HILLIS-CARNES
ENGINEERING ASSOCIATES

Revised
Geotechnical Engineering Study
Burtonsville Elementary School
Burtonsville, Maryland
HCEA Project No. 24033A

Prepared for:

MTFA Architecture
3200 Langston Blvd
Arlington, VA 22207

HILLIS-CARNES
ENGINEERING ASSOCIATES
10975 Guilford Road, Suite A
Annapolis Junction, MD 20701
Phone (410) 880-4788
Fax (410) 880-4098
www.hcea.com

February 26, 2024
Revised June 5, 2024

Ms. Meagan W. Jancy, AIA
Principal
MTFA Architecture
3200 Langston Blvd
Arlington, VA 22207

Re: Revised Geotechnical Engineering Study
Burtonsville Elementary School
Burtonsville, Maryland
HCEA Project No. 24033A

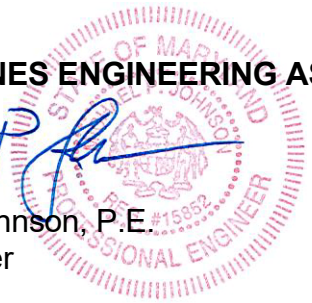
Ms. Jancy:

Hillis-Carnes Engineering Associates, Inc. (HCEA) is pleased to submit this revised report conveying the results of the subsurface exploration and subsequent geotechnical evaluation for the proposed project referenced above.

The material samples collected during the site exploration will be stored at our Annapolis Junction, Maryland office for 30 days from the date of this letter. If you require the samples to be stored for a longer period or to be delivered to you or another party, please request in writing before the end of the 30 days. Otherwise, the samples will be discarded at the end of the 30-day storage period.

HCEA appreciates having had the opportunity to provide the geotechnical consultation for this project, and we will remain available for further consultation during the various design stages. Please contact our office if questions arise concerning the contents of this report, or if additional consultation, design, inspection, or testing services are required.

Sincerely,
HILLIS-CARNES ENGINEERING ASSOCIATES, INC.



Michael P. Johnson, P.E.
Chief Engineer

William Harris, P.E.
Geotechnical Division Manager

TABLE OF CONTENTS

1.0 PURPOSE AND SCOPE

The purpose of this study was to determine the general subsurface conditions at the boring locations and to evaluate those conditions with respect to the concept and design of foundation systems, floor slabs, and related geotechnical aspects for the proposed construction project.

Our original report for this project was previously submitted under separate cover (report dated February 26, 2024). Since the time of our original report, review comments pertaining to stormwater management (SWM) measures were received from Montgomery County. Additional subsurface exploration was performed at locations offset from three of the previous SWM borings (B-6 through B-8). This report has been revised to include the results of those borings and to address Montgomery County's comments.

The evaluations and recommendations presented in this report were developed from a review of project characteristics and an interpretation of the general subsurface conditions at the site based on the results of the site exploration. The stratification lines indicated on the Records of Soil Exploration (boring logs) represent the approximate boundaries between soil types. However, the in-situ transitions may actually be gradual and/or at different levels than indicated. Such variations can be evaluated during construction and any minor design changes can be made at that time, if necessary.

An evaluation of the site with respect to potential construction problems and recommendations dealing with the earthwork and inspection during construction are also included. The inspection is considered necessary to verify the subsurface conditions and to verify that the soil-related construction phases are performed properly. The Appendix of this report contains a summary of the fieldwork performed for this study.

2.0 PROJECT CHARACTERISTICS

The project site is located at 14709 Saddle Creek Drive in the Burtonsville area of Montgomery County, Maryland. The project location is included on the Project Location Map (Figure 1) in the Appendix.

The proposed construction at the site is to include the new Burtonsville Elementary School and associated stormwater management (SWM) facilities. We understand that the land on which the school is to be constructed was previously graded by adjacent homebuilders as a condition of their building permits.

The proposed school is to be a 2-story structure that will have a finished floor elevation at El 411. Existing site grades in the proposed building area range from

El 408± to El 412±. As such, cuts on the order of 3± ft and fills on the order of approximately one foot are anticipated to establish the proposed finished floor elevation.

Structural loading information was not available at the time that this report was being prepared. It has therefore been necessary for us to assume for analytical purposes that maximum column loads will be on the order of 100 kips and that maximum wall loads will be on the order of 5 kips per foot. Settlements on the order of 1-inch total and 1/2-inch differential have been assumed to be tolerable by the structure.

Additional details concerning the proposed construction were not available at the time that this report was being prepared. Should any of the project characteristics, structural loading conditions, or tolerable settlement criteria differ from those outlined above, then this office should be contacted for a re-evaluation of the site.

3.0 FIELD EXPLORATION AND LABORATORY TESTING

To determine the general foundation soil types and to develop design parameters, 10 Standard Penetration Test (SPT) soil borings (S-1 through S-10) were drilled in January/February 2024 to depths of 25 ft below existing site grades in the proposed building area at the site. Fifteen additional borings (Borings B-1 through B-15) were also drilled in January/February 2024 to depths of 10 ft below existing site grades in proposed SWM and pavement areas. In-situ infiltration testing was performed at depths of 5 ft to 8 ft below the existing site grades at locations offset from 12 of these 15 SWM/pavement borings. The boring locations were located in the field by HCEA by estimation from existing site features. Therefore, the boring locations shown on the Boring Location Plan (Figure 2) in the Appendix should be considered approximate.

To address the SWM comments received from Montgomery County, the following additional subsurface exploration was performed in May 2024:

- A boring (B-6A) was augered to a depth of 10 ft below the existing site grade in a location offset from Boring B-6 where a shallow groundwater reading was obtained in the January/February 2024 boring.

- Two additional borings (B-7A and B-8A) were drilled to depths of 15 ft below the existing site grades at locations offset from Borings B-7 and B-8, respectively, where deeper subsurface information was requested.

The borings were advanced with hollow-stem augers and the subsurface soils were generally sampled at intervals of 2.5 feet to 5.0 feet. Samples were taken by driving a 1-3/8-inch I.D. (2-inch O.D.) split-spoon sampler in general accordance with ASTM D-1586 specifications. The sampler was first seated 6 inches to penetrate any loose cuttings and then was driven an additional 12

inches with blows of a 140-pound hammer, falling 30 inches. The number of hammer blows required to drive the sampler the final 12 inches is designated as the "Penetration Resistance" or "N-value." The penetration resistance (N-value) can be used as an indication of the soil strength and compression characteristics.

Portions of each SPT soil sample were placed in glass jars and transported to HCEA's laboratory. All of the jarred samples were visually examined in the laboratory by the Geotechnical Engineer and visually-manually classified in general accordance with the Unified Soil Classification System (USCS) and ASTM D-2488. The Unified Soil Classification Symbols appear on the Records of Soil Exploration and the system nomenclature is generally described in the Appendix.

Laboratory testing was performed on representative samples, which generally consisted of sieve and hydrometer analyses. The laboratory test results were used to obtain the USDA textural classifications of the soils tested. The results of the laboratory testing are presented in the Appendix.

4.0 SUBSURFACE CONDITIONS

Details of the subsurface conditions encountered at the site are shown on the Records of Soil Exploration. Strata divisions shown on the Records of Soil Exploration have been estimated based on visual examinations of the recovered boring samples and the sample collection intervals. In the field, strata changes could occur gradually and/or at different levels than indicated on the Records of Soil Exploration.

Groundwater conditions indicated on the Records of Soil Exploration are those observed during the subsurface exploration. Fluctuations in groundwater levels should be expected and are typically influenced by changes in seasons, grading, runoff, and infiltration rates, and may be influenced by other factors.

4.1 Site Geology

The Geologic Map of Maryland (USGS 1968) shows that the project site is located in the Eastern Piedmont Region. The Eastern Piedmont Region generally consists of near-surface residual materials, derived from in-place weathering of the underlying parent rock.

4.2 Surface and Man-Placed Fill Materials

The Records of Soil Exploration show topsoil thicknesses ranging from approximately 2 inches to 4 inches at the specific boring locations. Topsoil thicknesses noted on the logs should not be used solely to determine topsoil quantities at the site.

As stated previously, we understand that the land on which the school is to be constructed was previously graded by adjacent homebuilders. Man-placed fill or possible fill materials were noted in the specific building area boring locations as follows:

Boring	Approximate Depth of Fill/Possible Fill (ft)
S-3	8.5
S-4	5.0
S-5	8.5
S-6	18.5
S-10	8.5

The depths of fill materials encountered in the SWM/pavement borings are shown on the In-Situ Infiltration Test Results table and the individual boring logs in the Appendix.

Since the size of the samples obtained is relatively small in comparison to the areal extent of the site and since fill materials could be of similar composition to the natural soils encountered at the site, it is often difficult to determine the presence and composition of fill materials from the SPT samples. It should be anticipated that man-placed fill materials may be encountered at locations and/or to different depths below the existing ground surface due to previous construction that has occurred on and around the project site.

4.3 Natural Materials

The natural soils encountered in the borings generally consisted of poorly-graded sand (SP), silty sand (SM), clayey sand (SC), sandy clay or clay (CL), high-plasticity silt (MH), and combinations thereof. The SPT N-values recorded in the borings generally indicated a relative density range of very loose to dense for the more granular materials and a consistency range of very soft to medium stiff for the more cohesive soils.

4.4 Groundwater

In the building area (S-Series) borings, groundwater was typically encountered during drilling operations at depths between 15± ft and 23± ft below existing site grades. At the end of drilling or 24 hours after drilling, groundwater was typically encountered at depths between 9± ft and 20± ft in these borings. An exception to this occurred at the S-7 boring location where groundwater was encountered at a depth of 8± ft below the existing grade during drilling and at 4± ft after 24 hours. We must point out that the borings were drilled during a period of snowmelt. As such, the shallower readings may be a result of the snowmelt and/or the presence of perched water within the existing fill materials.

Groundwater was generally not observed in the SWM/pavement area (B-Series) borings within the depths explored during the time of our study. Groundwater was noted at a depth of 3± ft after 24 hours in Boring B-6 (February 2024); however, it appeared that this reading was likely the result of snowmelt. As a portion of the additional subsurface exploration performed in May 2024, Boring B-6A was augered to a depth of 10 ft below the existing site grade in a location offset from Boring B-6. Groundwater was not encountered within the depth explored in Boring B-6A, thereby supporting the conclusion that the previously encountered water at this location was a result of snowmelt.

A more accurate determination of the hydrostatic water table would require the installation of perforated pipes or piezometers which could be monitored over an extended period. The actual level of the hydrostatic water table and the amount and level of perched water should be anticipated to fluctuate throughout the year, depending on variations in precipitation, surface runoff, infiltration, site topography, and drainage.

5.0 EVALUATIONS AND RECOMMENDATIONS

Our findings suggest that the site can be developed for the proposed new elementary school structure, utilizing conventional spread footings on firm, in-place soils, new engineered fill, or a combination thereof. Footings or floor slabs should not be constructed on or over any existing fill materials unless they are specifically observed and approved for use by the Geotechnical Engineer or their designated representative in the field during construction. Special consideration should be given to the proper monitoring of stripping and fill operations, footing excavations, and concrete placement in all structural areas.

The following recommendations have been developed based on the previously described project characteristics and subsurface conditions. If there are any changes to the project characteristics or if different subsurface conditions are encountered during construction, HCEA should be consulted so that the recommendations of this report can be reviewed and revised accordingly.

5.1 General Site Preparation

All existing structures (including all above and below-ground construction) within the areas to be developed should be removed before the initiation of new construction. We suggest that all available information regarding the existing utilities at the site be reviewed before construction.

If any of the following are present onsite, removal should include underground pipes, utilities, and underground structures that might interfere with the new construction. Removal should also include topsoil; unapproved man-placed materials; frozen, wet, soft or very loose soils; and any other deleterious materials.

If abandoned underground utilities are to be removed before the initiation of construction, provisions should be made in the construction specifications and budget to restore the subgrade to a stable condition. Restoration should include backfilling and compaction of the excavation areas. These operations should be performed in a manner consistent with good erosion and sediment control practices.

After the initial stripping and removal process is completed, areas of the site to receive fill, or areas of the site at grade where the structure will be located, should be proofrolled. The proofrolling operations should be performed using a 20-ton, fully-loaded dump truck or another pneumatic-tire vehicle of similar size and weight. The purpose of the proofrolling will be to locate any near-surface pockets of soft or loose soils requiring undercutting. A Geotechnical Engineer or experienced soil inspector should witness the proofrolling operations and should determine which areas need further undercutting and/or stabilization. Removed material that can be reused as general site fill can be identified during construction by the Geotechnical Engineer or their designated representative.

As stated previously, we understand that the land on which the school is to be constructed was previously graded by adjacent homebuilders. Many of the materials encountered in the building area borings appear to have been placed in a somewhat controlled fashion; however, we are not aware of any testing records that may be available for the existing fill materials. It is therefore recommended that a series of test pits be excavated to better determine the extent, composition, and consistency of the existing man-placed fill materials. These test pits could be excavated during construction; however, excavating them before construction would allow any changes required due to the findings from the test pits to be prepared for and typically more easily and economically dealt with.

5.2 Fill Selection, Placement, and Compaction

All material to be used as fill or backfill should be inspected, tested, and approved by the Geotechnical Engineer or their authorized representative. In general, the on-site soils which are free from organic and other deleterious components can be re-used as general site fill. Some of the on-site materials may be suitable for various construction purposes and can be identified by an experienced Soils Inspector during grading operations.

Moisture conditioning (that is, wetting or drying) of the soils should be anticipated to achieve proper compaction. The moisture contents of the soils should be controlled properly to avoid extensive construction delays. If imported fill material is required, those materials should have Unified Soil Classifications of SM or more granular.

The fine-grained nature of some of the soils encountered on-site may make them sensitive to heavy dynamic loads and to increases in moisture content beyond

their “optimum” value. The traffic of heavy equipment, including heavy construction equipment, could create pumping and a general deterioration of the on-site soils, especially if conducted in the presence of water. If exposed to water, these soils can deteriorate and become difficult to work or compact properly. The grading should therefore, if at all possible, be carried out during a dry season. This would help to minimize these potential problems. Additionally, the contractor should not permit water to pond on the site. Exposed subgrades should be sloped and sealed at all times to facilitate rainfall runoff. If such problems arise, the Geotechnical Engineer should be consulted for an evaluation of the conditions.

All fill should be placed in relatively horizontal 8-inch (maximum) loose lifts and should be compacted to a minimum of 95 percent of the Standard Proctor (ASTM D-698) maximum dry density. Fill materials in landscape and other non-structural areas should be compacted to at least 90 percent of the Standard Proctor maximum dry density if significant subsidence of the fill under its own weight is to be avoided. Field moisture contents should be maintained within 2 percentage points of the optimum moisture content to provide adequate compaction. A sufficient number of in-place density tests should be performed by an experienced Engineering Technician on a full-time basis to verify that the proper degree of compaction is being obtained.

Structural fill should extend a minimum of 8 feet beyond structure lines where floor slabs are to be constructed on the fill. New fill slopes, if any, should be constructed no steeper than 2(H):1(V), or flatter, and new fills should be properly benched into existing slopes, wherever applicable. Any benches cut into existing slopes should be observed, tested, and approved by the Geotechnical Engineer before the placement of new fill.

5.3 Foundations

Our findings indicate that the proposed structure can be supported on spread footings bearing on firm, in-place soils, new engineered fill placed over in-place soils, or a combination thereof. The assumed structural loads, the tolerable settlement, and the encountered subsurface conditions were used to estimate the recommended net allowable soil bearing pressure.

Based on the soils encountered in the borings, a net allowable soil bearing pressure of 2,500 psf is recommended for proportioning footings on firm, in-place soils. Foundations should not be supported on or over any existing fill materials unless the fill materials are specifically observed, tested, and approved by the Geotechnical Engineer or their designated representative in the field during construction.

All footing excavations should be inspected by a Geotechnical Engineer or experienced soil inspector before the placement of concrete. The purpose of the inspection would be to verify that the exposed materials will be capable of

supporting the design bearing pressure. If soft or loose pockets are encountered in the footing excavations, the unsuitable materials should be removed, and the footings should be located at a lower elevation, or the unsuitable materials could be removed and replaced with structural fill or lean concrete (2,000 psi). Particular attention should be paid to the vicinities of Borings S-1, S-2, and S-9 where loose/soft materials were encountered near anticipated foundation bearing elevations.

To preclude punching shear failures, wall footings should be at least 18 inches wide and column footings should be at least 24 inches wide. It is recommended that wall footings be provided with longitudinal reinforcement. Proper longitudinal reinforcement is designed to provide the footings with greater bending capacity that should allow them to span across localized weak bearing zones that may go undetected during construction. Since a net soil pressure is specified, the weights of the footing concrete and backfill need not be added to the structural loads when proportioning the footings.

In all areas where foundations will be supported on structural fill, the structural fill should extend a sufficient distance laterally beyond the perimeters of footings. For design purposes, plans should reflect structural fill extending a minimum distance of 9 inches laterally beyond a footing perimeter for each linear foot of structural fill below the bearing level.

Exterior footings and footings in unheated areas should be located at depths of at least 2.5 feet below final exterior grades to provide adequate protection from frost heave. If the structure is to be constructed during the winter months or if the structure interior will likely be subjected to freezing temperatures after footing construction, then all footings should be provided with adequate frost cover protection. Otherwise, interior footings can be located on suitable materials at nominal depths below the finished floor grade.

5.4 Seismic Site Class

The Seismic Site Classification is D, based on the recommendations found in ASCE/SEI 7-10 standards and the results of the current site exploration.

5.5 Ground-Supported Slabs

Floor slabs should be supported on approved, firm natural soils, or on new compacted structural fill. Floor slabs should not be supported on or over any existing fill materials unless the fill materials are specifically observed, tested and approved by the Geotechnical Engineer or their designated representative in the field during construction. The slab subgrade should be prepared in accordance with the procedures outlined in Sections 5.1 and 5.2 of this report. In particular, the slab subgrade should be proofrolled to delineate any soft or loose areas requiring undercutting and/or stabilization.

It is recommended that the slab be directly supported on a minimum 4-inch layer of clean granular materials such as washed sand, clean sand and gravel, or screened, crushed stone. A suitable moisture/vapor barrier (that is, polyethylene sheeting) should also be provided. These procedures will provide a moisture break that will help to prevent capillary rise, dampness of the floor slabs and also help to cure the slab concrete. It is also recommended that construction joints on the slab surface and isolation joints between the slab and structural walls be provided (such that the slab would be ground-supported).

On most projects, there is a significant time lag between initial grading and a point when the contractor is ready to pour the slabs-on-grade. Environmental conditions and construction traffic often disturb the subgrade soils. Provisions should be made in the construction specifications for the restoration of the subgrade soils to a stable condition before the placement of the concrete for the floor slabs.

5.6 Groundwater and Drainage

In the building area (S-Series) borings, groundwater was typically encountered during drilling operations at depths between 15± ft and 23± ft below existing site grades. At the end of drilling or 24 hours after drilling, groundwater was typically encountered at depths between 9± ft and 20± ft in these borings. An exception to this occurred at the S-7 boring location where groundwater was encountered at a depth of 8± ft below the existing grade during drilling and at 4± ft after 24 hours. We must point out that the borings were drilled during a period of snowmelt. As such, the shallower readings may be a result of the snow melt and/or the presence of perched water within the existing fill materials.

Based on the available information, major construction problems related to the planned building area due to the presence of groundwater are generally not expected. However, it should be anticipated that perched water may be encountered, and that water may be encountered in areas of deeper utilities, if present.

Any water infiltration resulting from precipitation, surface run-off, or perched water should be able to be controlled utilizing sump pits and pumps, or by gravity ditching procedures. If any conditions are encountered which cannot be handled in such a manner, the Geotechnical Engineer should be consulted. A more accurate determination of the hydrostatic water table would require the installation of perforated pipes or piezometers, which could be monitored over an extended period. The actual level of the hydrostatic water table and the amount and level of perched water should be anticipated to fluctuate throughout the year, depending on variations in precipitation, surface runoff, infiltration, site topography, and drainage.

Adequate drainage should be provided at the site to minimize any increases in the moisture contents of the foundation soils. All pavement or parking areas

should be sloped away from the structure to prevent ponding of water around the structure.

