
6	2.00	0.11410			
7	4.00	0.11720			
8	8.00	0.12140			
9	16.00	0.12280			
10	30.00	0.12420			



Void Ratio = 0.827 Compression = 5.6 %
D_0 = 0.10484 D_{90} = 0.12147 D_{100} = 0.12331
C_v at 8.3 min. = 0.23 ft.^{2}/day

Pressure: 16.00 ksf | TEST READINGS | Load No. 6

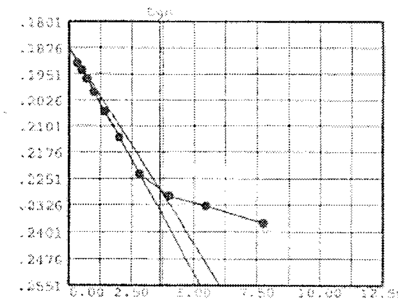
No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.12520	11	60.00	0.18180
2	0.10	0.13300	12	120.00	0.18500
3	0.25	0.13520			
4	0.50	0.13810			
5	1.00	0.14230			
6	2.00	0.14800			
7	4.00	0.15530			
8	8.00	0.16280			
9	16.00	0.17110			
10	30.00	0.17690			



Void Ratio = 0.711 Compression = 11.5 %
D_0 = 0.12972 D_{90} = 0.16919 D_{100} = 0.17357
C_v at 13.9 min. = 0.13 ft.^{2}/day

Pressure: 32.00 ksf — TEST READINGS — Load No. 7

No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.18500	11	60.00	0.23780
2	0.10	0.19200			
3	0.25	0.19400			
4	0.50	0.19650			
5	1.00	0.20030			
6	2.00	0.20590			
7	4.00	0.21350			
8	8.00	0.22380			
9	16.00	0.23000			
10	30.00	0.23300			



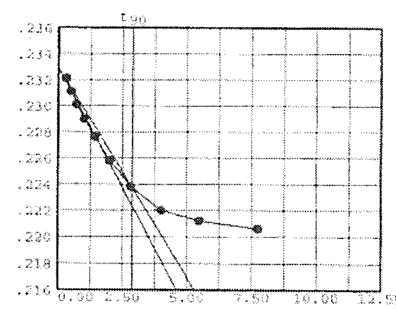
Void Ratio = 0.609   Compression = 16.8 %

D_0 = 0.18768 D_{90} = 0.22799 D_{100} = 0.23247

C_v at 13.1 min. = 0.12 ft.^{2}/day

Pressure: 8.00 ksf — TEST READINGS — Load No. 8

No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.23780	11	60.00	0.22060
2	0.10	0.23210			
3	0.25	0.23110			
4	0.50	0.23010			
5	1.00	0.22900			
6	2.00	0.22760			
7	4.00	0.22580			
8	8.00	0.22380			
9	16.00	0.22200			
10	30.00	0.22120			



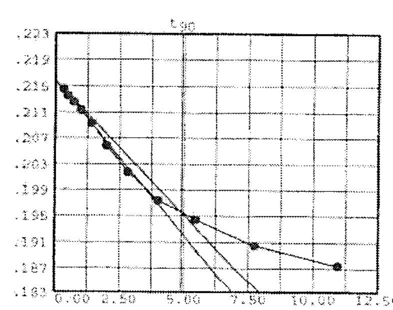
Void Ratio = 0.642   Compression = 15.1 %

D_0 = 0.23292 D_{90} = 0.22372 D_{100} = 0.22270

C_v at 8.3 min. = 0.18 ft.^{2}/day

Pressure: 2.00 ksf — TEST READINGS — Load No. 9

No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.22060	11	60.00	0.19210
2	0.10	0.21610	12	120.00	0.18900
3	0.25	0.21500			
4	0.50	0.21410			
5	1.00	0.21290			
6	2.00	0.21090			
7	4.00	0.20740			
8	8.00	0.20330			
9	16.00	0.19900			
10	30.00	0.19600			



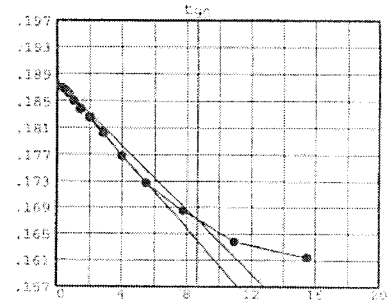
Void Ratio = 0.707   Compression = 11.8 %

D_0 = 0.21582 D_{90} = 0.19558 D_{100} = 0.19333

C_v at 24.0 min. = 0.07 ft.^{2}/day

Pressure: 0.50 ksf | TEST READINGS | Load No. 10

No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.18900	11	60.00	0.16880
2	0.10	0.18730	12	120.00	0.16420
3	0.25	0.18700	13	240.00	0.16180
4	0.50	0.18650			
5	1.00	0.18540			
6	2.00	0.18420			
7	4.00	0.18300			
8	8.00	0.18060			
9	16.00	0.17720			
10	30.00	0.17310			



Void Ratio = 0.757 Compression = 9.2 %
D_0 = 0.18791 D_{90} = 0.16711 D_{100} = 0.16480
C_v at 74.7 min. = 0.02 ft.^{2}/day

Froehling & Robertson

Consolidated Undrained Triaxial Test (ASTM D4767)

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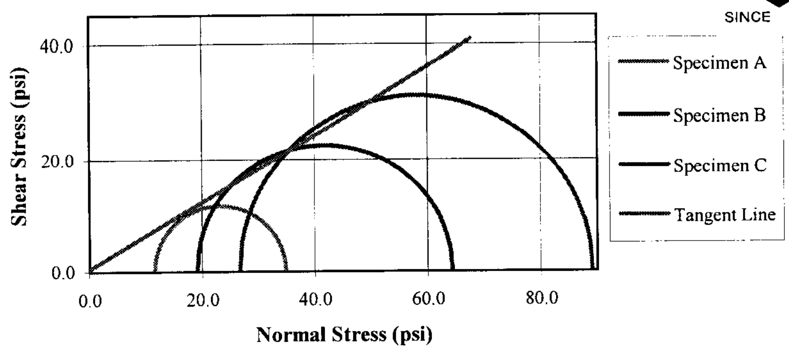
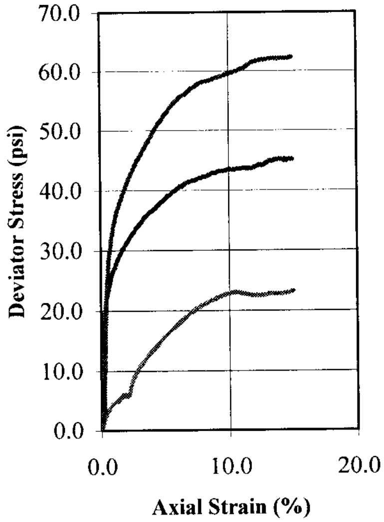
Effective Stress at Maximum Deviator Stress Criterion



Deviator Stress vs. Axial Strain



Initial	Specimen A	Specimen B	Specimen C	
Water Content (%)	18.5	19.5	19.8	
Dry Density (pcf)	111.3	115.8	111.3	
Saturation (%)	100.00	100.00	100.00	
Void Ratio	0.483	0.426	0.484	
Diameter (in)	2.836	2.856	2.828	
Height (in)	5.994	5.913	6.043	
Specific Gravity *(Assumed)*	2.65	2.65	2.65	
Liquid Limit	26	26	26	
Plastic Limit	17	17	17	
After Consolidation	**A**	**B**	**C**	
B-Value	99	97	98	
Water Content (%)	18.9	12.7	17.2	
Dry Density (pcf)	108.9	126.1	110.8	
Saturation (%)	100	100	100	
Void Ratio	0.520	0.312	0.493	
Confining Stress (psi)	20.6	39.4	59.3	
Back Press. (psi)	60.2	61.6	52.9	
Rate of Strain	0.000312	0.000312	0.000312	
After Shear	**A**	**B**	**C**	**D**
σ'1 at Failure (psi)	34.84	64.30	89.11	
σ'3 at Failure (psi)	11.60	19.10	26.70	