5.7 Stormwater Management by Infiltration

We have evaluated the site subsurface conditions at the boring location drilled in the vicinities of the proposed SWM infiltration facilities at the site (Borings B-1 through B-15) in accordance with the State of Maryland's, "2000 Maryland Stormwater Design Manual, Volumes I & II" and the Montgomery County "DPS Soil Testing Guidelines for Stormwater Management Practices" dated October 6, 2012. The following information is provided for planning stormwater management measures:

Location of seasonal high groundwater table:
Groundwater was generally not observed in the SWM/pavement area (B-Series) borings within the depths explored during the time of our study. Groundwater was noted at a depth of 3± ft after 24 hours in Boring B-6; however, it appears that this reading was likely the result of snowmelt. An accurate determination of the hydrostatic water table would require the installation of perforated pipes or piezometers which could be monitored over an extended period. The actual level of the hydrostatic water table and the amount and level of perched water should be anticipated to fluctuate throughout the year, depending on variations in precipitation, surface runoff, infiltration, site topography, and drainage. Site grading operations at other parts of the site can also influence the level of the groundwater in the stormwater management areas significantly. HCEA cannot be responsible for changes in groundwater conditions at the site due to seasonal variation and changes caused by other factors such as grading operations at the site.

Subsurface Conditions
The subsurface conditions encountered within the vicinities of the SWM facilities are shown on the Records of Soil Exploration for B-1 through B-15. In-situ infiltration testing was performed at locations offset from 12 of these 15 SWM/pavement area boring locations. The in-situ infiltration rates obtained have had no factor of safety applied to them. The results of the in-situ tests are included in the In-Situ Infiltration Test Results table in the Appendix.

As stated previously, two additional borings (B-7A and B-8A) were drilled to depths of 15 ft below the existing site grades at locations offset from Borings B-7 and B-8, respectively, where deeper subsurface information was requested. The boring logs for these additional borings are also included in the Appendix of this report.

Bedrock and Decomposed Rock:
Bedrock was not encountered within the depths explored in the B-Series borings during this exploration.

Conclusions:
Based on the State of Maryland's "2000 Maryland Stormwater Design Manual, Volumes I & II", infiltration basins and trenches are not acceptable practices when an infiltration rate of less than 0.52 inches per hour is obtained. Bio-retention facilities in areas with in-situ infiltration rates of less than 0.52 inches per hour require underdrains. Furthermore, the bottom of the facilities should be located a minimum of 4 feet above the seasonally high water table and/or bedrock. Additionally, infiltration methods of stormwater management should not be utilized in fill materials.

Please note that an impermeable liner or other appropriate measure may need to be taken for the facilities where fast in-situ infiltration test results were encountered to prevent the rapid infiltration of stormwater without being properly filtered.

5.8 Lateral Earth Pressures and Sliding Coefficient

The magnitude of lateral earth pressure against basement walls or retaining walls is dependent on the type of backfill material, drainage provisions, and whether the walls are permitted to yield during and/or after placement of the backfill. Generally, backfill materials behind the walls should consist of granular soils having classifications of SM or more granular. Because of the potential for swelling, cohesive materials should not be used as wall backfill. All backfill materials must be inspected and approved by the Geotechnical Engineer before their use.

Wall backfill materials should be compacted to dry densities on the order of 95 percent of the Standard Proctor maximum dry density. Smaller walk-behind compaction equipment should be utilized near the walls to achieve the proper compaction and to avoid damaging the walls. Walls should be properly braced during backfilling and compaction operations.

An adequate drainage system should be provided behind walls such that any surface infiltration or groundwater is intercepted and disposed of. Otherwise, hydrostatic pressures should also be considered in the wall design.

Four potential cases of lateral earth pressure are discussed within this report: the cases of active, passive, and at-rest earth pressures and earth pressure due to surface surcharge loading. The following assumptions are made for our recommendations below: hydrostatic pressures from groundwater are not included, the wall backfill is a granular material (unit weight of 120 psf, and friction angle of 30 degrees) and there is a relatively horizontal grade behind and in front of the wall.

At-rest (Top of Wall Fixed Against Deflection):
For the at-rest condition, walls are designed such that movement of the top of the wall is prohibited. In the at-rest case, an equivalent fluid pressure distribution

considering an equivalent fluid density of 60 lbs/ft^3 should be used for design purposes. Any surcharge loadings must also be considered in the wall designs.

Active (Top of Wall Free to Deflect):
In the active condition, the walls are designed as free-standing walls with unrestricted rotation at the top. In the active case, an equivalent fluid pressure distribution considering an equivalent fluid density of 40 lbs/ft^3 can be used for design purposes. Any surcharge loadings must also be considered in the wall designs.

Passive (Soil Wedge Resisting Wall Displacement):
In the passive condition, the lateral earth pressure acts as a resistant horizontal pressure, against the direction of wall displacement. In the passive case, an equivalent fluid pressure distribution considering an equivalent fluid density of 360 lbs/ft^3 can be used for design purposes. Any surcharge loadings must also be considered in the wall designs. For design and analyses, it is recommended to use the at-rest earth pressure in the evaluation of resistance to sliding because it often takes large strains to mobilize the full passive pressure.

Surcharge:
Lateral earth pressure due to surcharge loading at the ground surface can be approximated by multiplying the surcharge load at the surface by a lateral earth pressure coefficient. Considering the subsurface materials encountered during our site exploration, a lateral earth pressure coefficient of 0.5 is recommended for surcharge loads in the at-rest condition. It should be noted that surcharge lateral pressures are in addition to the lateral earth pressure cases discussed above.

Sliding Coefficient
A coefficient of sliding between concrete (such as wall footing) and the soils encountered during the site exploration of 0.35 is recommended.

5.9 Pavement Areas

All pavement subgrade areas should be prepared following the recommendations provided in Sections 5.1 and 5.2 of this report. In particular, pavement subgrades should be proofrolled to locate any isolated areas of soft or loose soils requiring undercutting and/or stabilization.

Based on the results of the borings, it appears that the pavement subgrade areas will be comprised of materials having classifications ranging from CL to SM in accordance with the Unified Soil Classification System. To provide design pavement sections, we have utilized a design CBR value of 3. It is recommended that exposed pavement subgrades be observed, tested, and evaluated by the Geotechnical Engineer before paving to determine that the design CBR value is present. Based on a CBR value of 3, the following pavement sections are recommended for on-site pavement areas:

Passenger Car Areas: This section can be utilized in areas where the only traffic will be automobile traffic.

	Thickness (inches)
Bituminous Concrete Surface	1.5
Bituminous Concrete Base	2.0
Graded Aggregate Base	4.0
Approved Subgrade (CBR = 3, minimum)	

Truck Areas: This section can be utilized in areas where the traffic will be comprised of both truck or bus and automobile traffic. This section has been designed utilizing an estimated design traffic volume (EAL) of 2 X 10^5. If a different traffic volume is developed during further project design, this office should be notified for a re-evaluation of the pavement section.

	Thickness (inches)
Bituminous Concrete Surface	1.5
Bituminous Concrete Binder	4.0
Graded Aggregate Base	8.0
Approved Subgrade (CBR = 3, minimum)	

The recommended asphalt pavement sections are not intended to accommodate heavy construction traffic. If the asphalt base course is placed before the substantial completion of the project, portions of the asphalt should be expected to be damaged and require replacement before the placement of the surface course.

For areas where a rigid concrete pavement is to be utilized, the minimum pavement section of 8-inches of concrete pavement over 6-inches of Graded Aggregate Base (GAB) is recommended for heavy-duty pavement areas, considering a design life of 20 years. A standard duty pavement section of 6-inches of concrete pavement over 6-inches of Graded Aggregate Base (GAB) is sufficient for automobile traffic areas.

The above-noted pavement sections are applicable provided that the subgrade soils for all proposed paved areas are similar to the materials considered in our analysis. Should substantially different materials be encountered during stripping and excavation operations or should the pavement subgrade consist of imported fill materials substantially different from those tested, then this Office should be contacted for a re-evaluation of the proposed pavement sections based on the different materials.

6.0 RECOMMENDED ADDITIONAL SERVICES

Additional soil and foundation engineering, testing, and consulting services recommended for this project are summarized below:

Site Preparation and Proofrolling: A Geotechnical Engineer or experienced soil inspector should inspect the site after it has been stripped and excavated. The inspector should determine if any undercutting or in-place densification is necessary to prepare a subgrade for fill placement or slab support.

Fill Placement and Compaction: A Geotechnical Engineer or experienced soil inspector should witness any required filling operations and should take sufficient in-place density tests to verify that the specified degree of fill compaction is achieved. He should observe and approve borrow materials used and should determine if their existing moisture contents are suitable.

Footing Excavation Inspections: A Geotechnical Engineer or experienced soil inspector should inspect the footing excavations for the structure foundations. The inspector should verify that the design bearing pressure is available and that no loose pockets exist beneath the bearing surfaces of the footing excavations. Based on the inspection, the Inspector would either approve the bearing surfaces or recommend that loose or soft soils be undercut to expose satisfactory bearing materials.

7.0 REMARKS

This report has been prepared to aid in the evaluation of the site for the proposed school construction. It is considered that adequate recommendations have been provided to serve as a basis for the design of plans and specifications. Additional recommendations can be provided as needed.

These analyses and recommendations are, of necessity, based on the information made available to us at the time of the actual writing of the report and the on-site conditions (surface and subsurface) that existed at the time the exploratory borings were drilled. Further assumption has been made that the limited exploratory borings, in relation both to the areal extent of the site and to depth, are representative of conditions across the site. The recommendations contained herein have been based on relatively widely spaced soil borings. Actual subsurface conditions encountered could vary from those outlined in this report.

If subsurface conditions are encountered that differ from those reported herein, this Office should be notified immediately so that the analyses and recommendations can be reviewed and/or revised as necessary. It is also recommended that:

1. We are given the opportunity to review any plans and specifications prepared after the final geotechnical study to comment on the interaction of the soil conditions as described herein and the design requirements.

2. A Geotechnical Engineer or experienced soil inspector is present at the site during the construction phase to verify installation according to the approved plans and specifications. This is particularly important during excavation, placement, and compaction of fill materials.

Please note that the successful completion of the project is dependent on your compliance with all of the recommendations provided in this report. While represented separately, the recommendations represent work that is intertwined. The successful completion of the project is specifically conditioned on your complying with all recommendations.

Our professional services have been performed, our findings obtained, and our recommendations prepared in accordance with generally accepted engineering principles and practices. This warranty is in lieu of all other warranties either implied or expressed. Hillis-Carnes Engineering Associates, Inc. assumes no responsibility for interpretations made by others based on work or recommendations made by HCEA.

APPENDIX

Important Information about This Geotechnical-Engineering Report

Figure 1: Project Location Map

Logs of Borings (Soil Profiles)

In-Situ Infiltration Test Results

Particle Size Distribution Reports

Records of Soil Exploration

Field Classification Sheet

Figure 2: Boring Location Plan

Important Information about This

Geotechnical-Engineering Report

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

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, clients can benefit from a lowered exposure to the subsurface problems that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed below, contact your GBA-member geotechnical engineer. Active involvement in the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Geotechnical-Engineering 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 given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. *Those who rely on a geotechnical-engineering report prepared for a different client can be seriously misled*. No one except authorized client representatives should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one – not even you – should apply this report for any purpose or project except the one originally contemplated.*

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read it *in its entirety*. Do not rely on an executive summary. Do not read selected elements only. *Read this report in full.*

You Need to Inform Your Geotechnical Engineer about Change

Your geotechnical engineer considered unique, project-specific factors when designing the study behind this report and developing the confirmation-dependent recommendations the report conveys. A few typical factors include:

- the client's goals, objectives, budget, schedule, and risk-management preferences;
- the general nature of the structure involved, its size, configuration, and performance criteria;
- the structure's location and orientation on the site; and
- other planned or existing site improvements, such as retaining walls, access roads, parking lots, and underground utilities.

Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- 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;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the 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. *The geotechnical engineer who prepared this report cannot accept responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

This Report May Not Be Reliable

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, that it could be unwise to rely on a geotechnical-engineering report whose reliability may have been affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If your geotechnical engineer has not indicated an "apply-by" date on the report, ask what it should be*, and, in general, *if you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying it. A minor amount of additional testing or analysis – if any is required at all – could prevent major problems.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface through various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing were performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgment to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team from project start to project finish, so the individual can provide informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, *they are not final*, because the geotechnical engineer who developed them relied heavily on judgment and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* revealed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a full-time member of the design team, to:

- confer with other design-team members,
- help develop specifications,
- review pertinent elements of other design professionals' plans and specifications, and
- be on hand quickly whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction observation.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for informational purposes only*. To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report, but they may rely on the factual data relative to the specific times, locations, and depths/elevations referenced. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include 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 personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures*. If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. As a general rule, *do not rely on an environmental report prepared for a different client, site, or project, or that is more than six months old.*

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, none of the engineer's services were designed, conducted, or intended to prevent uncontrolled migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration.*** Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

GEOPROFESSIONAL BUSINESS ASSOCIATION

Telephone: 301/565-2733
e-mail: info@geoprofessional.org www.geoprofessional.org

HILLIS-CARNES

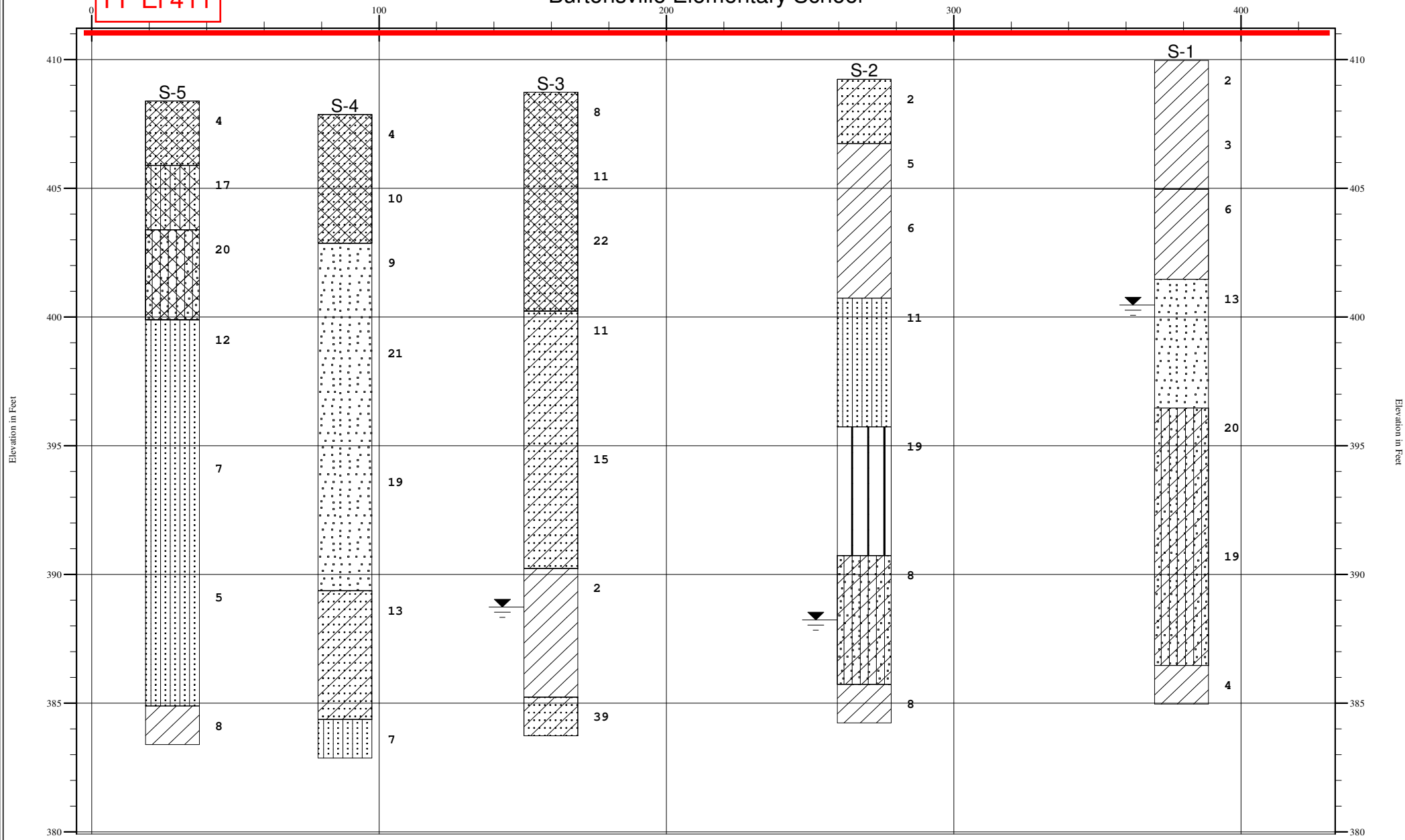
ENGINEERING ASSOCIATES, INC.

PROJECT LOCATION MAP

Scale: Reduced **Figure: 1**

LOG OF BORINGS
Burtonsville Elementary School

FF El 411



Description not given for: "DOF"

Description not given for: "0F"

Description not given for: ":ZOF"

Silty sand

Low plasticity clay

Poorly graded sand

Clayey sand/ Low plasticity clay

Elastic silt

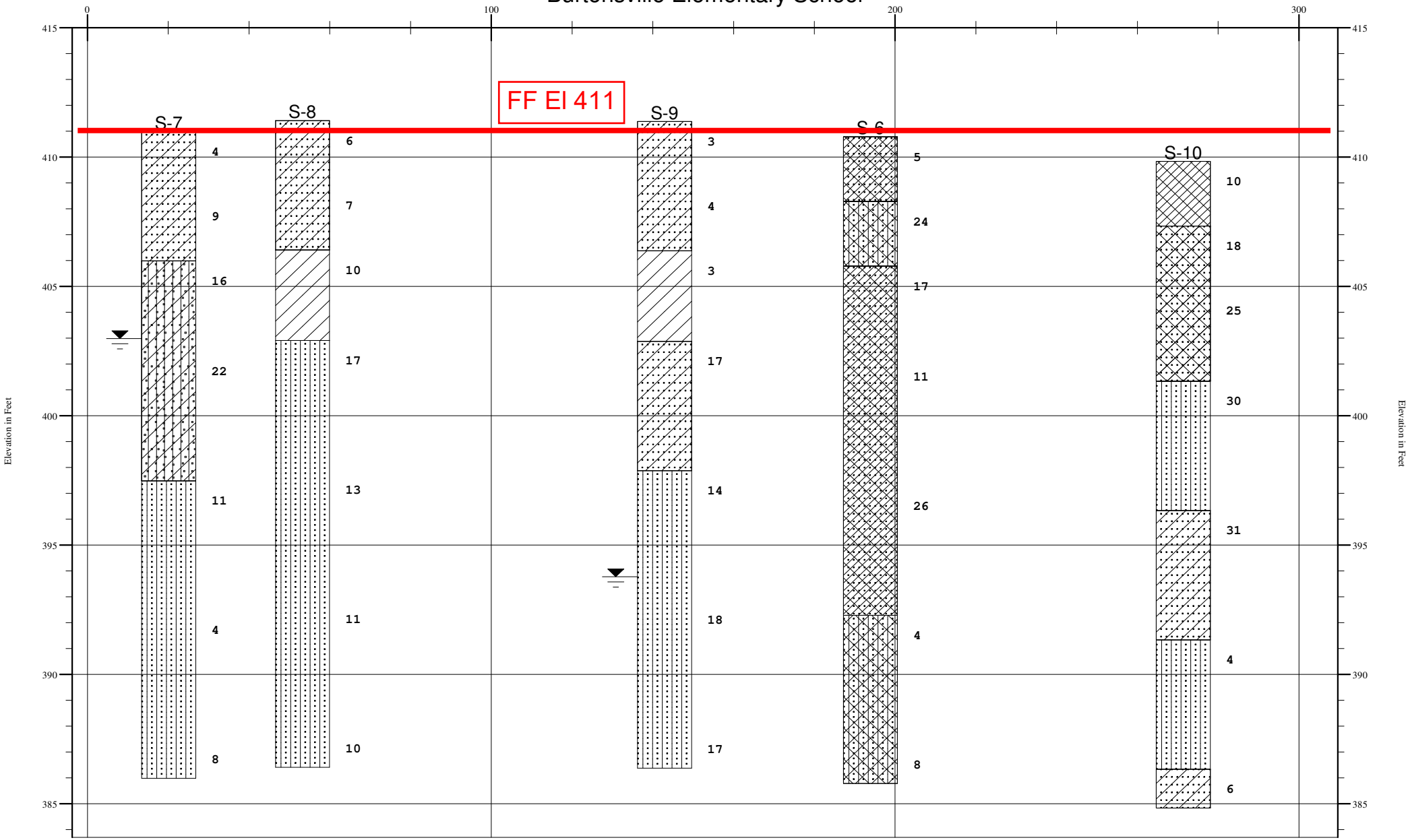
Poorly graded clayey silty sand

Description not given for: "OE"

HILLIS-CARNES ENGINEERING ASSOCIATES, INC.