Maximum Deviator Stress Criterion	
C (psi)	1.5
C' (psi)	0.4
Ø (deg)	19.6
Ø' (deg)	30.9

Project Name:	DC Consolidated Police Laboratories
Client Name:	HOK
Project Number:	H68-143G
Boring Number:	B-3
Sample Number:	NA
Boring Depth:	43.0' - 45.0'
Sample Type:	Undisturbed
Description:	Grey, Lean Clay with Sand (CL)
Test Type	Consolidated Undrained
Remarks	*There was 24.7% retained on the #4 sieve for specimen B. material as large as 1"

N/A	N/A	N/A	N/A
Failure Photographs			

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Consolidated Undrained Triaxial Test (ASTM D4767)

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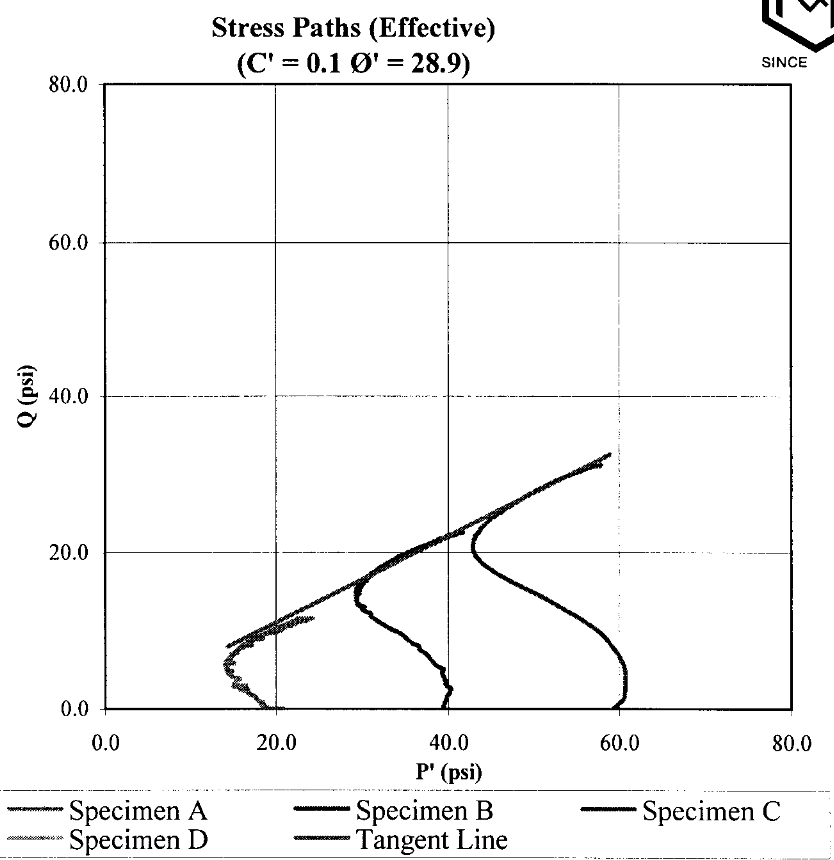

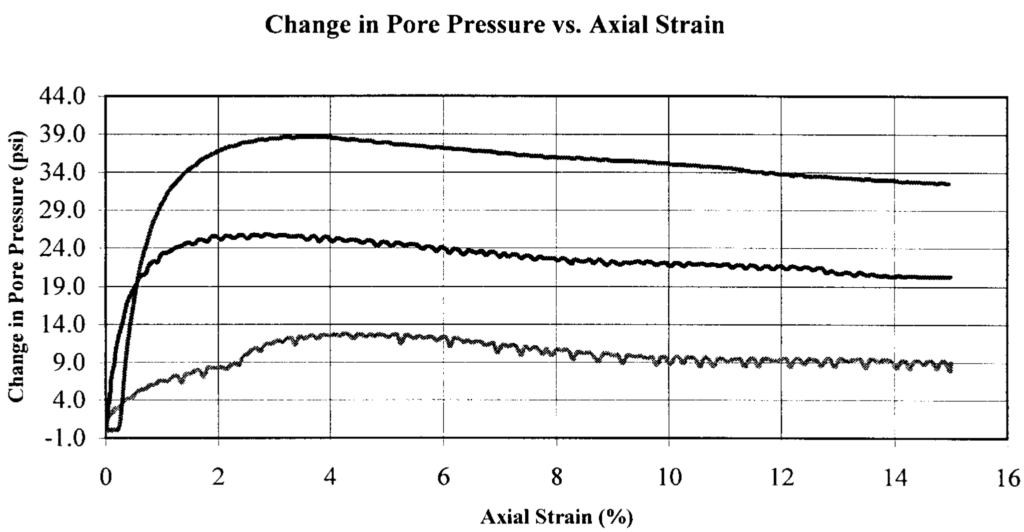

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Consolidated Undrained Triaxial Test (ASTM D4767)

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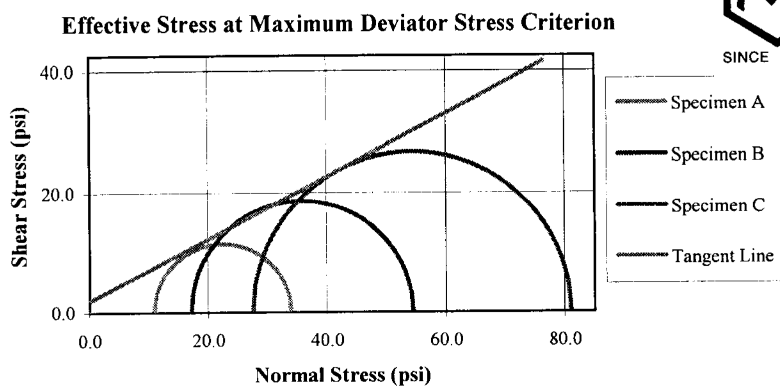
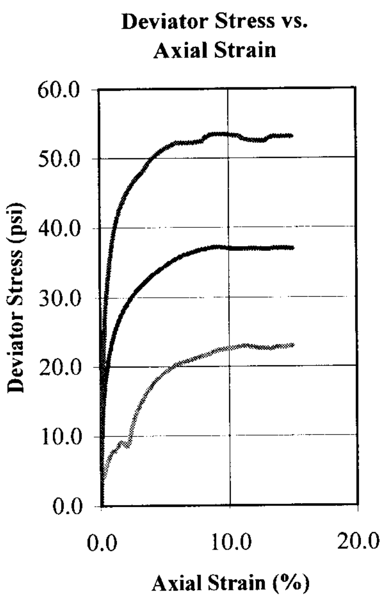




	Specimen			
Initial	**A**	**B**	**C**	
Water Content (%)	18.0	20.6	19.8	
Dry Density (pcf)	112.2	109.7	110.0	
Saturation (%)	100	100	100	
Void Ratio	0.472	0.505	0.501	
Diameter (in)	2.833	2.840	2.828	
Height (in)	5.996	6.008	6.057	
Specific Gravity *(Assumed)*	2.65	2.65	2.65	
Liquid Limit	21	21	21	
Plastic Limit	16	16	16	
After Consolidation	**A**	**B**	**C**	
B-Value	98	97	99	
Water Content (%)	18.1	17.5	17.9	
Dry Density (pcf)	113.6	110.5	109.5	
Saturation (%)	100	100	100	
Void Ratio	0.457	0.497	0.511	
Confining Stress (psi)	21.0	39.1	58.9	
Back Press. (psi)	50.8	49.9	51.5	
Rate of Strain	0.000205	0.00034	0.0002	
After Shear	**A**	**B**	**C**	
σ'1 at Failure (psi)	34.0	54.5	81.0	
σ'3 at Failure (psi)	11.0	17.2	27.6	