LOG OF BORINGS

Burtonsville Elementary School



Clayey sand/
Low plasticity clay

Poorly graded clayey
silty sand

Silty sand

Low plasticity
clay

Description not given for:
"DOF"

Description not given for:
"0F"

Description not given for:
"OF"

HILLIS-CARNES ENGINEERING ASSOCIATES, INC.

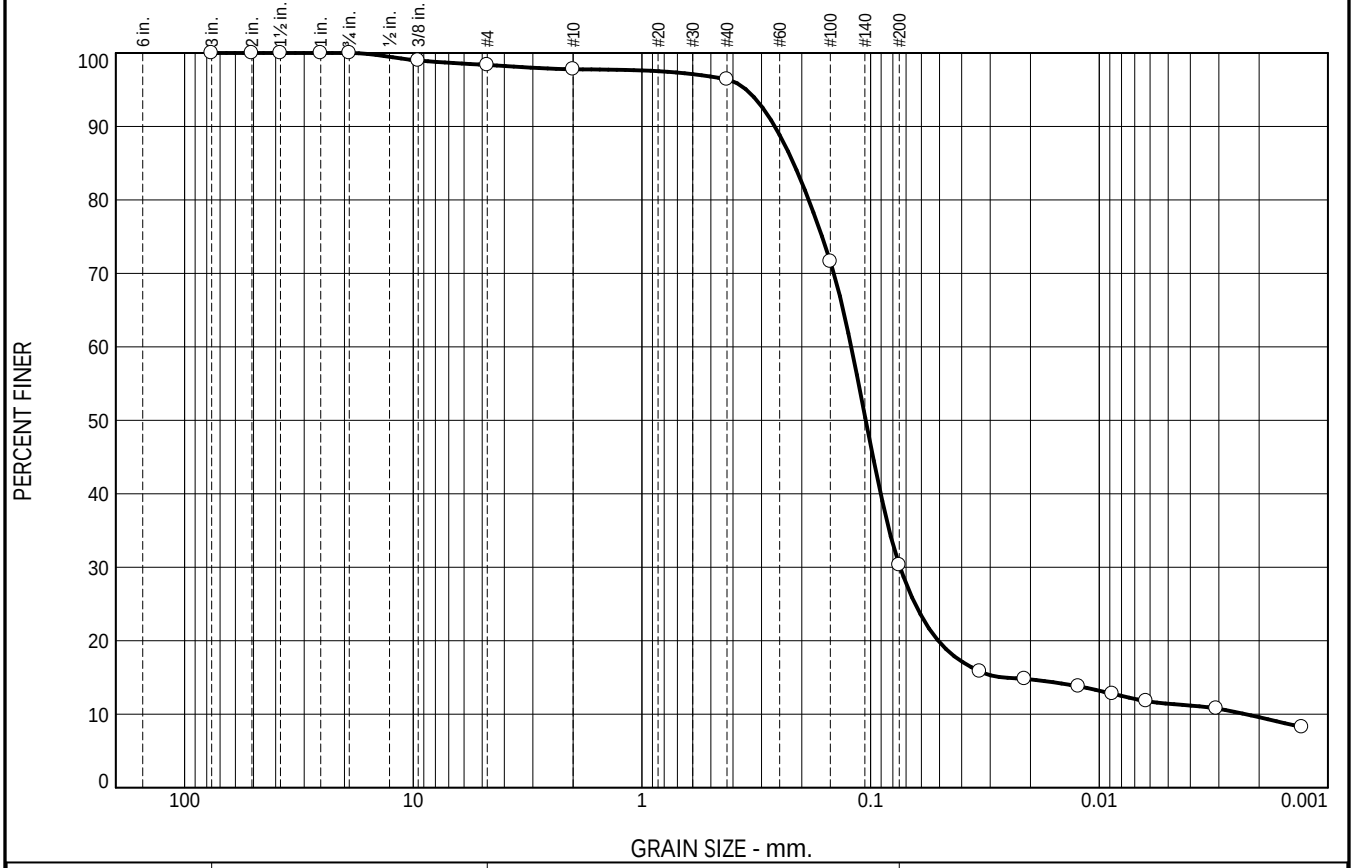
Burtonsville Elementary School

HCEA Project No. 24033A

In-Situ Infiltration Test Results

Boring	Fill Depth (ft)	Depth of Test (ft)	Measured Infiltration Rate (in/hr)
B-1	10	8	7.25
B-2	10	8	8.25
B-3	N/E	5	2.50
B-4	10	No Test	No Test
B-5	8.5	No Test	No Test
B-6	10	5	2.00
B-7	N/E	8	11.00
B-8	10	8	2.75
B-9	10	8	0.00
B-10	10	8	1.00
B-11	10	8	0.00
B-12	10	No Test	No Test
B-13	10	5	0.00
B-14	5	8	4.00
B-15	10	8	2.75

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.6	0.6	1.4	66.1	18.9	11.4

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3"	100.0		
2"	100.0		
1-1/2"	100.0		
1"	100.0		
3/4"	100.0		
3/8"	99.0		
#4	98.4		
#10	97.8		
#40	96.4		
#100	71.6		
#200	30.3		
0.0333 mm.	15.8		
0.0212 mm.	14.8		
0.0123 mm.	13.8		
0.0088 mm.	12.8		
0.0062 mm.	11.8		
0.0031 mm.	10.8		
0.0013 mm.	8.2		

* (no specification provided)

Soil Description

USDA: Orange brown sandy loam

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.2624 D_{85}= 0.2175 D_{60}= 0.1216
D_{50}= 0.1050 D_{30}= 0.0744 D_{15}= 0.0263
D_{10}= 0.0023 C_u= 53.10 C_c= 19.88

Classification

USCS= AASHTO=

Remarks

Moisture content: 9.8%
USDA Fractions- Sand: 78.7%, Silt: 11.5%, Clay: 9.8%

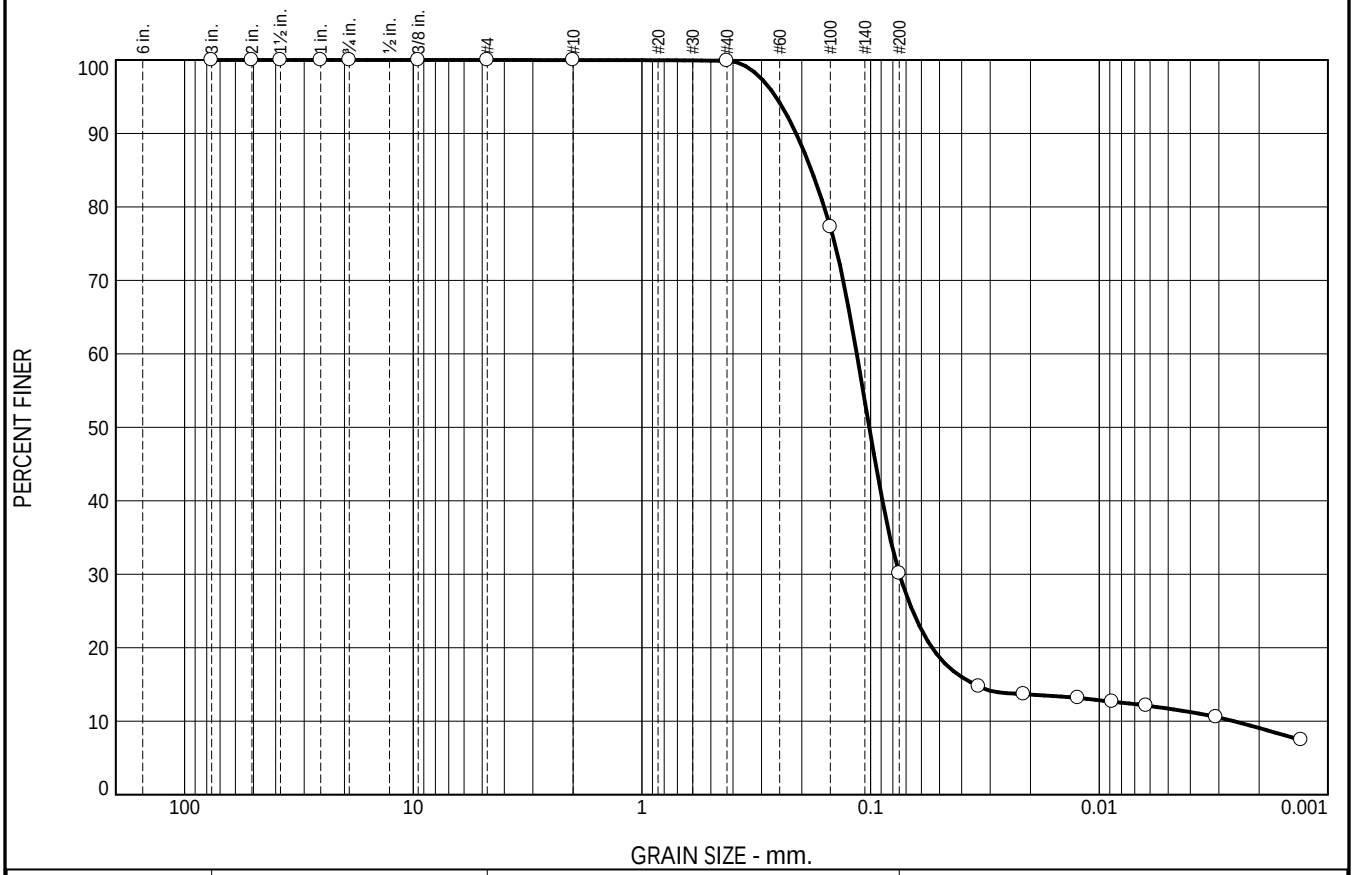
Location: B-1, S-4
Sample Number: 1 Depth: 8.5'-10.0' Date: 05/14/24

HILLIS-CARNES ENGINEERING ASSOCIATES, INC.
Annapolis Junction, MD

Client: MTFA Architecture, Inc.
Project: Burtonsville Elementary School

Project No: 24033A Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.1	69.8	18.4	11.7

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3"	100.0		
2"	100.0		
1-1/2"	100.0		
1"	100.0		
3/4"	100.0		
3/8"	100.0		
#4	100.0		
#10	100.0		
#40	99.9		
#100	77.3		
#200	30.1		
0.0337 mm.	14.7		
0.0214 mm.	13.7		
0.0124 mm.	13.2		
0.0088 mm.	12.7		
0.0062 mm.	12.1		
0.0031 mm.	10.6		
0.0013 mm.	7.5		

* (no specification provided)

Soil Description

USDA: Orange brown loamy sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.2118 D_{85}= 0.1816 D_{60}= 0.1150
D_{50}= 0.1014 D_{30}= 0.0748 D_{15}= 0.0350
D_{10}= 0.0026 C_u= 44.57 C_c= 18.86

Classification

USCS= AASHTO=

Remarks

Moisture content: 12.4%
USDA Fractions- Sand: 80.3%, Silt: 10.6%, Clay: 9.1%

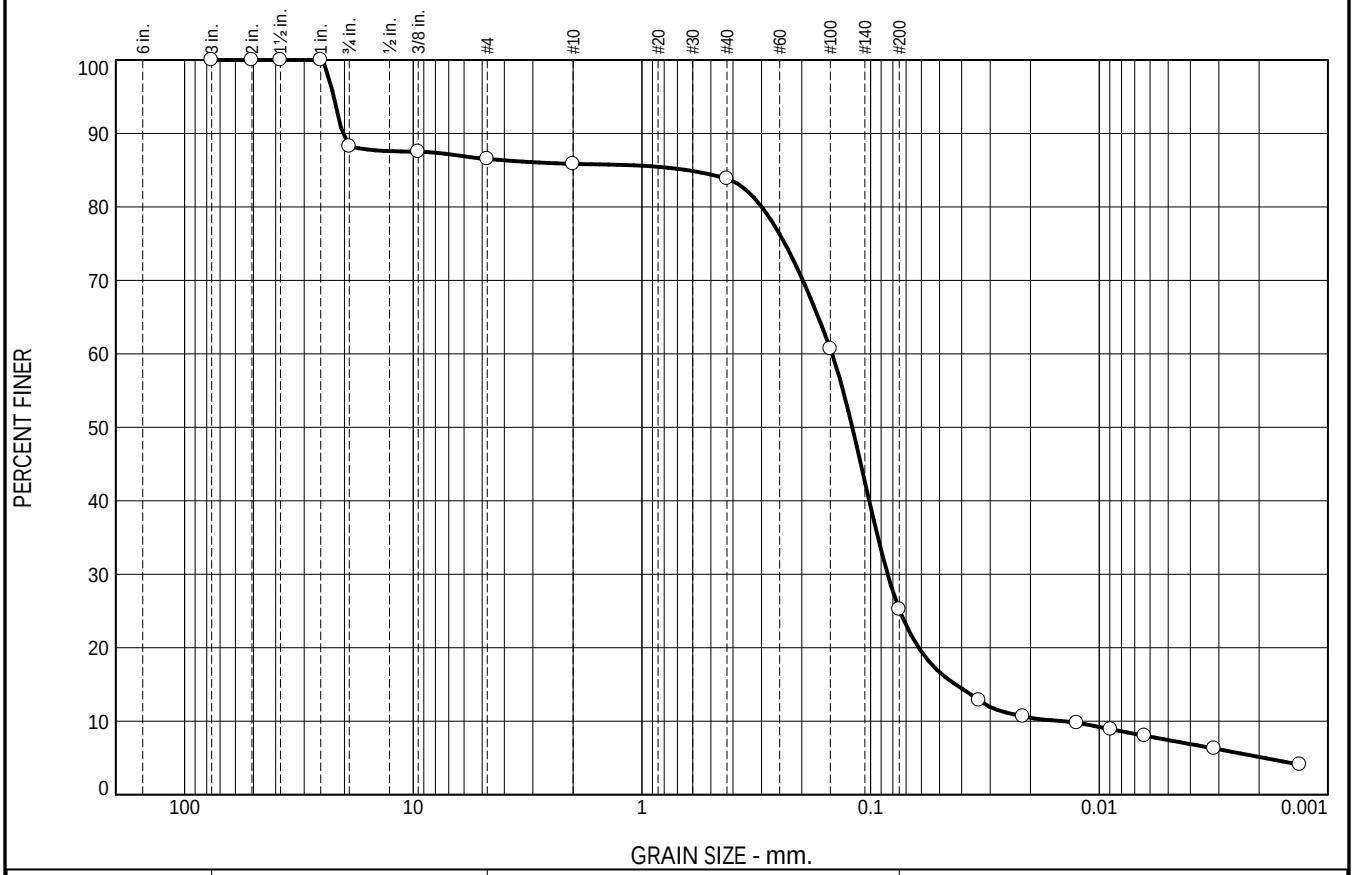
Location: B-3, S-3
Sample Number: 2 Depth: 5.0'-6.5' Date: 05/14/24

HILLIS-CARNES ENGINEERING ASSOCIATES, INC.
Annapolis Junction, MD

Client: MTFA Architecture, Inc.
Project: Burtonsville Elementary School

Project No: 24033A Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	11.8	1.7	0.6	2.1	58.6	17.8	7.4

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3"	100.0		
2"	100.0		
1-1/2"	100.0		
1"	100.0		
3/4"	88.2		
3/8"	87.5		
#4	86.5		
#10	85.9		
#40	83.8		
#100	60.7		
#200	25.2		
0.0335 mm.	12.8		
0.0216 mm.	10.7		
0.0125 mm.	9.8		
0.0089 mm.	8.9		
0.0063 mm.	8.0		
0.0031 mm.	6.3		
0.0013 mm.	4.1		

* (no specification provided)

Soil Description

USDA: Orange brown loamy sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 20.3819 D_{85}= 0.6334 D_{60}= 0.1473
D_{50}= 0.1203 D_{30}= 0.0843 D_{15}= 0.0426
D_{10}= 0.0145 C_u= 10.18 C_c= 3.33

Classification

USCS= AASHTO=

Remarks

Moisture content: 7.2%
USDA Fractions- Sand: 79.7%, Silt: 14.3%, Clay: 5.9%

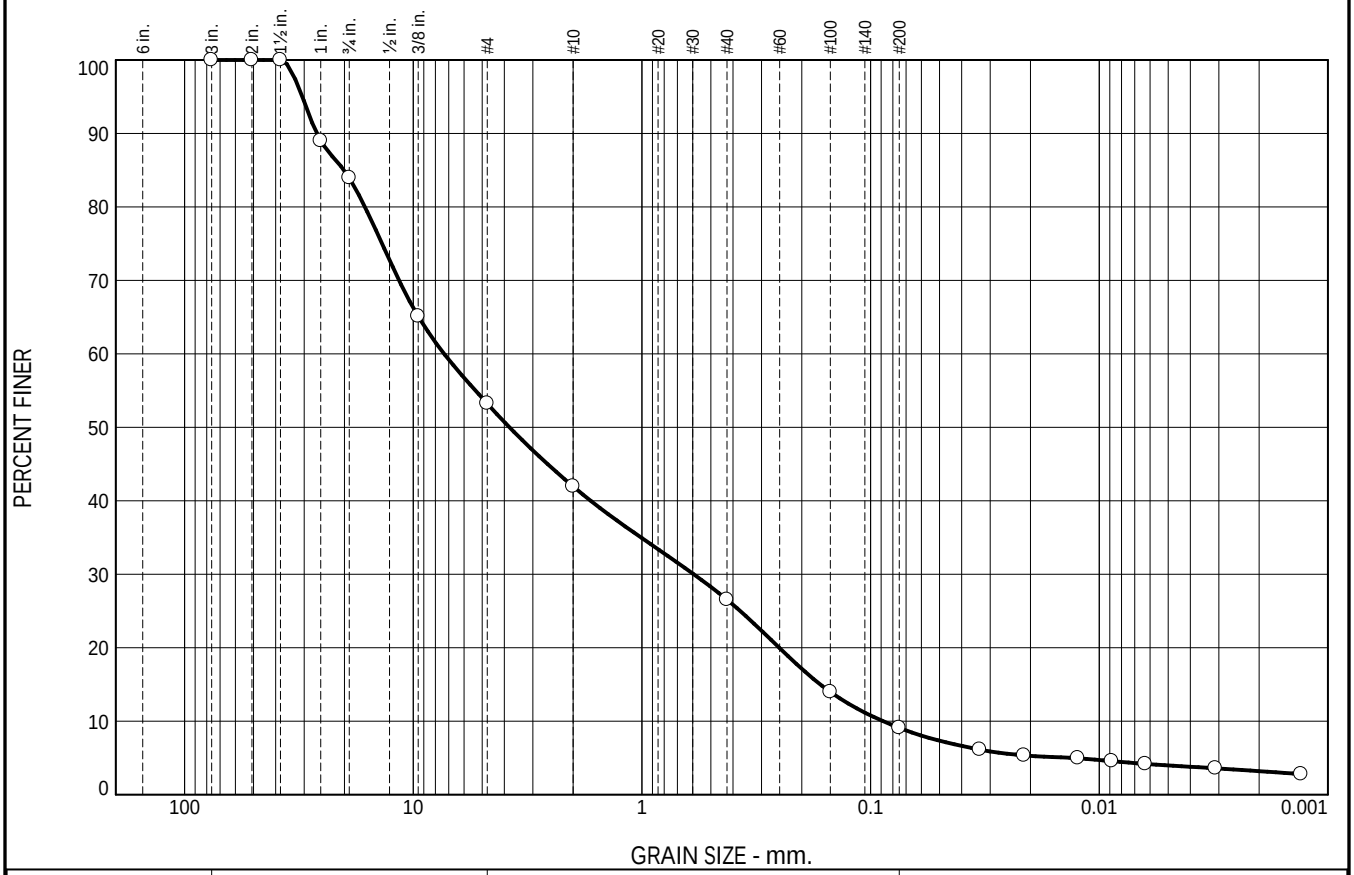
Location: B-7, S-4
Sample Number: 3 Depth: 8.5'-10.0' Date: 05/14/24

HILLIS-CARNES
ENGINEERING ASSOCIATES, INC.
Annapolis Junction, MD

Client: MTFA Architecture, Inc.
Project: Burtonsville Elementary School

Project No: 24033A Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	16.1	30.7	11.2	15.5	17.4	5.1	4.0

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3"	100.0		
2"	100.0		
1-1/2"	100.0		
1"	89.0		
3/4"	83.9		
3/8"	65.1		
#4	53.2		
#10	42.0		
#40	26.5		
#100	14.0		
#200	9.1		
0.0333 mm.	6.1		
0.0214 mm.	5.4		
0.0124 mm.	5.0		
0.0088 mm.	4.6		
0.0063 mm.	4.2		
0.0031 mm.	3.6		
0.0013 mm.	2.8		

* (no specification provided)

Soil Description

USDA: Orange brown loamy sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 26.4266 D_{85}= 20.0773 D_{60}= 7.3278
D_{50}= 3.7977 D_{30}= 0.5936 D_{15}= 0.1660
D_{10}= 0.0882 C_u= 83.06 C_c= 0.55

Classification

USCS= AASHTO=

Remarks

Moisture content: 4.5%
USDA Fractions- Sand: 82.1%, Silt: 10.2%, Clay: 7.6%

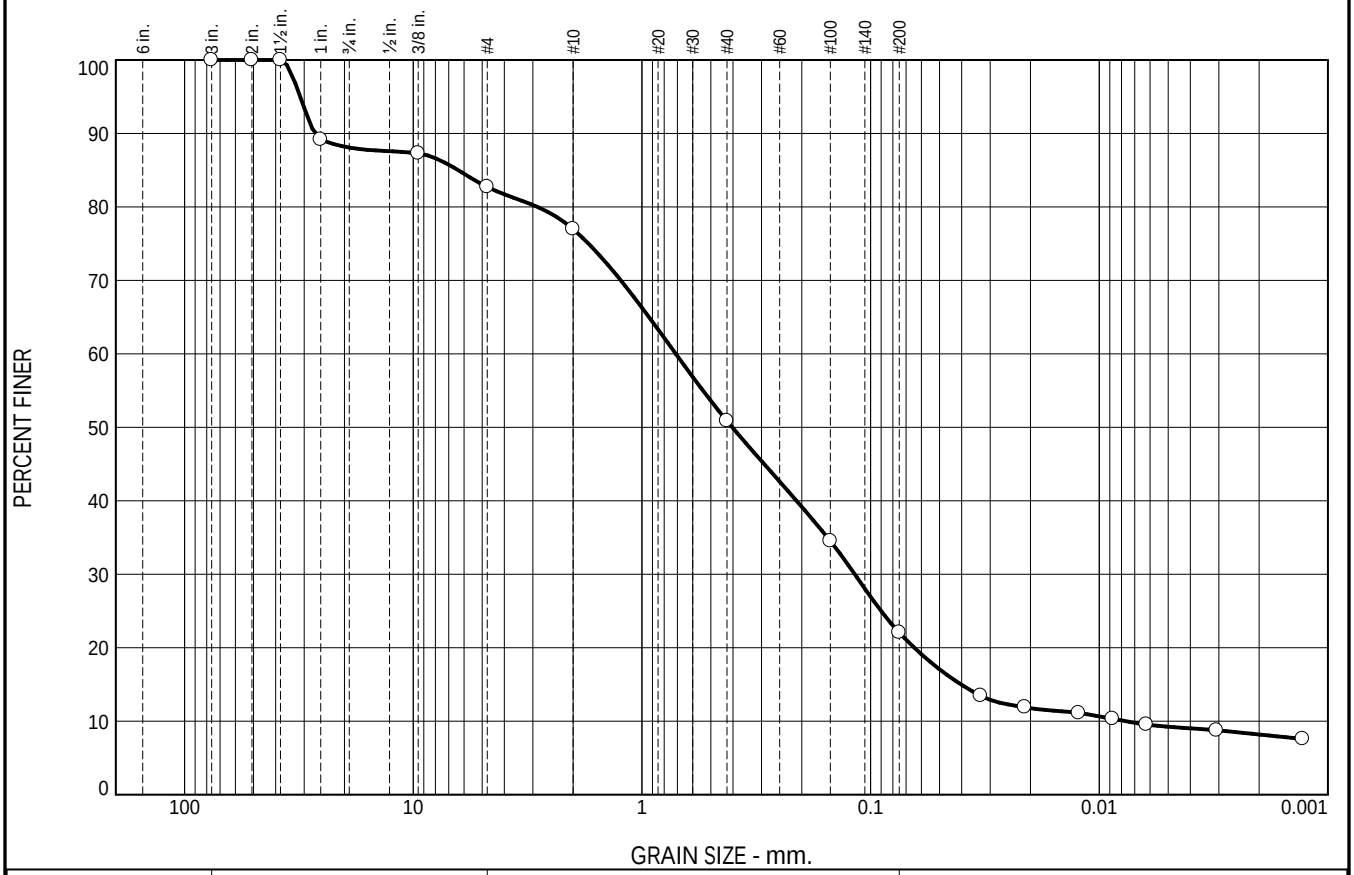
Location: B-8, S-4
Sample Number: 4 Depth: 8.5'-10.0' Date: 05/14/24

HILLIS-CARNES ENGINEERING ASSOCIATES, INC.
Annapolis Junction, MD

Client: MTFA Architecture, Inc.
Project: Burtonsville Elementary School

Project No: 24033A Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	11.9	5.4	5.7	26.1	28.8	12.9	9.2

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3"	100.0		
2"	100.0		
1-1/2"	100.0		
1"	89.2		
3/8"	87.3		
#4	82.7		
#10	77.0		
#40	50.9		
#100	34.5		
#200	22.1		
0.0330 mm.	13.5		
0.0212 mm.	11.9		
0.0123 mm.	11.1		
0.0087 mm.	10.3		
0.0062 mm.	9.5		
0.0031 mm.	8.8		
0.0013 mm.	7.6		

* (no specification provided)

Soil Description

USDA: Brown with orange sandy loam

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 26.9157 D_{85}= 6.3692 D_{60}= 0.7111
D_{50}= 0.4028 D_{30}= 0.1173 D_{15}= 0.0402
D_{10}= 0.0077 C_u= 92.79 C_c= 2.53

Classification

USCS= AASHTO=

Remarks

Moisture content: 9.1%
USDA Fractions- Sand: 77.0%, Silt: 12.3%, Clay: 10.6%

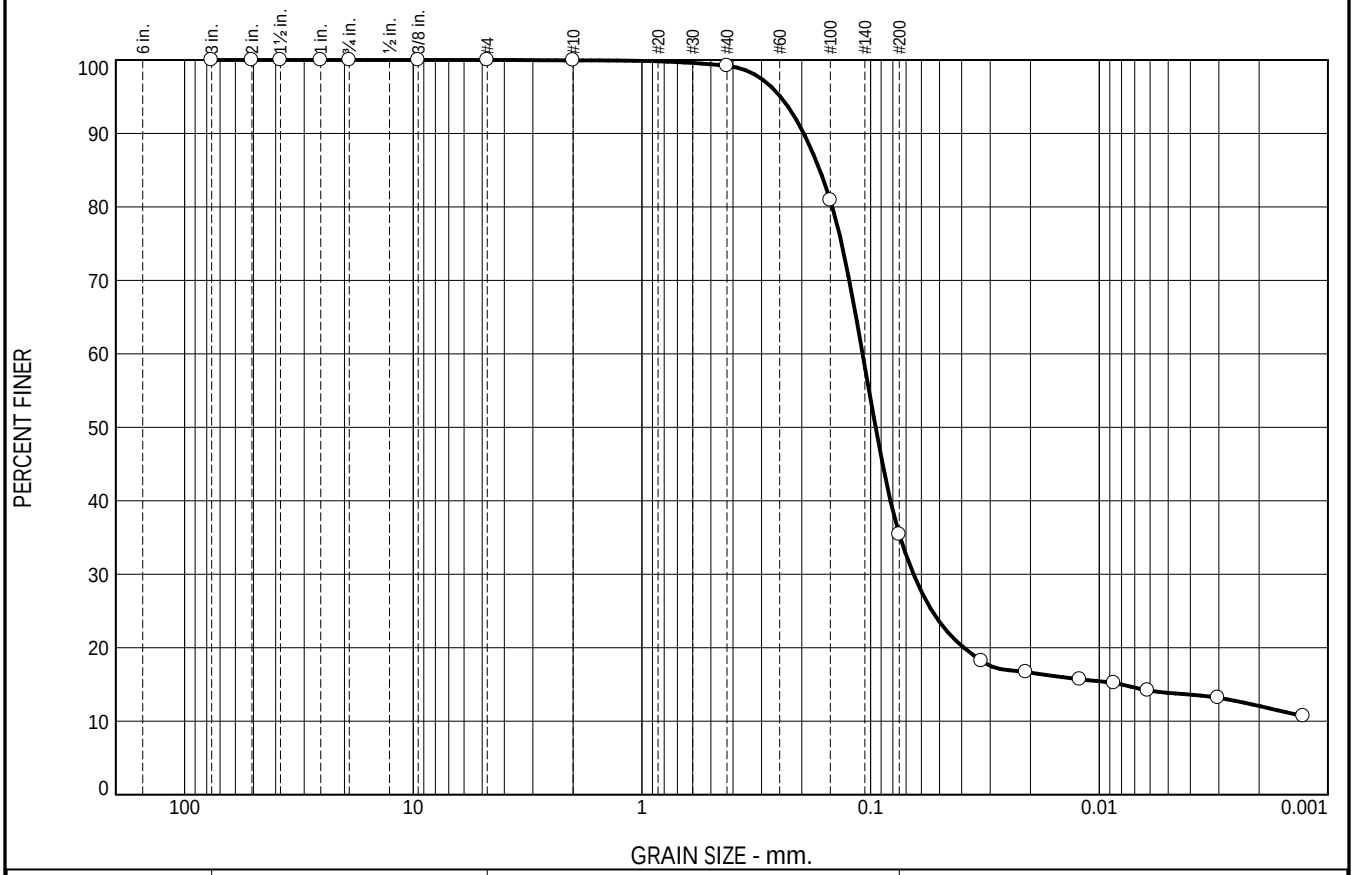
Location: B-10, S-4
Sample Number: 5 Depth: 8.5'-10.0' Date: 05/14/24

HILLIS-CARNES ENGINEERING ASSOCIATES, INC.
Annapolis Junction, MD

Client: MTFA Architecture, Inc.
Project: Burtonsville Elementary School

Project No: 24033A Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	0.7	63.8	21.5	13.9

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3"	100.0		
2"	100.0		
1-1/2"	100.0		
1"	100.0		
3/4"	100.0		
3/8"	100.0		
#4	100.0		
#10	99.9		
#40	99.2		
#100	80.9		
#200	35.4		
0.0328 mm.	18.2		
0.0209 mm.	16.7		
0.0122 mm.	15.7		
0.0086 mm.	15.2		
0.0061 mm.	14.2		
0.0030 mm.	13.2		
0.0013 mm.	10.7		

* (no specification provided)

Soil Description

USDA: Orange brown sandy loam

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.1961 D_{85}= 0.1668 D_{60}= 0.1084
D_{50}= 0.0951 D_{30}= 0.0649 D_{15}= 0.0080
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Moisture content: 10.3%
USDA Fractions- Sand: 75.3%, Silt: 12.6%, Clay: 12.1%

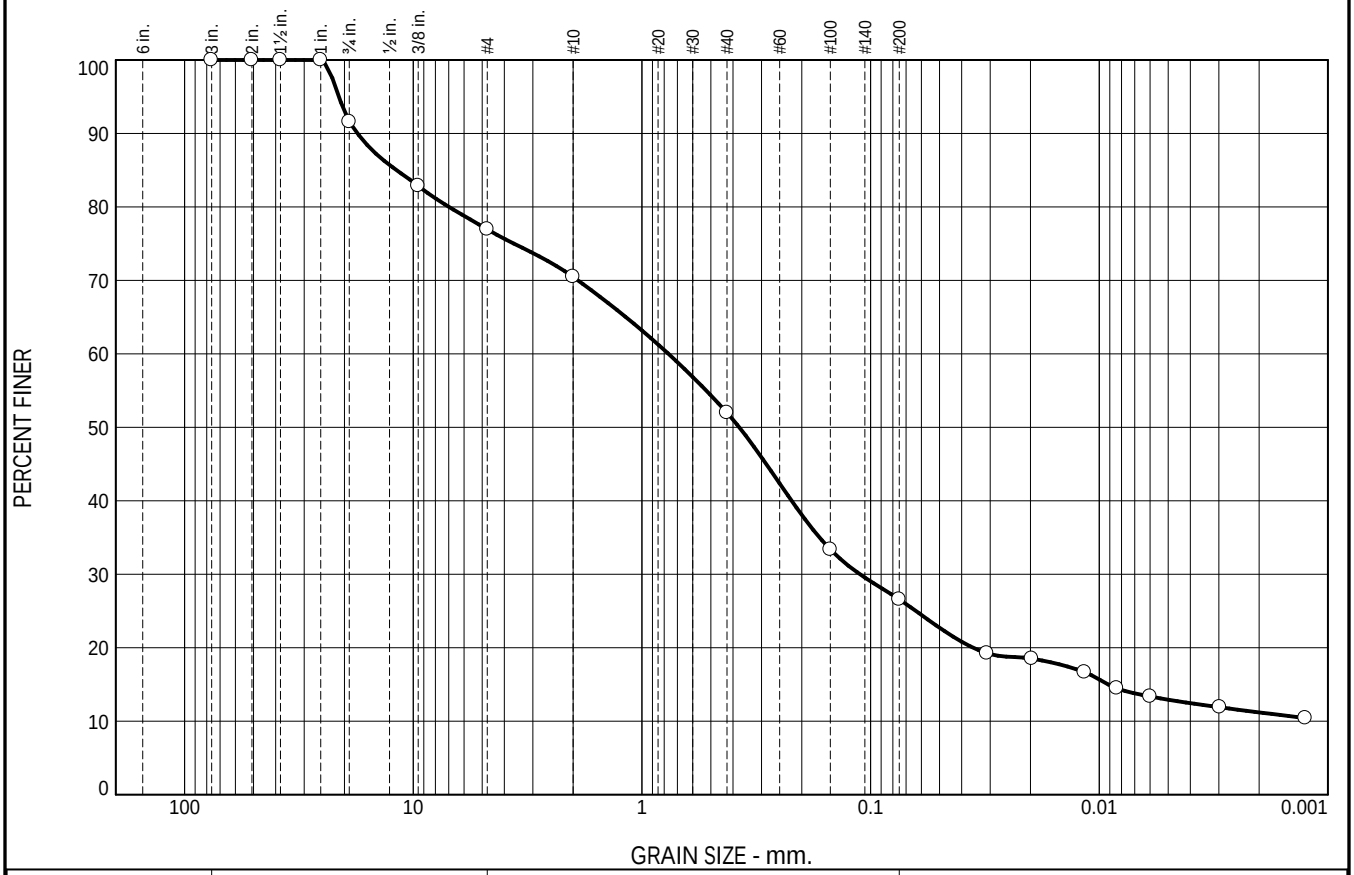
Location: B-14, S-4
Sample Number: 6 Depth: 8.5'-10.0' Date: 05/14/24

HILLIS-CARNES ENGINEERING ASSOCIATES, INC.
Annapolis Junction, MD

Client: MTFA Architecture, Inc.
Project: Burtonsville Elementary School

Project No: 24033A Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	8.4	14.6	6.5	18.5	25.4	13.7	12.9

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3"	100.0		
2"	100.0		
1-1/2"	100.0		
1"	100.0		
3/4"	91.6		
3/8"	82.9		
#4	77.0		
#10	70.5		
#40	52.0		
#100	33.4		
#200	26.6		
0.0310 mm.	19.3		
0.0197 mm.	18.5		
0.0116 mm.	16.7		
0.0084 mm.	14.5		
0.0060 mm.	13.4		
0.0030 mm.	11.9		
0.0013 mm.	10.4		

* (no specification provided)

Soil Description

USDA: Gray brown with red sandy loam

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 17.5410 D_{85}= 11.8346 D_{60}= 0.7659
D_{50}= 0.3753 D_{30}= 0.1113 D_{15}= 0.0091
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Moisture content: 8.0%
USDA Fractions- Sand: 67.0%, Silt: 17.2%, Clay: 15.9%

Location: B-15, S-4
Sample Number: 7 Depth: 8.5'-10.0' Date: 05/14/24

HILLIS-CARNES ENGINEERING ASSOCIATES, INC.
Annapolis Junction, MD

Client: MTFA Architecture, Inc.
Project: Burtonsville Elementary School

Project No: 24033A Figure

HILLIS - CARNES ENGINEERING ASSOCIATES, INC.

RECORD OF SOIL EXPLORATION

Project Name: **Burtonsville Elementary School** Boring No.: B-1

Location: Burtonsville, MD Job #: 24033A

SAMPLER

Datum: NAD83 / NAVD88 Hammer Wt.: 140 lbs. Hole Diameter: 3.25 in. Foreman: J. Russell

Surf. Elev.: 408.29 ft Hammer Drop: 30 in. Rock Core Diameter: N/A Inspector:

Date Started: 1-30-2024 Pipe Size (O.D.): 2 in. Boring Method: HSA Date Completed: 1-30-2024

Elevation/ Depth (ft)	SOIL SYMBOLS/ SAMPLE CONDITIONS	Description	Boring and Sampling Notes	Sample No.	Rec. (in)	NM (%)	SPT Blows	SPT N (blows/ft) N	SPT N (blows/ft) 10 30 50
0 / 405	D	Dark orangish brown, moist, medium dense, silty SAND with some gavel (SM; FILL)	Topsoil - 3"	1	12		5-6-9	15	
	D	Orangish brown, some concrete	Groundwater was not encountered while drilling	2	8		6-8-9	17	
5 / 400	D	Light brown, moist, medium dense, silty SAND (SM; POSSIBLE FILL)		3	14		4-5-9	14	
	D	Orangish brown (USDA: Sandy Loam)	Boring backfilled 24-hours after completion	4	4		5-6-8	14	
10 / 395		Bottom of boring at 10.0 feet							
15 / 390									
20 / 385									
25 / 380									
30 / 375									

SAMPLER TYPE
DRIVEN SPLIT SPOON UNLESS OTHERWISE
PT - PRESSED SHELBY TUBE
CA - CONTINUOUS FLIGHT AUGER
RC - ROCK CORE

SAMPLE CONDITIONS
D - DISINTEGRATED
I - INTACT
U - UNDISTURBED
L - LOST

	GROUND WATER	CAVE IN DEPTH
AT COMPLETION	DRY ft.	7.0 ft.
AFTER 24 HRS.	DRY ft.	7.0 ft.
AFTER ____ HRS.	____ ft.	____ ft.

BORING METHOD
HSA - HOLLOW STEM AUGERS
CFA - CONTINUOUS FLIGHT AUGERS
DC - DRIVING CASING
MD - MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" O.D. SAMPLER 1' WITH 140# HAMMER FALLING 30": COUNT MADE AT 6" INTERVALS.

HILLIS - CARNES ENGINEERING ASSOCIATES, INC.