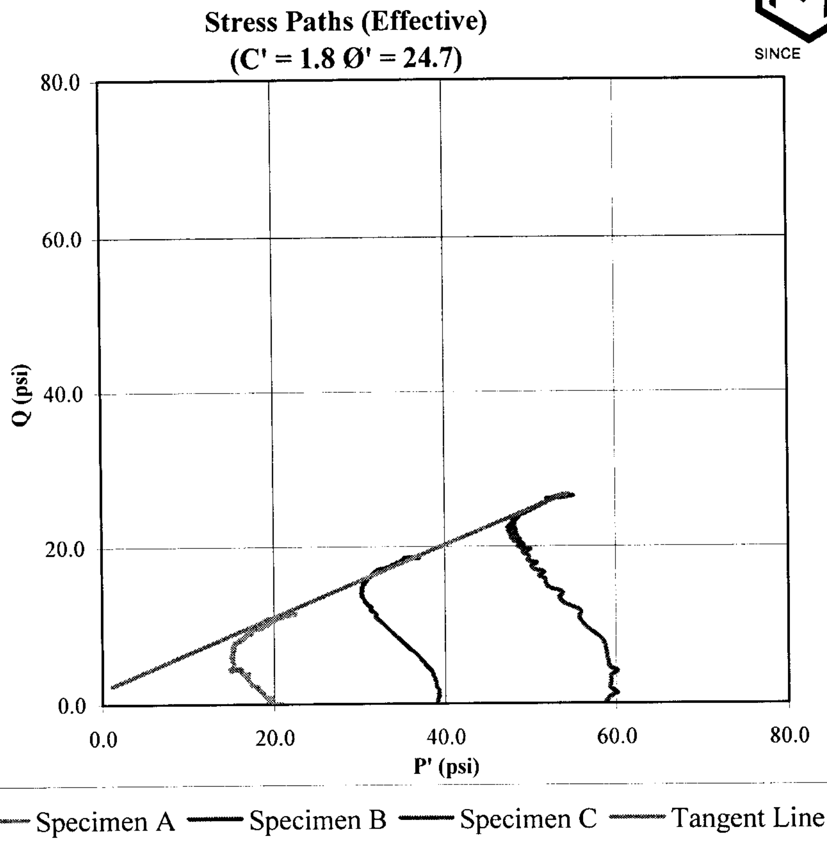
Maximum Deviator Stress Criterion	
C (psi)	2.5
C' (psi)	1.9
Ø (deg)	16.6
Ø' (deg)	27.4

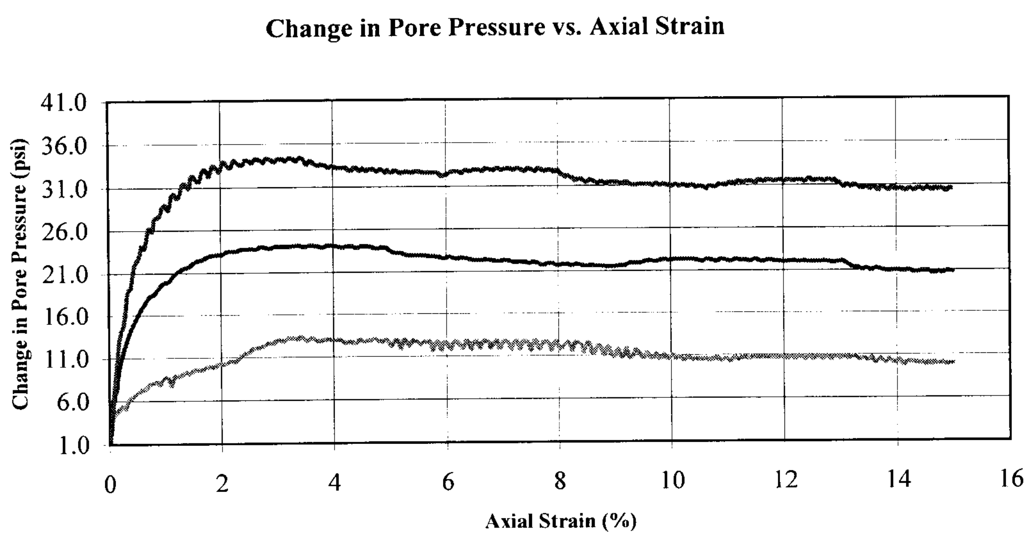
Project Name:	DC Consolidated Police laboratories
Client Name:	HOK
Project Number:	H68-134G
Boring Number:	B-9
Sample Number:	
Boring Depth:	39.9' - 40.4'
Sample Type:	Undisturbed
Description:	Brownish-Grey, Sandy Silty Clay.
Test Type	Consolidated Undrained
Remarks	CL-ML