RECORD OF SOIL EXPLORATION

Project Name: **Burtonsville Elementary School** Boring No.: B-2

Location: Burtonsville, MD Job #: 24033A

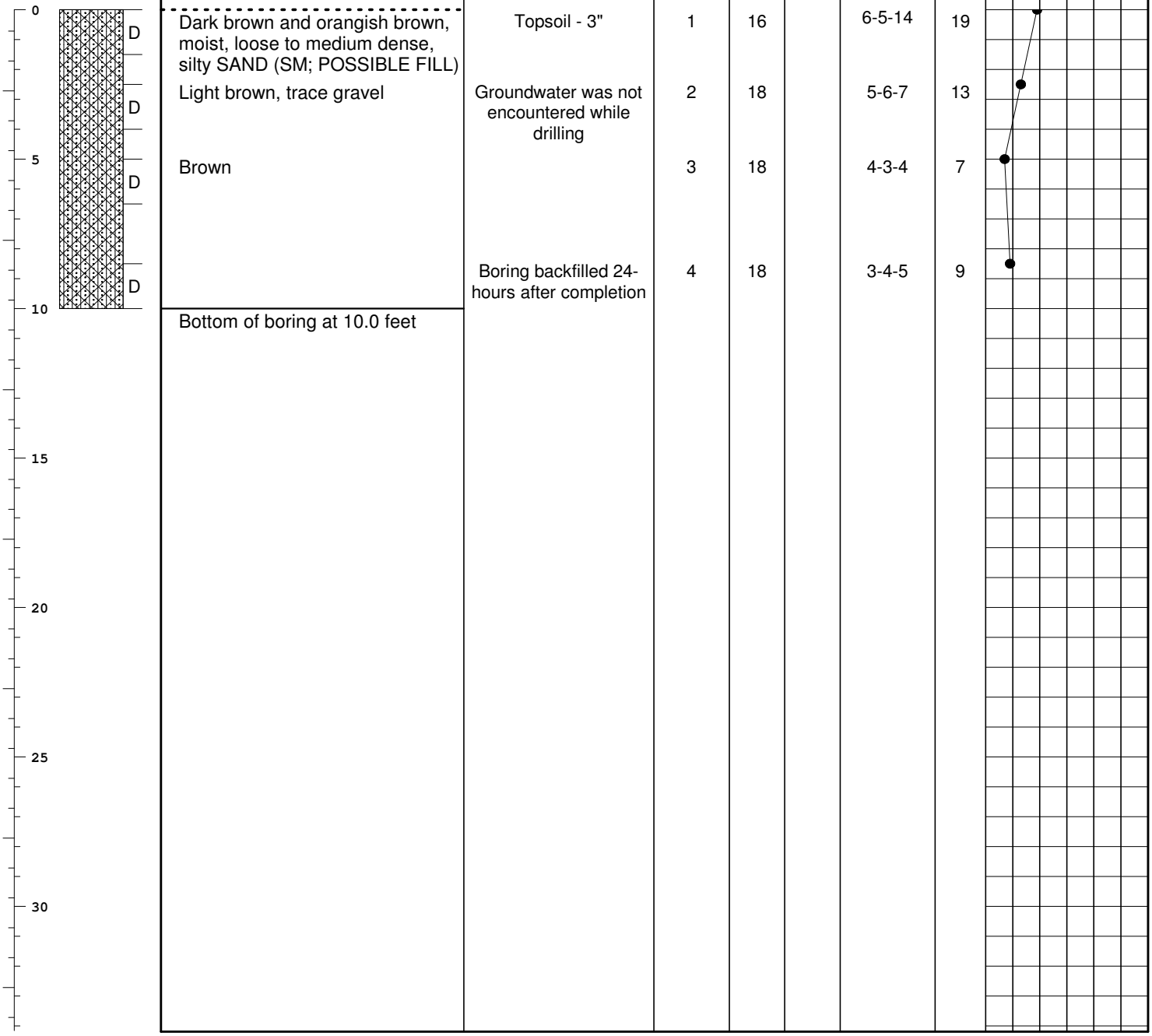
SAMPLER

Datum: NAD83 / NAVD88 Hammer Wt.: 140 lbs. Hole Diameter: 3.25 in. Foreman: J. Russell

Surf. Elev.: 407.72 ft Hammer Drop: 30 in. Rock Core Diameter: N/A Inspector:

Date Started: 1-30-2024 Pipe Size (O.D.): 2 in. Boring Method: HSA Date Completed: 1-30-2024

Elevation/ Depth (ft)	SOIL SYMBOLS/ SAMPLE CONDITIONS	Description	Boring and Sampling Notes	Sample No.	Rec. (in)	NM (%)	SPT Blows	SPT N (blows/ft) N
0 / 407.72	D	Dark brown and orangish brown, moist, loose to medium dense, silty SAND (SM; POSSIBLE FILL)	Topsoil - 3"	1	16		6-5-14	19
405	D	Light brown, trace gravel	Groundwater was not encountered while drilling	2	18		5-6-7	13
5	D	Brown		3	18		4-3-4	7
400	D		Boring backfilled 24-hours after completion	4	18		3-4-5	9
10		Bottom of boring at 10.0 feet						
395								
15								
390								
20								
385								
25								
380								
30								
375								



SAMPLER TYPE
DRIVEN SPLIT SPOON UNLESS OTHERWISE
PT - PRESSED SHELBY TUBE
CA - CONTINUOUS FLIGHT AUGER
RC - ROCK CORE

SAMPLE CONDITIONS
D - DISINTEGRATED
I - INTACT
U - UNDISTURBED
L - LOST

	GROUND WATER	CAVE IN DEPTH
AT COMPLETION	DRY ft.	7.5 ft.
AFTER 24 HRS.	DRY ft.	7.6 ft.
AFTER ____ HRS.	____ ft.	____ ft.

BORING METHOD
HSA - HOLLOW STEM AUGERS
CFA - CONTINUOUS FLIGHT AUGERS
DC - DRIVING CASING
MD - MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" O.D. SAMPLER 1' WITH 140# HAMMER FALLING 30": COUNT MADE AT 6" INTERVALS.

HILLIS - CARNES ENGINEERING ASSOCIATES, INC.

RECORD OF SOIL EXPLORATION

Project Name: **Burtonsville Elementary School** Boring No.: B-3

Location: Burtonsville, MD Job #: 24033A

SAMPLER

Datum: NAD83 / NAVD88 Hammer Wt.: 140 lbs. Hole Diameter: 3.25 in. Foreman: J. Russell

Surf. Elev.: 409.43 ft Hammer Drop: 30 in. Rock Core Diameter: N/A Inspector:

Date Started: 1-29-2024 Pipe Size (O.D.): 2 in. Boring Method: HSA Date Completed: 1-29-2024

Elevation/ Depth (ft)	SOIL SYMBOLS/ SAMPLE CONDITIONS	Description	Boring and Sampling Notes	Sample No.	Rec. (in)	NM (%)	SPT Blows	SPT N (blows/ft) N
0 / 409.43	D	Brown, moist, loose to medium dense, silty clayey SAND (SC-SM)	Topsoil - 3"	1	12		2-2-3	5
	D		Groundwater was not encountered while drilling	2	15		2-4-5	9
5 / 405	D	Light brown (USDA: Loamy Sand)		3	15		7-8-6	14
	D	Orangish brown	Boring backfilled 24-hours after completion	4	14		4-4-4	8
10 / 400		Bottom of boring at 10.0 feet						
15 / 395								
20 / 390								
25 / 385								
30 / 380								

SPT N (blows/ft) scale: 10 30 50

SAMPLER TYPE
DRIVEN SPLIT SPOON UNLESS OTHERWISE
PT - PRESSED SHELBY TUBE
CA - CONTINUOUS FLIGHT AUGER
RC - ROCK CORE

SAMPLE CONDITIONS
D - DISINTEGRATED
I - INTACT
U - UNDISTURBED
L - LOST

	GROUND WATER		CAVE IN DEPTH	
AT COMPLETION	DRY	ft.	6.5	ft.
AFTER 24 HRS.	DRY	ft.	7.6	ft.
AFTER ____ HRS.		ft.		ft.

BORING METHOD
HSA - HOLLOW STEM AUGERS
CFA - CONTINUOUS FLIGHT AUGERS
DC - DRIVING CASING
MD - MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" O.D. SAMPLER 1' WITH 140# HAMMER FALLING 30": COUNT MADE AT 6" INTERVALS.

HILLIS - CARNES ENGINEERING ASSOCIATES, INC.

RECORD OF SOIL EXPLORATION

Project Name: **Burtonsville Elementary School** Boring No.: B-4

Location: Burtonsville, MD Job #: 24033A

SAMPLER

Datum: NAD83 / NAVD88 Hammer Wt.: 140 lbs. Hole Diameter: 3.25 in. Foreman: J. Russell

Surf. Elev.: 410.88 ft Hammer Drop: 30 in. Rock Core Diameter: N/A Inspector:

Date Started: 2-1-2024 Pipe Size (O.D.): 2 in. Boring Method: HSA Date Completed: 2-1-2024

Elevation/ Depth (ft)	SOIL SYMBOLS/ SAMPLE CONDITIONS	Description	Boring and Sampling Notes	Sample No.	Rec. (in)	NM (%)	SPT Blows	SPT N (blows/ft) N
0 / 410	D	Brown, moist, loose, clayey SAND with some gravel (SC; FILL)	Topsoil - 2"	1	10		2-3-5	8
	D	Brown, moist, medium dense, silty SAND with some gravel (SM; FILL)	Groundwater was not encountered while drilling	2	12		3-4-9	13
5 / 405	D	Brown, moist, loose to medium dense, clayey SAND with some gravel (SC; FILL)		3	14		3-5-6	11
	D	Trace gravel	Boring backfilled 24-hours after completion	4	12		5-5-5	10
10 / 400		Bottom of boring at 10.0 feet						
15 / 395								
20 / 390								
25 / 385								
30 / 380								

SPT N (blows/ft) scale: 10 30 50

SAMPLER TYPE
DRIVEN SPLIT SPOON UNLESS OTHERWISE
PT - PRESSED SHELBY TUBE
CA - CONTINUOUS FLIGHT AUGER
RC - ROCK CORE

SAMPLE CONDITIONS
D - DISINTEGRATED
I - INTACT
U - UNDISTURBED
L - LOST

	GROUND WATER		CAVE IN DEPTH	
AT COMPLETION	DRY	ft.	8.0	ft.
AFTER 24 HRS.	DRY	ft.	8.6	ft.
AFTER ____ HRS.		ft.		ft.

BORING METHOD
HSA - HOLLOW STEM AUGERS
CFA - CONTINUOUS FLIGHT AUGERS
DC - DRIVING CASING
MD - MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" O.D. SAMPLER 1' WITH 140# HAMMER FALLING 30": COUNT MADE AT 6" INTERVALS.

HILLIS - CARNES ENGINEERING ASSOCIATES, INC.

RECORD OF SOIL EXPLORATION

Project Name: **Burtonsville Elementary School** | Boring No.: B-5

Location: Burtonsville, MD | Job #: 24033A

SAMPLER

Datum: NAD83 / NAVD88 | Hammer Wt.: 140 lbs. | Hole Diameter: 3.25 in. | Foreman: J. Russell

Surf. Elev.: 410.31 ft | Hammer Drop: 30 in. | Rock Core Diameter: N/A | Inspector:

Date Started: 1-29-2024 | Pipe Size (O.D.): 2 in. | Boring Method: HSA | Date Completed: 1-29-2024

Elevation/ Depth (ft)	SOIL SYMBOLS/ SAMPLE CONDITIONS	Description	Boring and Sampling Notes	Sample No.	Rec. (in)	NM (%)	SPT Blows	SPT N (blows/ft) N
410 / 0	D	Orangish brown, moist, loose, silty clayey SAND (SC-SM; FILL)	Topsoil - 4"	1	14		3-3-5	8
	D	Brown	Groundwater was not encountered while drilling	2	12		3-4-3	7
405 / 5	D	Brown, moist, dense, clayey SAND with some gravel (SC; FILL)		3	18		7-18-19	37
	D	Orangish brown, moist, loose, silty clayey SAND (SC-SM)	Boring backfilled 24-hours after completion	4	14		4-4-6	10
400 / 10		Bottom of boring at 10.0 feet						
395 / 15								
390 / 20								
385 / 25								
380 / 30								

SPT N (blows/ft) scale: 10 30 50

SAMPLER TYPE
DRIVEN SPLIT SPOON UNLESS OTHERWISE
PT - PRESSED SHELBY TUBE
CA - CONTINUOUS FLIGHT AUGER
RC - ROCK CORE

SAMPLE CONDITIONS
D - DISINTEGRATED
I - INTACT
U - UNDISTURBED
L - LOST

	GROUND WATER		CAVE IN DEPTH	
AT COMPLETION	DRY	ft.	5.0	ft.
AFTER 24 HRS.	DRY	ft.	7.0	ft.
AFTER ____ HRS.		ft.		ft.

BORING METHOD
HSA - HOLLOW STEM AUGERS
CFA - CONTINUOUS FLIGHT AUGERS
DC - DRIVING CASING
MD - MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" O.D. SAMPLER 1' WITH 140# HAMMER FALLING 30": COUNT MADE AT 6" INTERVALS.

HILLIS - CARNES
ENGINEERING ASSOCIATES, INC.

RECORD OF SOIL EXPLORATION

Project Name: **Burtonsville Elementary School** | Boring No.: B-6

Location: Burtonsville, MD | Job #: 24033A

SAMPLER

Datum: NAD83 / NAVD88 | Hammer Wt.: 140 lbs. | Hole Diameter: 3.25 in. | Foreman: J. Russell

Surf. Elev.: 411.02 ft | Hammer Drop: 30 in. | Rock Core Diameter: N/A | Inspector:

Date Started: 2-1-2024 | Pipe Size (O.D.): 2 in. | Boring Method: HSA | Date Completed: 2-1-2024

Elevation/ Depth (ft)	SOIL SYMBOLS/ SAMPLE CONDITIONS	Description	Boring and Sampling Notes	Sample No.	Rec. (in)	NM (%)	SPT Blows	SPT N (blows/ft) N
0 / 410	D	Brown, moist, loose to medium dense, clayey SAND with some gravel (SC; FILL)	Topsoil - 3"	1	10		2-2-4	6
	D		Groundwater was not encountered while drilling	2	14		3-5-8	13
5 / 405	D	Light brown, moist, medium dense, silty clayey SAND with some gravel (SC-SM)		3	14		5-7-11	18
	D	Dark orangish brown, moist, dense, clayey SAND with some gravel (SC; FILL)	Boring backfilled 24-hours after completion	4	15		8-16-18	34
10 / 400		Bottom of boring at 10.0 feet						
15 / 395								
20 / 390								
25 / 385								
30 / 380								

SPT N (blows/ft) scale: 10, 30, 50

SAMPLER TYPE
DRIVEN SPLIT SPOON UNLESS OTHERWISE
PT - PRESSED SHELBY TUBE
CA - CONTINUOUS FLIGHT AUGER
RC - ROCK CORE

SAMPLE CONDITIONS
D - DISINTEGRATED
I - INTACT
U - UNDISTURBED
L - LOST

	GROUND WATER	CAVE IN DEPTH
AT COMPLETION	DRY ft.	8.4 ft.
AFTER 24 HRS.	3.11 ft.	4.0 ft.
AFTER ____ HRS.	____ ft.	____ ft.

BORING METHOD
HSA - HOLLOW STEM AUGERS
CFA - CONTINUOUS FLIGHT AUGERS
DC - DRIVING CASING
MD - MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" O.D. SAMPLER 1' WITH 140# HAMMER FALLING 30": COUNT MADE AT 6" INTERVALS.

HILLIS - CARNES ENGINEERING ASSOCIATES, INC.

RECORD OF SOIL EXPLORATION

Project Name: **Burtonsville Elementary School** Boring No.: B-6A

Location: Burtonsville, MD Job #: 24033A

SAMPLER

Datum: NAD83 / NAVD88 Hammer Wt.: N/A lbs. Hole Diameter: 3.25 in. Foreman: J. Russell

Surf. Elev.: 411.02 ft Hammer Drop: N/A in. Rock Core Diameter: N/A Inspector:

Date Started: 5-15-24 Pipe Size (O.D.): N/A in. Boring Method: CFA Date Completed: 5-15-24

Elevation/ Depth (ft)	SOIL SYMBOLS/ SAMPLE CONDITIONS	Description	Boring and Sampling Notes	Sample No.	Rec. (in)	NM (%)	SPT Blows	SPT N (blows/ft) N	SPT N (blows/ft) 10 30 50
0 / 410		Continuous Flight Augered to 10 ft	Boring Offset from Boring B-6						
5 / 405			Groundwater was not encountered while drilling						
10 / 400		Bottom of Boring at 10 ft							
15 / 395									
20 / 390									
25 / 385									
30 / 380									

SAMPLER TYPE
DRIVEN SPLIT SPOON UNLESS OTHERWISE
PT - PRESSED SHELBY TUBE
CA - CONTINUOUS FLIGHT AUGER
RC - ROCK CORE

SAMPLE CONDITIONS
D - DISINTEGRATED
I - INTACT
U - UNDISTURBED
L - LOST

	GROUND WATER	CAVE IN DEPTH
AT COMPLETION	DRY ft.	ft.
AFTER 24 HRS.	ft.	ft.
AFTER ____ HRS.	ft.	ft.

BORING METHOD
HSA - HOLLOW STEM AUGERS
CFA - CONTINUOUS FLIGHT AUGERS
DC - DRIVING CASING
MD - MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" O.D. SAMPLER 1' WITH 140# HAMMER FALLING 30": COUNT MADE AT 6" INTERVALS.

HILLIS - CARNES ENGINEERING ASSOCIATES, INC.

RECORD OF SOIL EXPLORATION

Project Name: **Burtonsville Elementary School** Boring No.: B-7

Location: Burtonsville, MD Job #: 24033A

SAMPLER

Datum: NAD83 / NAVD88 Hammer Wt.: 140 lbs. Hole Diameter: 3.25 in. Foreman: J. Russell

Surf. Elev.: 410.80 ft Hammer Drop: 30 in. Rock Core Diameter: N/A Inspector:

Date Started: 2-1-2024 Pipe Size (O.D.): 2 in. Boring Method: HSA Date Completed: 2-1-2024

Elevation/ Depth (ft)	SOIL SYMBOLS/ SAMPLE CONDITIONS	Description	Boring and Sampling Notes	Sample No.	Rec. (in)	NM (%)	SPT Blows	SPT N (blows/ft) N
410 / 0	D	Brown, damp, loose to medium dense, poorly graded SAND with trace gravel and clay (SP)	Topsoil - 2"	1	10		3-4-6	10
	D		Groundwater was not encountered while drilling	2	15		5-6-12	18
405 / 5	D	Brown, moist, medium dense, clayey SAND with some gravel (SC)		3	14		8-15-14	29
	D	Light brown, moist, medium dense, silty SAND with some gravel (SM) (USDA: Loamy Sand)	Boring backfilled 24-hours after completion	4	10		5-6-7	13
400 / 10		Bottom of boring at 10.0 feet						
395 / 15								
390 / 20								
385 / 25								
380 / 30								

SPT N (blows/ft) scale: 10, 30, 50

SAMPLER TYPE
DRIVEN SPLIT SPOON UNLESS OTHERWISE
PT - PRESSED SHELBY TUBE
CA - CONTINUOUS FLIGHT AUGER
RC - ROCK CORE

SAMPLE CONDITIONS
D - DISINTEGRATED
I - INTACT
U - UNDISTURBED
L - LOST

	GROUND WATER		CAVE IN DEPTH	
AT COMPLETION	DRY	ft.	8.2	ft.
AFTER 24 HRS.	DRY	ft.	6.6	ft.
AFTER ____ HRS.		ft.		ft.

BORING METHOD
HSA - HOLLOW STEM AUGERS
CFA - CONTINUOUS FLIGHT AUGERS
DC - DRIVING CASING
MD - MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" O.D. SAMPLER 1' WITH 140# HAMMER FALLING 30": COUNT MADE AT 6" INTERVALS.

HILLIS - CARNES ENGINEERING ASSOCIATES, INC.

RECORD OF SOIL EXPLORATION

Project Name: **Burtonsville Elementary School** Boring No.: B-7A

Location: Burtonsville, MD Job #: 24033A

SAMPLER

Datum: NAD83 / NAVD88 Hammer Wt.: 140 lbs. Hole Diameter: 3.25 in. Foreman: J. Russell

Surf. Elev.: 410.80 ft Hammer Drop: 30 in. Rock Core Diameter: N/A Inspector:

Date Started: 5-15-24 Pipe Size (O.D.): 2 in. Boring Method: HSA Date Completed: 5-15-24

Elevation/ Depth (ft)	SOIL SYMBOLS/ SAMPLE CONDITIONS	Description	Boring and Sampling Notes	Sample No.	Rec. (in)	NM (%)	SPT Blows	SPT N (blows/ft) N	SPT N (blows/ft) 10 30 50
410 / 0		Continuous Flight Augered to 13.5 ft	Topsoil - 3"						
			Boring Offset from Boring B-7						
405 / 5			Groundwater was encountered at 13.0 feet while drilling						
400 / 10									
395 / 15	D	Yellowish-light brown, wet, very loose, fine SAND, trace silt (SP)		1	17		1-1-1	2	●
		Bottom of Boring at 15 ft							
390 / 20									
385 / 25									
380 / 30									

SAMPLER TYPE
DRIVEN SPLIT SPOON UNLESS OTHERWISE
PT - PRESSED SHELBY TUBE
CA - CONTINUOUS FLIGHT AUGER
RC - ROCK CORE

SAMPLE CONDITIONS
D - DISINTEGRATED
I - INTACT
U - UNDISTURBED
L - LOST

	GROUND WATER	CAVE IN DEPTH
AT COMPLETION	DRY ft.	9.6 ft.
AFTER 24 HRS.	ft.	ft.
AFTER ____ HRS.	ft.	ft.

BORING METHOD
HSA - HOLLOW STEM AUGERS
CFA - CONTINUOUS FLIGHT AUGERS
DC - DRIVING CASING
MD - MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" O.D. SAMPLER 1' WITH 140# HAMMER FALLING 30": COUNT MADE AT 6" INTERVALS.

HILLIS - CARNES ENGINEERING ASSOCIATES, INC.

RECORD OF SOIL EXPLORATION

Project Name: **Burtonsville Elementary School** | Boring No.: B-8

Location: Burtonsville, MD | Job #: 24033A

SAMPLER

Datum: NAD83 / NAVD88 | Hammer Wt.: 140 lbs. | Hole Diameter: 3.25 in. | Foreman: J. Russell

Surf. Elev.: 410.70 ft | Hammer Drop: 30 in. | Rock Core Diameter: N/A | Inspector:

Date Started: 2-1-2024 | Pipe Size (O.D.): 2 in. | Boring Method: HSA | Date Completed: 2-1-2024

Elevation/ Depth (ft)	SOIL SYMBOLS/ SAMPLE CONDITIONS	Description	Boring and Sampling Notes	Sample No.	Rec. (in)	NM (%)	SPT Blows	SPT N (blows/ft) N
410 / 0	D	Brown, moist, very loose to medium dense, silty clayey SAND with trace gravel (SC-SM; POSSIBLE FILL)	Topsoil - 4"	1	10		1-1-2	3
	D		Groundwater was not encountered while drilling	2	12		2-2-3	5
405 / 5	D			3	14		3-3-4	7
	D	Some gravel (USDA: Loamy Sand)	Boring backfilled 24-hours after completion	4	12		4-10-10	20
400 / 10		Bottom of boring at 10.0 feet						
395 / 15								
390 / 20								
385 / 25								
380 / 30								

SPT N (blows/ft) scale: 10, 30, 50

SAMPLER TYPE
DRIVEN SPLIT SPOON UNLESS OTHERWISE
PT - PRESSED SHELBY TUBE
CA - CONTINUOUS FLIGHT AUGER
RC - ROCK CORE

SAMPLE CONDITIONS
D - DISINTEGRATED
I - INTACT
U - UNDISTURBED
L - LOST

	GROUND WATER	CAVE IN DEPTH
AT COMPLETION	DRY ft.	8.0 ft.
AFTER 24 HRS.	DRY ft.	8.0 ft.
AFTER ____ HRS.	____ ft.	____ ft.

BORING METHOD
HSA - HOLLOW STEM AUGERS
CFA - CONTINUOUS FLIGHT AUGERS
DC - DRIVING CASING
MD - MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" O.D. SAMPLER 1' WITH 140# HAMMER FALLING 30": COUNT MADE AT 6" INTERVALS.

HILLIS - CARNES ENGINEERING ASSOCIATES, INC.

RECORD OF SOIL EXPLORATION

Project Name: **Burtonsville Elementary School** Boring No.: B-8A

Location: Burtonsville, MD Job #: 24033A

SAMPLER

Datum: NAD83 / NAVD88 Hammer Wt.: 140 lbs. Hole Diameter: 3.25 in. Foreman: J. Russell

Surf. Elev.: 410.70 ft Hammer Drop: 30 in. Rock Core Diameter: N/A Inspector:

Date Started: 5-15-24 Pipe Size (O.D.): 2 in. Boring Method: HSA Date Completed: 5-15-24

Elevation/ Depth (ft)	SOIL SYMBOLS/ SAMPLE CONDITIONS	Description	Boring and Sampling Notes	Sample No.	Rec. (in)	NM (%)	SPT Blows	SPT N (blows/ft) N	SPT N (blows/ft) 10 30 50
410 / 0		Continuous Flight Augered to 13.5 ft	Topsoil - 3"						
			Boring Offset form Boring B-8						
405 / 5			Groundwater was encountered at 13.0 feet while drilling						
400 / 10									
	D	Yellowish-light brown, wet, loose, fine SAND, trace off-white silt pockets (SP)		1	18		2-2-3	5	●
395 / 15		Bottom of Boring at 15 ft							
390 / 20									
385 / 25									
380 / 30									

SAMPLER TYPE
DRIVEN SPLIT SPOON UNLESS OTHERWISE
PT - PRESSED SHELBY TUBE
CA - CONTINUOUS FLIGHT AUGER
RC - ROCK CORE

SAMPLE CONDITIONS
D - DISINTEGRATED
I - INTACT
U - UNDISTURBED
L - LOST

	GROUND WATER	CAVE IN DEPTH
AT COMPLETION	DRY ft.	9.0 ft.
AFTER 24 HRS.	ft.	ft.
AFTER ____ HRS.	ft.	ft.

BORING METHOD
HSA - HOLLOW STEM AUGERS
CFA - CONTINUOUS FLIGHT AUGERS
DC - DRIVING CASING
MD - MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" O.D. SAMPLER 1' WITH 140# HAMMER FALLING 30": COUNT MADE AT 6" INTERVALS.

HILLIS - CARNES ENGINEERING ASSOCIATES, INC.

RECORD OF SOIL EXPLORATION

Project Name: **Burtonsville Elementary School** Boring No.: B-9

Location: Burtonsville, MD Job #: 24033A

SAMPLER

Datum: NAD83 / NAVD88 Hammer Wt.: 140 lbs. Hole Diameter: 3.25 in. Foreman: J. Russell

Surf. Elev.: 408.85 ft Hammer Drop: 30 in. Rock Core Diameter: N/A Inspector:

Date Started: 2-1-2024 Pipe Size (O.D.): 2 in. Boring Method: HSA Date Completed: 2-1-2024

Elevation/ Depth (ft)	SOIL SYMBOLS/ SAMPLE CONDITIONS	Description	Boring and Sampling Notes	Sample No.	Rec. (in)	NM (%)	SPT Blows	SPT N (blows/ft) N
0 / 405	D	Brown, moist, medium dense, clayey SAND with some gravel (SC; FILL)	Topsoil - 3"	1	14		3-5-9	14
5 / 400	D	Brown, light brown, and dark gray, moist, medium dense, silty clayey SAND with trace organics and gravel (SC-SM; FILL)	Groundwater was not encountered while drilling	2	15		4-7-12	19
	D	Brown		3	12		6-7-11	18
10 / 395	D	Gray, moist, very dense, silty SAND and GRAVEL (SM/GM; FILL)	Boring backfilled 24-hours after completion	4	14		7-45-23	68
15 / 390		Bottom of boring at 10.0 feet						
20 / 385								
25 / 380								
30 / 375								

SPT N (blows/ft) scale: 10, 30, 50

SAMPLER TYPE
DRIVEN SPLIT SPOON UNLESS OTHERWISE
PT - PRESSED SHELBY TUBE
CA - CONTINUOUS FLIGHT AUGER
RC - ROCK CORE

SAMPLE CONDITIONS
D - DISINTEGRATED
I - INTACT
U - UNDISTURBED
L - LOST

	GROUND WATER	CAVE IN DEPTH
AT COMPLETION	DRY ft.	8.5 ft.
AFTER 24 HRS.	DRY ft.	8.0 ft.
AFTER ____ HRS.	____ ft.	____ ft.

BORING METHOD
HSA - HOLLOW STEM AUGERS
CFA - CONTINUOUS FLIGHT AUGERS
DC - DRIVING CASING
MD - MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" O.D. SAMPLER 1' WITH 140# HAMMER FALLING 30": COUNT MADE AT 6" INTERVALS.

HILLIS - CARNES ENGINEERING ASSOCIATES, INC.

RECORD OF SOIL EXPLORATION

Project Name: **Burtonsville Elementary School** | Boring No.: B-10

Location: Burtonsville, MD | Job #: 24033A

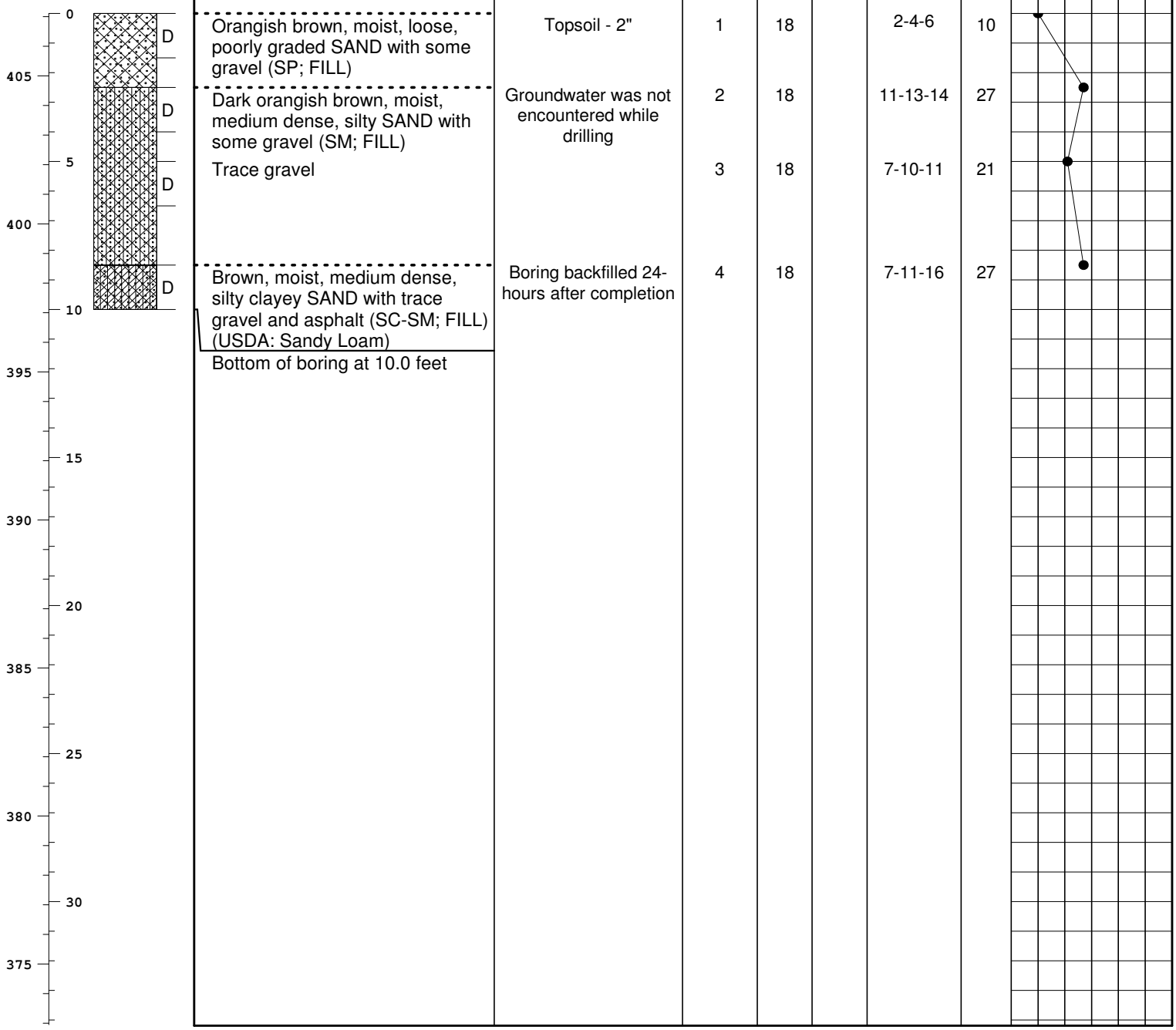
SAMPLER

Datum: NAD83 / NAVD88 | Hammer Wt.: 140 lbs. | Hole Diameter: 3.25 in. | Foreman: J. Russell

Surf. Elev.: 407.11 ft | Hammer Drop: 30 in. | Rock Core Diameter: N/A | Inspector:

Date Started: 1-30-2024 | Pipe Size (O.D.): 2 in. | Boring Method: HSA | Date Completed: 1-30-2024

Elevation/ Depth (ft)	SOIL SYMBOLS/ SAMPLE CONDITIONS	Description	Boring and Sampling Notes	Sample No.	Rec. (in)	NM (%)	SPT Blows	SPT N (blows/ft) N
0 / 407	D	Orangish brown, moist, loose, poorly graded SAND with some gravel (SP; FILL)	Topsoil - 2"	1	18		2-4-6	10
5 / 402	D	Dark orangish brown, moist, medium dense, silty SAND with some gravel (SM; FILL)	Groundwater was not encountered while drilling	2	18		11-13-14	27
	D	Trace gravel		3	18		7-10-11	21
10 / 397	D	Brown, moist, medium dense, silty clayey SAND with trace gravel and asphalt (SC-SM; FILL) (USDA: Sandy Loam)	Boring backfilled 24-hours after completion	4	18		7-11-16	27
		Bottom of boring at 10.0 feet						



SAMPLER TYPE
DRIVEN SPLIT SPOON UNLESS OTHERWISE
PT - PRESSED SHELBY TUBE
CA - CONTINUOUS FLIGHT AUGER
RC - ROCK CORE

SAMPLE CONDITIONS
D - DISINTEGRATED
I - INTACT
U - UNDISTURBED
L - LOST

	GROUND WATER	CAVE IN DEPTH
AT COMPLETION	DRY ft.	7.0 ft.
AFTER 24 HRS.	DRY ft.	7.0 ft.
AFTER ____ HRS.	____ ft.	____ ft.

BORING METHOD
HSA - HOLLOW STEM AUGERS
CFA - CONTINUOUS FLIGHT AUGERS
DC - DRIVING CASING
MD - MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" O.D. SAMPLER 1' WITH 140# HAMMER FALLING 30": COUNT MADE AT 6" INTERVALS.

HILLIS - CARNES ENGINEERING ASSOCIATES, INC.

RECORD OF SOIL EXPLORATION

Project Name: **Burtonsville Elementary School** Boring No.: B-11

Location: Burtonsville, MD Job #: 24033A

SAMPLER

Datum: NAD83 / NAVD88 Hammer Wt.: 140 lbs. Hole Diameter: 3.25 in. Foreman: J. Russell

Surf. Elev.: 407.00 ft Hammer Drop: 30 in. Rock Core Diameter: N/A Inspector:

Date Started: 1-30-2024 Pipe Size (O.D.): 2 in. Boring Method: HSA Date Completed: 1-30-2024

Elevation/ Depth (ft)	SOIL SYMBOLS/ SAMPLE CONDITIONS	Description	Boring and Sampling Notes	Sample No.	Rec. (in)	NM (%)	SPT Blows	SPT N (blows/ft) N
0 / 405	D	Brown, moist, loose, clayey SAND with some gravel (SC; FILL)	Topsoil -	1	18		5-5-5	10
	D	Brown and dark gray, moist, medium stiff, sandy CLAY with some gravel and organics (CL; FILL)	Groundwater was not encountered while drilling	2	18		4-3-4	7
5 / 400	D	Trace organics		3	8		3-3-5	8
	D	Dark orangish brown, moist, medium dense, silty SAND with some gravel and trace asphalt (SM; FILL)	Boring backfilled 24-hours after completion	4	18		11-13-15	28
10 / 395		Bottom of boring at 10.0 feet						
15 / 390								
20 / 385								
25 / 380								
30 / 375								

SPT N (blows/ft) scale: 10, 30, 50

SAMPLER TYPE
DRIVEN SPLIT SPOON UNLESS OTHERWISE
PT - PRESSED SHELBY TUBE
CA - CONTINUOUS FLIGHT AUGER
RC - ROCK CORE

SAMPLE CONDITIONS
D - DISINTEGRATED
I - INTACT
U - UNDISTURBED
L - LOST

	GROUND WATER	CAVE IN DEPTH
AT COMPLETION	DRY ft.	7.4 ft.
AFTER 24 HRS.	DRY ft.	7.6 ft.
AFTER ____ HRS.	____ ft.	____ ft.

BORING METHOD
HSA - HOLLOW STEM AUGERS
CFA - CONTINUOUS FLIGHT AUGERS
DC - DRIVING CASING
MD - MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" O.D. SAMPLER 1' WITH 140# HAMMER FALLING 30": COUNT MADE AT 6" INTERVALS.

HILLIS - CARNES ENGINEERING ASSOCIATES, INC.

RECORD OF SOIL EXPLORATION

Project Name: **Burtonsville Elementary School** Boring No.: B-12

Location: Burtonsville, MD Job #: 24033A

SAMPLER

Datum: NAD83 / NAVD88 Hammer Wt.: 140 lbs. Hole Diameter: 3.25 in. Foreman: J. Russell

Surf. Elev.: 405.35 ft Hammer Drop: 30 in. Rock Core Diameter: N/A Inspector:

Date Started: 2-1-2024 Pipe Size (O.D.): 2 in. Boring Method: HSA Date Completed: 2-1-2024

Elevation/ Depth (ft)	SOIL SYMBOLS/ SAMPLE CONDITIONS	Description	Boring and Sampling Notes	Sample No.	Rec. (in)	NM (%)	SPT Blows	SPT N (blows/ft) N	SPT N (blows/ft) 10 30 50
405 / 0	D	Brown, moist, medium stiff to stiff, sandy CLAY with some gravel (CL; FILL)	Topsoil - 3"	1	12		3-4-5	9	
	D	Grayish brown	Groundwater was not encountered while drilling	2	14		4-4-7	11	
400 / 5	D			3	12		4-4-5	9	
	D	Trace brick fragments	Boring backfilled 24-hours after completion	4	14		2-5-7	12	
395 / 10		Bottom of boring at 10.0 feet							
390 / 15									
385 / 20									
380 / 25									
375 / 30									

SAMPLER TYPE
DRIVEN SPLIT SPOON UNLESS OTHERWISE
PT - PRESSED SHELBY TUBE
CA - CONTINUOUS FLIGHT AUGER
RC - ROCK CORE

SAMPLE CONDITIONS
D - DISINTEGRATED
I - INTACT
U - UNDISTURBED
L - LOST

	GROUND WATER		CAVE IN DEPTH	
AT COMPLETION	DRY	ft.	8.5	ft.
AFTER 24 HRS.	DRY	ft.	7.6	ft.
AFTER ____ HRS.		ft.		ft.

BORING METHOD
HSA - HOLLOW STEM AUGERS
CFA - CONTINUOUS FLIGHT AUGERS
DC - DRIVING CASING
MD - MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" O.D. SAMPLER 1' WITH 140# HAMMER FALLING 30": COUNT MADE AT 6" INTERVALS.

HILLIS - CARNES ENGINEERING ASSOCIATES, INC.

RECORD OF SOIL EXPLORATION

Project Name: **Burtonsville Elementary School** Boring No.: B-13

Location: Burtonsville, MD Job #: 24033A

SAMPLER

Datum: NAD83 / NAVD88 Hammer Wt.: 140 lbs. Hole Diameter: 3.25 in. Foreman: J. Russell

Surf. Elev.: 404.91 ft Hammer Drop: 30 in. Rock Core Diameter: N/A Inspector:

Date Started: 1-30-2024 Pipe Size (O.D.): 2 in. Boring Method: HSA Date Completed: 1-30-2024

Elevation/ Depth (ft)	SOIL SYMBOLS/ SAMPLE CONDITIONS	Description	Boring and Sampling Notes	Sample No.	Rec. (in)	NM (%)	SPT Blows	SPT N (blows/ft) N	SPT N (blows/ft) 10 30 50
0	D	Brownish gray, moist, stiff, sandy CLAY with some gravel and trace organics (CL; FILL)	Topsoil - 2"	1	8		4-6-10	16	
	D	Brown, moist, medium dense, clayey SAND with some gravel and trace organics (SC; FILL)	Groundwater was not encountered while drilling	2	18		4-6-6	12	
400 5	D	Brown, moist, stiff, sandy CLAY with some gravel and trace organics (CL; FILL)		3	14		4-5-7	12	
	D	Light brown and light reddish brown, moist, medium dense, clayey SAND with some gravel (SC; POSSIBLE FILL)	Boring backfilled 24-hours after completion	4	18		5-6-9	15	
395 10		Bottom of boring at 10.0 feet							
390 15									
385 20									
380 25									
375 30									

SAMPLER TYPE
DRIVEN SPLIT SPOON UNLESS OTHERWISE
PT - PRESSED SHELBY TUBE
CA - CONTINUOUS FLIGHT AUGER
RC - ROCK CORE

SAMPLE CONDITIONS
D - DISINTEGRATED
I - INTACT
U - UNDISTURBED
L - LOST

	GROUND WATER		CAVE IN DEPTH	
AT COMPLETION	DRY	ft.	7.0	ft.
AFTER 24 HRS.	DRY	ft.	7.0	ft.
AFTER ____ HRS.		ft.		ft.

BORING METHOD
HSA - HOLLOW STEM AUGERS
CFA - CONTINUOUS FLIGHT AUGERS
DC - DRIVING CASING
MD - MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" O.D. SAMPLER 1' WITH 140# HAMMER FALLING 30": COUNT MADE AT 6" INTERVALS.

HILLIS - CARNES
ENGINEERING ASSOCIATES, INC.