N/A	N/A	N/A	N/A
Failure Photographs			

Froehling & Robertson

Consolidated Undrained Triaxial Test (ASTM D4767)





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APPENDIX E

NOTES:

1. FILTER MATERIAL GRADATION SHALL SATISFY REQUIREMENTS FOR D.C. COARSE AGGREGATE SIZE No. 78 OR APPROVED EQUIVALENT. WASHED GRAVEL OR CRUSHED STONE DRAINAGE BLANKET SHALL SATISFY GRADATION REQUIREMENTS FOR D.C. COARSE AGGREGATE SIZE No. 57.

2. PERMEABLE GEOTEXTILE WRAP SHALL HAVE APPARENT OPEN SIZE NOT LARGER THAN THE No. 70 U.S. STANDARD SEIVE SIZE. USE A MINIMUM TEAR RESISTANCE AS NEEDED TO PREVENT DAMAGE AND FOR EASE OF HANDLING DURING INSTALLATION.

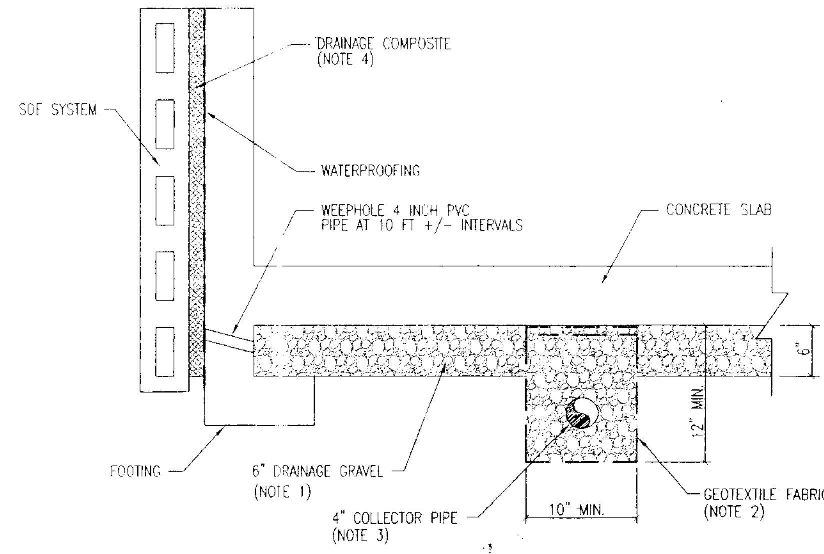
3. SUBDRAINAGE PIPING SHALL BE NINIMUM 4-INCH DIAMETER SLOTTED CORRUGATED POLYETHELENE (PE) TUBING ACCORDING TO ASTM F405 WITH DRAINGUARD WRAP. PRELIMINARY LAYOUT CONSISTING OF A SINGLE PERIMETER COLLECTOR LINE--FINAL LAYOUT TO BE ADJUSTED AS NEEDED BASED ON FLOW QUANTITY MEASYREMENTS TO BE MADE DURING CONSTRUCTION.

4. APPROVED PREFABRICATED DRAINAGE ELEMENT SHALL SATISFY MINIMUM THICKNESS, FLOW CAPACITY AND COMPRESSIVE STRENGTH REQUIREMENTS AS DETERMINED BY THE GEOTECHNICAL ENGINEER.