RECORD OF SOIL EXPLORATION

Project Name: **Burtonsville Elementary School** | Boring No.: B-14

Location: Burtonsville, MD | Job #: 24033A

SAMPLER

Datum: NAD83 / NAVD88 | Hammer Wt.: 140 lbs. | Hole Diameter: 3.25 in. | Foreman: J. Russell

Surf. Elev.: 405.43 ft | Hammer Drop: 30 in. | Rock Core Diameter: N/A | Inspector:

Date Started: 1-30-2024 | Pipe Size (O.D.): 2 in. | Boring Method: HSA | Date Completed: 1-30-2024

Elevation/ Depth (ft)	SOIL SYMBOLS/ SAMPLE CONDITIONS	Description	Boring and Sampling Notes	Sample No.	Rec. (in)	NM (%)	SPT Blows	SPT N (blows/ft) N	SPT N (blows/ft) 10 30 50
405 / 0	D	Brown, moist, loose, clayey SAND with some gravel (SC; FILL)	Topsoil - 3"	1	16		3-4-5	9	
	D	Brownish gray, moist, stiff, sandy silty CLAY with some gravel and trace organics (CL; FILL)	Groundwater was not encountered while drilling	2	18		5-5-6	11	
400 / 5	D	Orangish brown, moist, loose to medium dense, silty clayey SAND (SC-SM)		3	12		3-4-3	7	
	D	(USDA: Sandy Loam)	Boring backfilled 24-hours after completion	4	18		4-6-6	12	
395 / 10		Bottom of boring at 10.0 feet							
390 / 15									
385 / 20									
380 / 25									
375 / 30									

SAMPLER TYPE
DRIVEN SPLIT SPOON UNLESS OTHERWISE
PT - PRESSED SHELBY TUBE
CA - CONTINUOUS FLIGHT AUGER
RC - ROCK CORE

SAMPLE CONDITIONS
D - DISINTEGRATED
I - INTACT
U - UNDISTURBED
L - LOST

	GROUND WATER		CAVE IN DEPTH	
AT COMPLETION	DRY	ft.	7.3	ft.
AFTER 24 HRS.	DRY	ft.	7.3	ft.
AFTER ____ HRS.		ft.		ft.

BORING METHOD
HSA - HOLLOW STEM AUGERS
CFA - CONTINUOUS FLIGHT AUGERS
DC - DRIVING CASING
MD - MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" O.D. SAMPLER 1' WITH 140# HAMMER FALLING 30": COUNT MADE AT 6" INTERVALS.

HILLIS - CARNES
ENGINEERING ASSOCIATES, INC.

RECORD OF SOIL EXPLORATION

Project Name: **Burtonsville Elementary School** Boring No.: B-15

Location: Burtonsville, MD Job #: 24033A

SAMPLER

Datum: NAD83 / NAVD88 Hammer Wt.: 140 lbs. Hole Diameter: 3.25 in. Foreman: J. Russell

Surf. Elev.: 400.35 ft Hammer Drop: 30 in. Rock Core Diameter: N/A Inspector:

Date Started: 1-30-2024 Pipe Size (O.D.): 2 in. Boring Method: HSA Date Completed: 1-30-2024

Elevation/ Depth (ft)	SOIL SYMBOLS/ SAMPLE CONDITIONS	Description	Boring and Sampling Notes	Sample No.	Rec. (in)	NM (%)	SPT Blows	SPT N (blows/ft) N	SPT N (blows/ft) 10 30 50
400 / 0	D	Brown, moist, medium stiff, sandy CLAY with some gravel and trace organics (CL; FILL)	Topsoil - 4"	1	6		2-3-4	7	
	D	Grayish brown	Groundwater was not encountered while drilling	2	18		2-3-5	8	
395 / 5	D			3	18		2-3-5	8	
	D	Brown and light reddish brown. moist, medium dense, clayey SAND with some gravel (SC; POSSIBLE FILL) (USDA: Sandy Loam)	Boring backfilled 24-hours after completion	4	12		3-5-8	13	
390 / 10		Bottom of boring at 10.0 feet							
385 / 15									
380 / 20									
375 / 25									
370 / 30									

SAMPLER TYPE
DRIVEN SPLIT SPOON UNLESS OTHERWISE
PT - PRESSED SHELBY TUBE
CA - CONTINUOUS FLIGHT AUGER
RC - ROCK CORE

SAMPLE CONDITIONS
D - DISINTEGRATED
I - INTACT
U - UNDISTURBED
L - LOST

	GROUND WATER	CAVE IN DEPTH
AT COMPLETION	DRY ft.	8.0 ft.
AFTER 24 HRS.	DRY ft.	8.0 ft.
AFTER ____ HRS.	____ ft.	____ ft.

BORING METHOD
HSA - HOLLOW STEM AUGERS
CFA - CONTINUOUS FLIGHT AUGERS
DC - DRIVING CASING
MD - MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" O.D. SAMPLER 1' WITH 140# HAMMER FALLING 30": COUNT MADE AT 6" INTERVALS.

HILLIS - CARNES ENGINEERING ASSOCIATES, INC.

RECORD OF SOIL EXPLORATION

Project Name: **Burtonsville Elementary School** | Boring No.: S-1

Location: Burtonsville, MD | Job #: 24033A

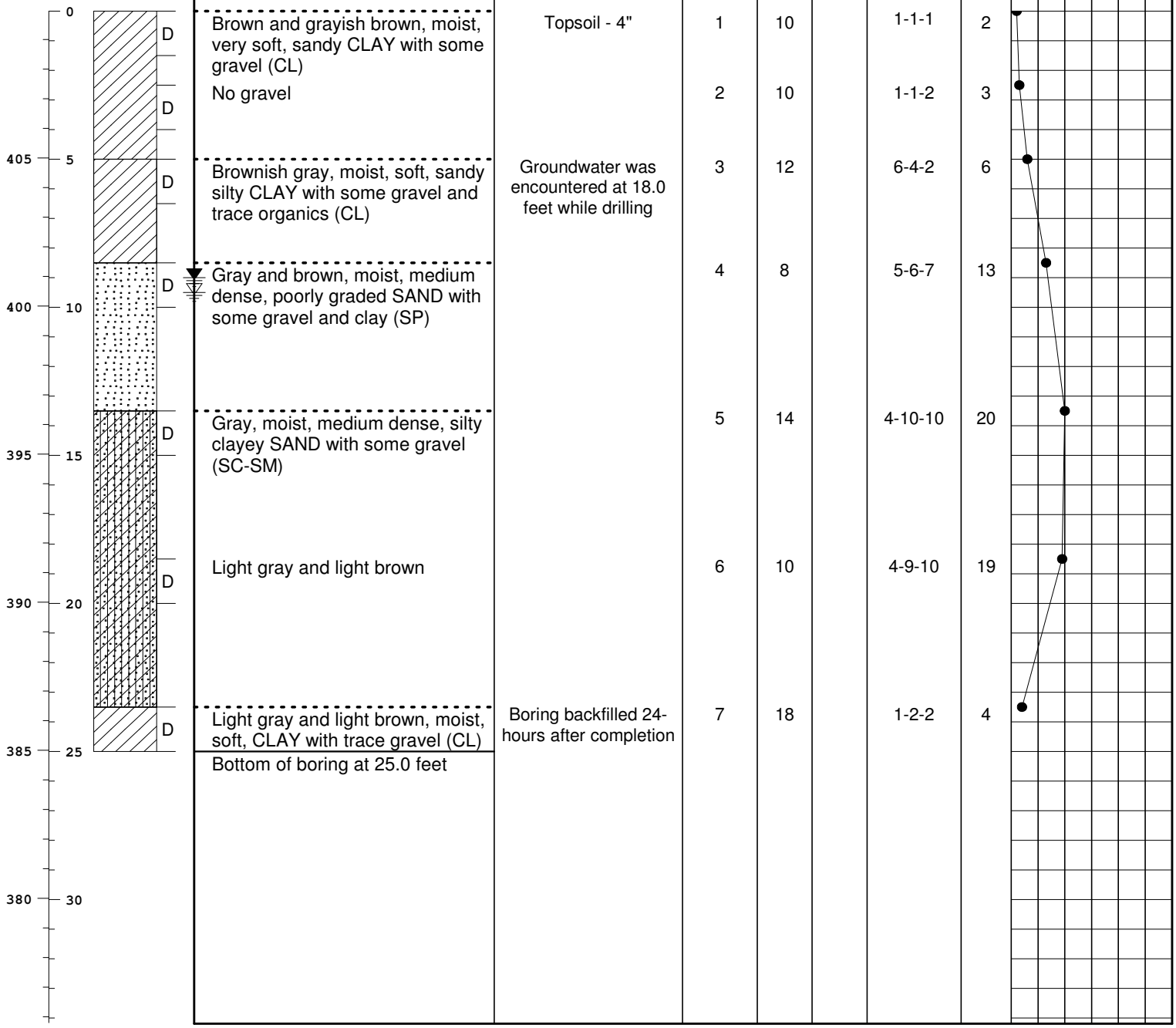
SAMPLER

Datum: NAD83 / NAVD88 | Hammer Wt.: 140 lbs. | Hole Diameter: 3.25 in. | Foreman: J. Russell

Surf. Elev.: 409.96 ft | Hammer Drop: 30 in. | Rock Core Diameter: N/A | Inspector:

Date Started: 1-29-2024 | Pipe Size (O.D.): 2 in. | Boring Method: HSA | Date Completed: 1-29-2024

Elevation/ Depth (ft)	SOIL SYMBOLS/ SAMPLE CONDITIONS	Description	Boring and Sampling Notes	Sample No.	Rec. (in)	NM (%)	SPT Blows	SPT N (blows/ft) N
0	D	Brown and grayish brown, moist, very soft, sandy CLAY with some gravel (CL)	Topsoil - 4"	1	10		1-1-1	2
	D	No gravel		2	10		1-1-2	3
405 — 5	D	Brownish gray, moist, soft, sandy silty CLAY with some gravel and trace organics (CL)	Groundwater was encountered at 18.0 feet while drilling	3	12		6-4-2	6
	D	Gray and brown, moist, medium dense, poorly graded SAND with some gravel and clay (SP)		4	8		5-6-7	13
400 — 10								
	D	Gray, moist, medium dense, silty clayey SAND with some gravel (SC-SM)		5	14		4-10-10	20
395 — 15								
	D	Light gray and light brown		6	10		4-9-10	19
390 — 20								
	D	Light gray and light brown, moist, soft, CLAY with trace gravel (CL)	Boring backfilled 24-hours after completion	7	18		1-2-2	4
385 — 25		Bottom of boring at 25.0 feet						
380 — 30								



SAMPLER TYPE
DRIVEN SPLIT SPOON UNLESS OTHERWISE
PT - PRESSED SHELBY TUBE
CA - CONTINUOUS FLIGHT AUGER
RC - ROCK CORE

SAMPLE CONDITIONS
D - DISINTEGRATED
I - INTACT
U - UNDISTURBED
L - LOST

	GROUND WATER		CAVE IN DEPTH	
AT COMPLETION	9.5	ft.	10.5	ft.
AFTER 24 HRS.	9.0	ft.	11.0	ft.
AFTER ____ HRS.		ft.		ft.

BORING METHOD
HSA - HOLLOW STEM AUGERS
CFA - CONTINUOUS FLIGHT AUGERS
DC - DRIVING CASING
MD - MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" O.D. SAMPLER 1' WITH 140# HAMMER FALLING 30": COUNT MADE AT 6" INTERVALS.

HILLIS - CARNES ENGINEERING ASSOCIATES, INC.

RECORD OF SOIL EXPLORATION

Project Name: **Burtonsville Elementary School** Boring No.: S-2

Location: Burtonsville, MD Job #: 24033A

SAMPLER

Datum: NAD83 / NAVD88 Hammer Wt.: 140 lbs. Hole Diameter: 3.25 in. Foreman: J. Russell

Surf. Elev.: 409.23 ft Hammer Drop: 30 in. Rock Core Diameter: N/A Inspector:

Date Started: 2-1-2024 Pipe Size (O.D.): 2 in. Boring Method: HSA Date Completed: 2-1-2024

Elevation/ Depth (ft)	SOIL SYMBOLS/ SAMPLE CONDITIONS	Description	Boring and Sampling Notes	Sample No.	Rec. (in)	NM (%)	SPT Blows	SPT N (blows/ft) N
409.23 / 0	D	Brown, moist, very loose, clayey SAND with some gravel (SC)	Topsoil - 2"	1	10		1-1-1	2
	D	Brown, moist, soft to medium stiff, sandy CLAY with some gravel (CL)		2	10		1-2-3	5
405 / 5	D	Brownish gray, trace organics	Groundwater was encountered at 20.0 feet while drilling	3	14		2-2-4	6
400 / 10	D	Orangish brown, moist, medium dense, silty SAND with trace gravel (SM)		4	15		6-6-5	11
395 / 15	D	Brown and gray, moist, very stiff, elastic SILT with trace sand (MH)		5	15		4-7-12	19
390 / 20	D	Orangish brown, moist, loose, silty clayey SAND with trace gravel (SC-SM)		6	10		4-4-4	8
385 / 25	D	Light brown, moist, medium stiff, CLAY with trace gravel (CL)	Boring backfilled 24-hours after completion	7	14		4-3-5	8
380 / 30		Bottom of boring at 25.0 feet						

SPT N (blows/ft) scale: 10, 30, 50

SAMPLER TYPE

DRIVEN SPLIT SPOON UNLESS OTHERWISE
PT - PRESSED SHELBY TUBE
CA - CONTINUOUS FLIGHT AUGER
RC - ROCK CORE

SAMPLE CONDITIONS

D - DISINTEGRATED
I - INTACT
U - UNDISTURBED
L - LOST

	GROUND WATER		CAVE IN DEPTH	
AT COMPLETION	21.0	ft.	22.0	ft.
AFTER 24 HRS.	20.0	ft.	21.0	ft.
AFTER ____ HRS.		ft.		ft.

BORING METHOD

HSA - HOLLOW STEM AUGERS
CFA - CONTINUOUS FLIGHT AUGERS
DC - DRIVING CASING
MD - MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" O.D. SAMPLER 1' WITH 140# HAMMER FALLING 30": COUNT MADE AT 6" INTERVALS.

HILLIS - CARNES
ENGINEERING ASSOCIATES, INC.

RECORD OF SOIL EXPLORATION

Project Name: **Burtonsville Elementary School** Boring No.: S-3

Location: Burtonsville, MD Job #: 24033A

SAMPLER

Datum: NAD83 / NAVD88 Hammer Wt.: 140 lbs. Hole Diameter: 3.25 in. Foreman: J. Russell

Surf. Elev.: 408.73 ft Hammer Drop: 30 in. Rock Core Diameter: N/A Inspector:

Date Started: 1-31-2024 Pipe Size (O.D.): 2 in. Boring Method: HSA Date Completed: 1-31-2024

Elevation/ Depth (ft)	SOIL SYMBOLS/ SAMPLE CONDITIONS	Description	Boring and Sampling Notes	Sample No.	Rec. (in)	NM (%)	SPT Blows	SPT N (blows/ft) N
0 / 405	D	Brown and light reddish brown, moist, loose to medium dense, clayey SAND with some gravel (SC; FILL)	Topsoil - 3"	1	12		3-3-5	8
	D			2	12		3-5-6	11
5 / 400	D		Groundwater was encountered at 18.0 feet while drilling	3	12		4-8-14	22
	D	Brown, moist, medium dense, clayey SAND with trace gravel (SC)		4	14		4-4-7	11
10 / 395	D	Some gravel		5	14		7-9-6	15
15 / 390	D	Light brown, moist, very soft, sandy CLAY with trace gravel (CL)		6	12		1-1-1	2
20 / 385	D	Orangish brown, moist, dense, clayey SAND with some gravel (SC)	Boring backfilled 24-hours after completion	7	10		3-17-22	39
25 / 380		Bottom of boring at 25.0 feet						
30 / 375								

SPT N (blows/ft) scale: 10, 30, 50

SAMPLER TYPE
DRIVEN SPLIT SPOON UNLESS OTHERWISE
PT - PRESSED SHELBY TUBE
CA - CONTINUOUS FLIGHT AUGER
RC - ROCK CORE

SAMPLE CONDITIONS
D - DISINTEGRATED
I - INTACT
U - UNDISTURBED
L - LOST

	GROUND WATER	CAVE IN DEPTH
AT COMPLETION	20.0 ft.	21.5 ft.
AFTER 24 HRS.	19.0 ft.	20.0 ft.
AFTER ____ HRS.	____ ft.	____ ft.

BORING METHOD
HSA - HOLLOW STEM AUGERS
CFA - CONTINUOUS FLIGHT AUGERS
DC - DRIVING CASING
MD - MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" O.D. SAMPLER 1' WITH 140# HAMMER FALLING 30": COUNT MADE AT 6" INTERVALS.

HILLIS - CARNES
ENGINEERING ASSOCIATES, INC.

RECORD OF SOIL EXPLORATION

Project Name: **Burtonsville Elementary School** Boring No.: S-4

Location: Burtonsville, MD Job #: 24033A

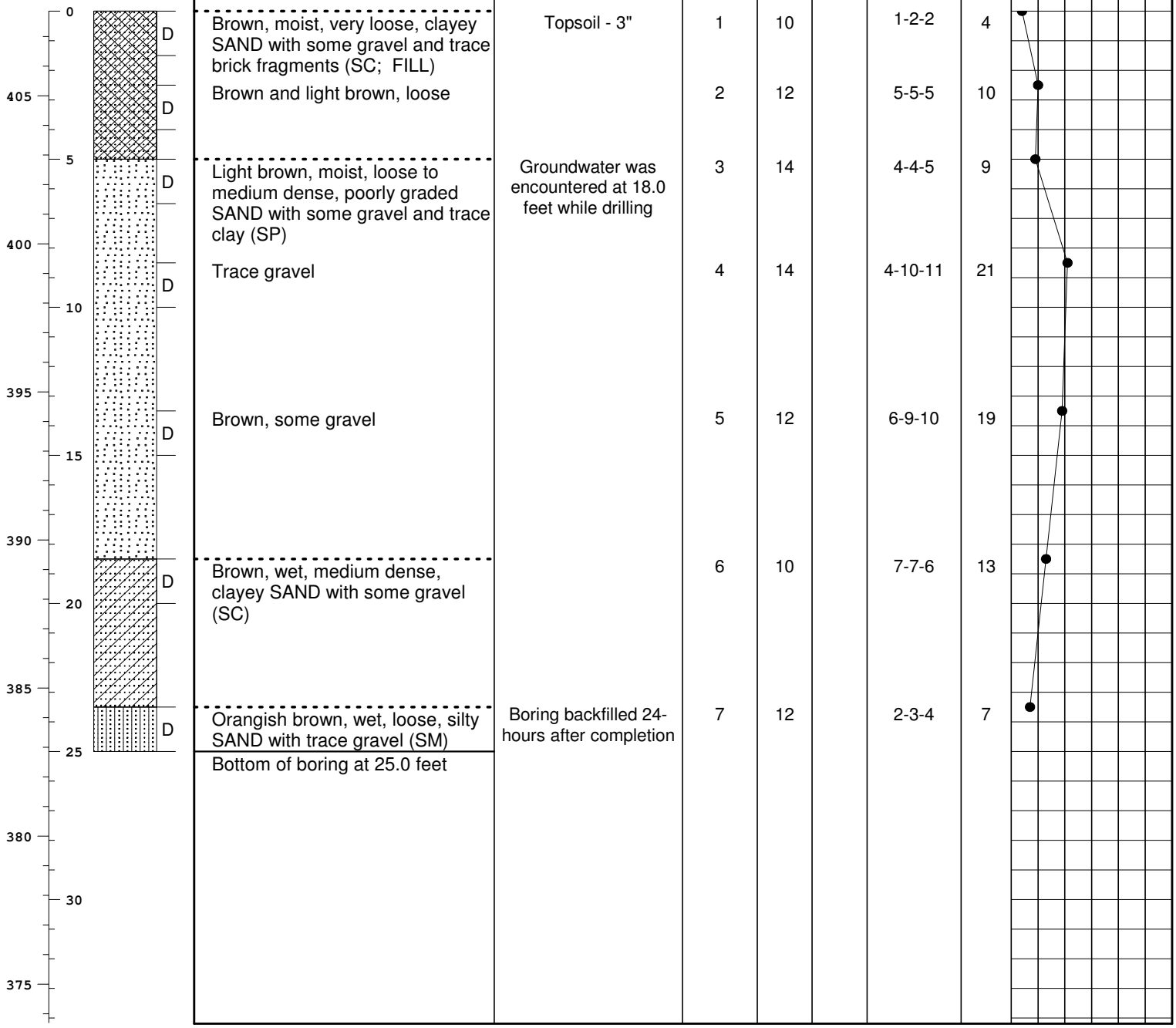
SAMPLER

Datum: NAD83 / NAVD88 Hammer Wt.: 140 lbs. Hole Diameter: 3.25 in. Foreman: J. Russell

Surf. Elev.: 407.86 ft Hammer Drop: 30 in. Rock Core Diameter: N/A Inspector:

Date Started: 1-31-2024 Pipe Size (O.D.): 2 in. Boring Method: HSA Date Completed: 1-31-2024

Elevation/ Depth (ft)	SOIL SYMBOLS/ SAMPLE CONDITIONS	Description	Boring and Sampling Notes	Sample No.	Rec. (in)	NM (%)	SPT Blows	SPT N (blows/ft) N
0 / 407.86	D	Brown, moist, very loose, clayey SAND with some gravel and trace brick fragments (SC; FILL)	Topsoil - 3"	1	10		1-2-2	4
405	D	Brown and light brown, loose		2	12		5-5-5	10
5	D	Light brown, moist, loose to medium dense, poorly graded SAND with some gravel and trace clay (SP)	Groundwater was encountered at 18.0 feet while drilling	3	14		4-4-5	9
400	D	Trace gravel		4	14		4-10-11	21
10								
395	D	Brown, some gravel		5	12		6-9-10	19
15								
390	D	Brown, wet, medium dense, clayey SAND with some gravel (SC)		6	10		7-7-6	13
20								
385	D	Orangish brown, wet, loose, silty SAND with trace gravel (SM)	Boring backfilled 24-hours after completion	7	12		2-3-4	7
25		Bottom of boring at 25.0 feet						
380								
30								
375								



SAMPLER TYPE
DRIVEN SPLIT SPOON UNLESS OTHERWISE
PT - PRESSED SHELBY TUBE
CA - CONTINUOUS FLIGHT AUGER
RC - ROCK CORE

SAMPLE CONDITIONS
D - DISINTEGRATED
I - INTACT
U - UNDISTURBED
L - LOST

	GROUND WATER		CAVE IN DEPTH	
AT COMPLETION	DRY	ft.	17.0	ft.
AFTER 24 HRS.	DRY	ft.	14.0	ft.
AFTER ____ HRS.		ft.		ft.