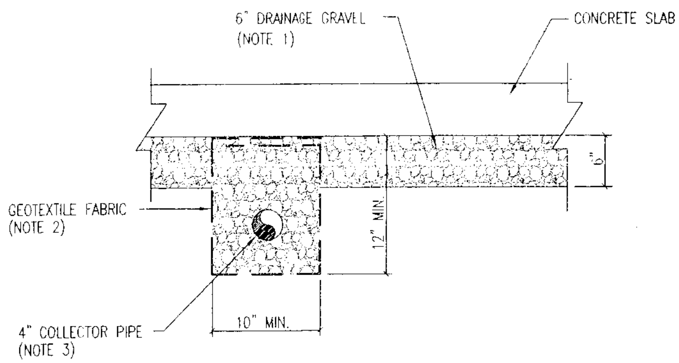
5. OUTLET OF COLLECTED GROUNDWATER SHALL BE IN CLOSED PIPING CONNECTED TO A SUMP FACILITY FOR PUMPING TO FINAL DISPOSAL INTO A STORM SEWER LINE.

6. FINAL SIZING AND LAYOUT OF SUBDRAINAGE PIPING MAY REQUIRE ADJUSTMENT BASED ON ACTUAL GROUNDWATER FLOW RATE, WHICH SHOULD BE MEASURED DURING CONSTRUCTION. THE SPECIFIED MINIMUM 4-INCH DIAMETER IS BASED ON A FLOW RATE OF UP TO 50 GALLONS PER MINUTE.

7. APPROVED CLEANOUTS SHALL BE PROVIDED AFTER EVERY RIGHT ANGLE BEND AND A MAXIMUM OF 100 LINEAR FT CENTER-TO-CENTER SPACING ALONG CONTINUOUS LINES.



DRAINAGE SECTION



COLLECTOR PIPE SECTION

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FROEHLING & ROBERTSON, INC.

GEOTECHNICAL • ENVIRONMENTAL • MATERIALS
ENGINEERS • LABORATORIES

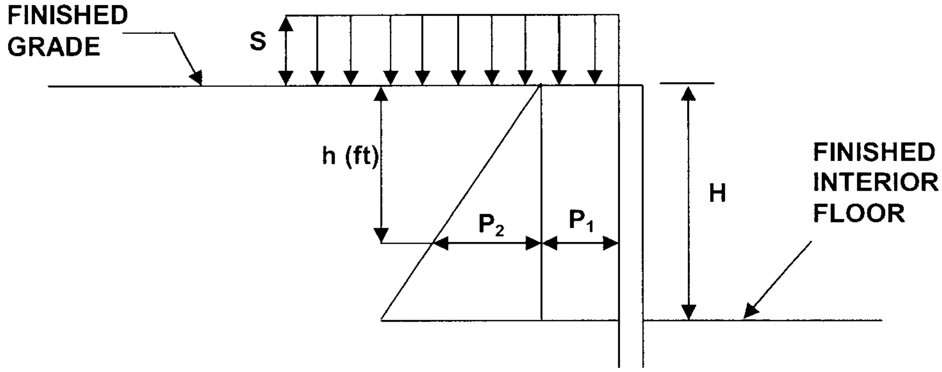
"OVER 125 YEARS OF SERVICE"

22923 Quicksilver Drive
Sterling, Va 20166
Ph: (703)996-0123 Fax: (703) 996-0124

SUBDRAINAGE RECOMENDATIONS

PROJECT: PROPOSED CONSOLIDATED POLICE LABORATORY
LOCATION: 4TH & SCHOOL STREETS SW, WASHINGTON, DC

SCALE: NTS	DATE: 7-09-07	DRAWN BY: GDH	
CLIENT: HO+K WASHINGTON, DC	F&R PROJECT NO. H68-134G	SHEET No. 1	REV. 0



NOTES

1. Symbols and units used in the calculation of lateral pressures are as follows:

   S = Uniform vertical surcharge load in pounds per square foot (psf)
   H = Total Foundation Wall Height
   h = Depth in feet measured as shown below ground surface
   γ_w = Wet unit weight of soil 125 pounds per cubic foot
   $P_1 = (k)S$ = Lateral earth pressure in psf due to surcharge
   For at-rest case, $k = k_o = 0.43$
   For active case, $k = ka = 0.27$
   $P_2 = k\ \gamma_w\ h$ = Lateral earth pressure in psf at depth h below ground surface

2. For below grade foundation walls of this project, with structural restraint at the ground level floor slab connection, the at-rest coefficient k_o applies. At depth h we recommend using a total lateral pressure, $P_t = P_1 + P_2 = 0.43(S) + 54.0$ pcf (h). This simplified relation, which considers average properties of a combination of compacted backfill and the in-place natural subsoils, is based on a maximum height of wall, H = 25 ft.

3. The diagram given is applicable for below grade foundation walls supporting the natural subsoils and/or backfill.

4. Horizontal Backfill is assumed. It is also understood that material and compaction requirements for the backfill are satisfied in accordance with the recommended specifications given herein.

5. Lateral earth pressure values calculated do not include a factor of safety.

6. This diagram does not include hydrostatic pressure, full drainage must be provided behind the walls.

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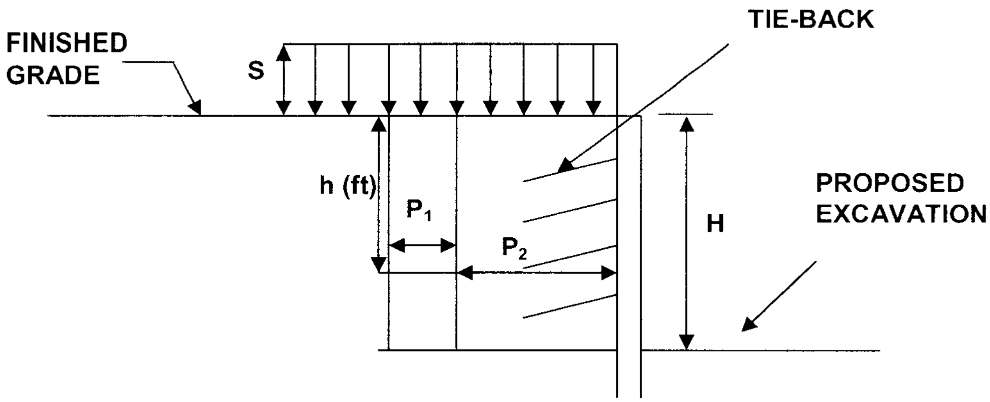
LATERAL EARTH PRESSURES Proposed Consolidated Police Laboratory 4th & School Street SW, Washington, DC F&R PROJECT NO. H68-134G	Sheet No. 2



NOTES

1. Symbols and units used in the calculation of lateral pressures are as follows:

   S = Uniform vertical surcharge load in pounds per square foot (psf)
   H = Total Foundation Wall Height
   h = Depth in feet measured as shown below ground surface
   γ_w = Wet unit weight of soil 125 pounds per cubic foot
   P_1 = (k)S = Lateral earth pressure in psf due to surcharge
   For at-rest case, k = k_o = 0.43
   P_2 = $k_o \gamma h$ = Lateral earth pressure in psf at depth h below ground surface

2. For design of the Support of Excavation at depth h we recommend using a total lateral pressure, $P_t = P_1 + P_2$ = 0.43(S) + 54.0 pcf (h).

3. The diagram given is applicable for design of the Support of Excavation.

4. SOE earth pressure values calculated do not include a factor of safety.

5. Hydrostatic pressure should be added to the earth pressure diagram once a design water level has been established.

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SOE EARTH PRESSURES Proposed Consolidated Police Laboratory Building 4th & School Street SW, Washington, DC F&R PROJECT NO. H68-134G	Sheet No. 3

SINCE F&R 1881

APPENDIX F

Important Information About Your

Geotechnical Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

The following information is provided to help you manage your risks.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. No one except you should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you* — should apply the report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical engineering report that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ—sometimes significantly—from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are *Not* Final

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final,* because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.*

A Geotechnical Engineering Report Is Subject to Misinterpretation

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Contractors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time* to perform additional study. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations" many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, a number of mold prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; ***none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.***

Rely, on Your ASFE-Member Geotechncial Engineer for Additional Assistance

Membership in ASFE/The Best People on Earth exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with you ASFE-member geotechnical engineer for more information.

ASFE
The Best People on Earth

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