BORING METHOD
HSA - HOLLOW STEM AUGERS
CFA - CONTINUOUS FLIGHT AUGERS
DC - DRIVING CASING
MD - MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" O.D. SAMPLER 1' WITH 140# HAMMER FALLING 30": COUNT MADE AT 6" INTERVALS.

HILLIS - CARNES ENGINEERING ASSOCIATES, INC.

RECORD OF SOIL EXPLORATION

Project Name: **Burtonsville Elementary School** Boring No.: S-5

Location: Burtonsville, MD Job #: 24033A

SAMPLER

Datum: NAD83 / NAVD88 Hammer Wt.: 140 lbs. Hole Diameter: 3.25 in. Foreman: J. Russell

Surf. Elev.: 408.39 ft Hammer Drop: 30 in. Rock Core Diameter: N/A Inspector:

Date Started: 2-1-2024 Pipe Size (O.D.): 2 in. Boring Method: HSA Date Completed: 2-1-2024

Elevation/ Depth (ft)	SOIL SYMBOLS/ SAMPLE CONDITIONS	Description	Boring and Sampling Notes	Sample No.	Rec. (in)	NM (%)	SPT Blows	SPT N (blows/ft) N
0 / 405	D	Brown, moist, very loose, clayey SAND with trace gravel (SC; POSSIBLE FILL)	Topsoil - 3"	1	10		1-2-2	4
	D	Brown, moist, medium dense, silty SAND with some gravel (SM; POSSIBLE FILL)		2	12		3-6-11	17
5 / 400	D	Brown, moist, medium dense, silty clayey SAND with some gravel (SC-SM; POSSIBLE FILL)	Groundwater was encountered at 15.0 feet while drilling	3	10		6-8-12	20
	D	Orangish brown, moist, loose to medium dense, silty SAND (SM)		4	14		4-6-6	12
10 / 395	D	Wet		5	14		3-4-3	7
15 / 390	D			6	14		2-2-3	5
20 / 385	D	Light brown and light gray, moist, medium stiff, CLAY (CL)	Boring backfilled 24-hours after completion	7	18		2-3-5	8
25 / 380		Bottom of boring at 25.0 feet						
30 / 375								

SPT N (blows/ft) scale: 10, 30, 50

SAMPLER TYPE
DRIVEN SPLIT SPOON UNLESS OTHERWISE
PT - PRESSED SHELBY TUBE
CA - CONTINUOUS FLIGHT AUGER
RC - ROCK CORE

SAMPLE CONDITIONS
D - DISINTEGRATED
I - INTACT
U - UNDISTURBED
L - LOST

	GROUND WATER		CAVE IN DEPTH	
AT COMPLETION	DRY	ft.	16.0	ft.
AFTER 24 HRS.	15.0	ft.	15.6	ft.
AFTER ____ HRS.		ft.		ft.

BORING METHOD
HSA - HOLLOW STEM AUGERS
CFA - CONTINUOUS FLIGHT AUGERS
DC - DRIVING CASING
MD - MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" O.D. SAMPLER 1' WITH 140# HAMMER FALLING 30": COUNT MADE AT 6" INTERVALS.

HILLIS - CARNES ENGINEERING ASSOCIATES, INC.

RECORD OF SOIL EXPLORATION

Project Name: **Burtonsville Elementary School** Boring No.: S-6

Location: Burtonsville, MD Job #: 24033A

SAMPLER

Datum: NAD83 / NAVD88 Hammer Wt.: 140 lbs. Hole Diameter: 3.25 in. Foreman: J. Russell

Surf. Elev.: 410.79 ft Hammer Drop: 30 in. Rock Core Diameter: N/A Inspector:

Date Started: 1-31-2024 Pipe Size (O.D.): 2 in. Boring Method: HSA Date Completed: 1-31-2024

Elevation/ Depth (ft)	SOIL SYMBOLS/ SAMPLE CONDITIONS	Description	Boring and Sampling Notes	Sample No.	Rec. (in)	NM (%)	SPT Blows	SPT N (blows/ft) N
410 / 0	D	Brown, moist, loose, clayey SAND with trace gravel and organics (SC; FILL)	Topsoil - 2"	1	10		2-2-3	5
	D	Light brown, moist, medium dense, silty SAND with some gravel (SM; FILL)		2	14		4-10-14	24
405 / 5	D	Reddish brown, moist, medium dense, clayey SAND with some gravel (SC; FILL)	Groundwater was encountered at 22.0 feet while drilling	3	14		5-7-10	17
	D	Brown and light brown		4	14		4-5-6	11
400 / 10	D	Dark brown		5	12		10-15-11	26
395 / 15	D	Orangish brown, wet, very loose to loose, silty SAND (SM)		6	15		1-1-3	4
390 / 20	D		Boring backfilled 24-hours after completion	7	12		3-4-4	8
385 / 25		Bottom of boring at 25.0 feet						
380 / 30								

SPT N (blows/ft) scale: 10, 30, 50

SAMPLER TYPE
DRIVEN SPLIT SPOON UNLESS OTHERWISE
PT - PRESSED SHELBY TUBE
CA - CONTINUOUS FLIGHT AUGER
RC - ROCK CORE

SAMPLE CONDITIONS
D - DISINTEGRATED
I - INTACT
U - UNDISTURBED
L - LOST

	GROUND WATER		CAVE IN DEPTH	
AT COMPLETION	DRY	ft.	18.0	ft.
AFTER 24 HRS.	DRY	ft.	18.3	ft.
AFTER ____ HRS.		ft.		ft.

BORING METHOD
HSA - HOLLOW STEM AUGERS
CFA - CONTINUOUS FLIGHT AUGERS
DC - DRIVING CASING
MD - MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" O.D. SAMPLER 1' WITH 140# HAMMER FALLING 30": COUNT MADE AT 6" INTERVALS.

HILLIS - CARNES
ENGINEERING ASSOCIATES, INC.

RECORD OF SOIL EXPLORATION

Project Name: **Burtonsville Elementary School** Boring No.: S-7

Location: Burtonsville, MD Job #: 24033A

SAMPLER

Datum: NAD83 / NAVD88 Hammer Wt.: 140 lbs. Hole Diameter: 3.25 in. Foreman: J. Russell

Surf. Elev.: 410.99 ft Hammer Drop: 30 in. Rock Core Diameter: N/A Inspector:

Date Started: 1-29-2024 Pipe Size (O.D.): 2 in. Boring Method: HSA Date Completed: 1-29-2024

Elevation/ Depth (ft)	SOIL SYMBOLS/ SAMPLE CONDITIONS	Description	Boring and Sampling Notes	Sample No.	Rec. (in)	NM (%)	SPT Blows	SPT N (blows/ft) N
0 / 410	D	Orangish brown, moist, very loose to loose, clayey SAND with trace gravel (SC)	Topsoil - 4"	1	10		2-2-2	4
	D			2	15		4-4-5	9
5 / 405	D	Brown, moist, medium dense, silty clayey SAND with some gravel (SC-SM)	Groundwater was encountered at 8.0 feet while drilling	3	12		5-7-9	16
	D	Trace organics		4	14		4-8-14	22
10 / 400	D	Orangish brown, wet, very loose to medium dense, silty SAND (SM)		5	14		6-6-5	11
15 / 395	D			6	10		1-2-2	4
20 / 390	D		Boring backfilled 24-hours after completion	7	15		3-4-4	8
25 / 385		Bottom of boring at 25.0 feet						
30 / 380								

SPT N (blows/ft) scale: 10, 30, 50

SAMPLER TYPE
DRIVEN SPLIT SPOON UNLESS OTHERWISE
PT - PRESSED SHELBY TUBE
CA - CONTINUOUS FLIGHT AUGER
RC - ROCK CORE

SAMPLE CONDITIONS
D - DISINTEGRATED
I - INTACT
U - UNDISTURBED
L - LOST

	GROUND WATER		CAVE IN DEPTH	
AT COMPLETION	8.0	ft.	9.0	ft.
AFTER 24 HRS.	4.0	ft.	5.0	ft.
AFTER ____ HRS.		ft.		ft.

BORING METHOD
HSA - HOLLOW STEM AUGERS
CFA - CONTINUOUS FLIGHT AUGERS
DC - DRIVING CASING
MD - MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" O.D. SAMPLER 1' WITH 140# HAMMER FALLING 30": COUNT MADE AT 6" INTERVALS.

HILLIS - CARNES ENGINEERING ASSOCIATES, INC.

RECORD OF SOIL EXPLORATION

Project Name: **Burtonsville Elementary School** Boring No.: S-8

Location: Burtonsville, MD Job #: 24033A

SAMPLER

Datum: NAD83 / NAVD88 Hammer Wt.: 140 lbs. Hole Diameter: 3.25 in. Foreman: J. Russell

Surf. Elev.: 411.41 ft Hammer Drop: 30 in. Rock Core Diameter: N/A Inspector:

Date Started: 1-29-2024 Pipe Size (O.D.): 2 in. Boring Method: HSA Date Completed: 1-29-2024

Elevation/ Depth (ft)	SOIL SYMBOLS/ SAMPLE CONDITIONS	Description	Boring and Sampling Notes	Sample No.	Rec. (in)	NM (%)	SPT Blows	SPT N (blows/ft) N
0 / 410	D	Light brown, moist, medium dense, clayey SAND with some gravel (SC)	Topsoil - 3"	1	10		2-2-4	6
	D	Brown, trace gravel		2	12		2-3-4	7
5 / 405	D	Brown, moist, medium stiff, sandy CLAY with some gravel (CL)	Groundwater was encountered at 18.0 feet while drilling	3	15		3-4-6	10
	D	Orangish brown, moist, loose to medium dense, silty SAND (SM)		4	17		7-7-10	17
10 / 400	D			5	14		4-5-8	13
15 / 395	D	Wet		6	12		4-5-6	11
20 / 390	D		Boring backfilled 24-hours after completion	7	10		4-5-5	10
25 / 385		Bottom of boring at 25.0 feet						
30 / 380								

SPT N (blows/ft) scale: 10, 30, 50

SAMPLER TYPE
DRIVEN SPLIT SPOON UNLESS OTHERWISE
PT - PRESSED SHELBY TUBE
CA - CONTINUOUS FLIGHT AUGER
RC - ROCK CORE

SAMPLE CONDITIONS
D - DISINTEGRATED
I - INTACT
U - UNDISTURBED
L - LOST

	GROUND WATER		CAVE IN DEPTH	
AT COMPLETION	DRY	ft.	17.0	ft.
AFTER 24 HRS.	16.6	ft.	17.0	ft.
AFTER ____ HRS.		ft.		ft.

BORING METHOD
HSA - HOLLOW STEM AUGERS
CFA - CONTINUOUS FLIGHT AUGERS
DC - DRIVING CASING
MD - MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" O.D. SAMPLER 1' WITH 140# HAMMER FALLING 30": COUNT MADE AT 6" INTERVALS.

HILLIS - CARNES ENGINEERING ASSOCIATES, INC.

RECORD OF SOIL EXPLORATION

Project Name: **Burtonsville Elementary School** Boring No.: S-9

Location: Burtonsville, MD Job #: 24033A

SAMPLER

Datum: NAD83 / NAVD88 Hammer Wt.: 140 lbs. Hole Diameter: 3.25 in. Foreman: J. Russell

Surf. Elev.: 411.38 ft Hammer Drop: 30 in. Rock Core Diameter: N/A Inspector:

Date Started: 1-29-2024 Pipe Size (O.D.): 2 in. Boring Method: HSA Date Completed: 1-29-2024

Elevation/ Depth (ft)	SOIL SYMBOLS/ SAMPLE CONDITIONS	Description	Boring and Sampling Notes	Sample No.	Rec. (in)	NM (%)	SPT Blows	SPT N (blows/ft) N
0 / 410	D	Dark brown, moist, very loose, clayey SAND with trace gravel (SC)	Topsoil - 2"	1	10		1-1-2	3
	D	Trace organics		2	12		6-2-2	4
5 / 405	D	Gray, moist, very soft, CLAY with trace gravel (CL)	Groundwater was encountered at 23.0 feet while drilling	3	14		2-1-2	3
	D	Brown, moist, medium dense, clayey SAND with some gravel (SC)		4	15		2-8-9	17
10 / 400	D	Orangish brown, moist, medium dense, silty SAND (SM)		5	14		3-6-8	14
15 / 395	D	Wet		6	15		7-8-10	18
20 / 390	D		Boring backfilled 24-hours after completion	7	14		7-8-9	17
25 / 385		Bottom of boring at 25.0 feet						
30 / 380								

SPT N (blows/ft) scale: 10, 30, 50

SAMPLER TYPE
DRIVEN SPLIT SPOON UNLESS OTHERWISE
PT - PRESSED SHELBY TUBE
CA - CONTINUOUS FLIGHT AUGER
RC - ROCK CORE

SAMPLE CONDITIONS
D - DISINTEGRATED
I - INTACT
U - UNDISTURBED
L - LOST

	GROUND WATER		CAVE IN DEPTH	
AT COMPLETION	17.6	ft.	18.0	ft.
AFTER 24 HRS.	14.0	ft.	15.0	ft.
AFTER ____ HRS.		ft.		ft.

BORING METHOD
HSA - HOLLOW STEM AUGERS
CFA - CONTINUOUS FLIGHT AUGERS
DC - DRIVING CASING
MD - MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" O.D. SAMPLER 1' WITH 140# HAMMER FALLING 30": COUNT MADE AT 6" INTERVALS.

HILLIS - CARNES ENGINEERING ASSOCIATES, INC.

RECORD OF SOIL EXPLORATION

Project Name: **Burtonsville Elementary School** Boring No.: S-10

Location: Burtonsville, MD Job #: 24033A

SAMPLER

Datum: NAD83 / NAVD88 Hammer Wt.: 140 lbs. Hole Diameter: 3.25 in. Foreman: J. Russell

Surf. Elev.: 409.84 ft Hammer Drop: 30 in. Rock Core Diameter: N/A Inspector:

Date Started: 1-31-2024 Pipe Size (O.D.): 2 in. Boring Method: HSA Date Completed: 1-31-2024

Elevation/ Depth (ft)	SOIL SYMBOLS/ SAMPLE CONDITIONS	Description	Boring and Sampling Notes	Sample No.	Rec. (in)	NM (%)	SPT Blows	SPT N (blows/ft) N
0	D	Grayish brown, moist, medium stiff, sandy CLAY with some gravel and trace organics (CL; FILL)	Topsoil - 4"	1	12		3-5-5	10
	D	Orangish brown, moist, medium dense, clayey SAND with some gravel (SC; FILL)		2	17		7-9-9	18
405 5	D	Brown	Groundwater was encountered at 18.0 feet while drilling	3	10		6-10-15	25
	D	Orangish brown, moist, medium dense, silty SAND with some gravel (SM)		4	15		8-13-17	30
400 10	D	Dark brown, moist, dense, clayey SAND with some gravel (SC)		5	10		9-17-14	31
395 15	D	Orangish brown, wet, very loose, silty SAND (SM)		6	18		2-2-2	4
390 20	D	Dark brown, wet, loose, clayey SAND (SC)	Boring backfilled 24-hours after completion	7	10		2-3-3	6
385 25		Bottom of boring at 25.0 feet						
380 30								

SPT N (blows/ft) scale: 10 30 50

SAMPLER TYPE
DRIVEN SPLIT SPOON UNLESS OTHERWISE
PT - PRESSED SHELBY TUBE
CA - CONTINUOUS FLIGHT AUGER
RC - ROCK CORE

SAMPLE CONDITIONS
D - DISINTEGRATED
I - INTACT
U - UNDISTURBED
L - LOST

	GROUND WATER	CAVE IN DEPTH
AT COMPLETION	DRY ft.	18.5 ft.
AFTER 24 HRS.	DRY ft.	18.0 ft.
AFTER ____ HRS.	____ ft.	____ ft.

BORING METHOD
HSA - HOLLOW STEM AUGERS
CFA - CONTINUOUS FLIGHT AUGERS
DC - DRIVING CASING
MD - MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" O.D. SAMPLER 1' WITH 140# HAMMER FALLING 30": COUNT MADE AT 6" INTERVALS.

HILLIS-CARNES ENGINEERING ASSOCIATES, Inc.

10975 Guilford Road, Suite A • Annapolis Junction, Maryland 20701
Phone: (410)880-4788 • Fax: (410)880-4098

Description of Soils – per ASTM D2487

Major Component	Component Type	Component Description	Symbol	Group Name
Coarse-Grained Soils, More than 50% is retained on the No. 200 sieve	**Gravels** – More than 50% of the coarse fraction is retained on the No. 4 sieve. Coarse = 1" to 3" Medium = ½" to 1" Fine = ¼" to ½"	Clean Gravels <5% Passing No. 200 sieve	**GW**	Well Graded Gravel
			GP	Poorly Graded Gravel
		Gravels with fines, >12% Passing the No. 200 sieve	**GM**	Silty Gravel
			GC	Clayey Gravel
	Sands – More than 50% of the coarse fraction passes the No. 4 sieve. Coarse = No.10 to No.4 Medium = No. 10 to No. 40 Fine = No. 40 to No. 200	Clean Sands <5% Passing No. 200 sieve	**SW**	Well Graded Sand
			SP	Poorly Graded Sand
		Sands with fines, >12% Passing the No. 200 sieve	**SM**	Silty Sand
			SC	Clayey Sand
Fine Grained Soils, More than 50% passes the No. 200 sieve	Silts and Clays Liquid Limit is less than 50 Low to medium plasticity	Inorganic	**ML**	Silt
			CL	Lean Clay
		Organic	**OL**	Organic silt
				Organic Clay
	Silts and Clays Liquid Limit of 50 or greater Medium to high plasticity	Inorganic	**MH**	Elastic Silt
			CH	Fat Clay
		Organic	**OH**	Organic Silt
				Organic Clay
Highly Organic Soils	Primarily Organic matter, dark color, organic odor		**PT**	Peat

Proportions of Soil Components

Component Form	Description	Approximate percent by weight
Noun	Sand, Gravel, Silt, Clay, etc.	50% or more
Adjective	Sandy, silty, clayey, etc.	35% to 49%
Some	Some sand, some silt, etc.	12% to 34%
Trace	Trace sand, trace mica, etc.	1% to 11%
With	With sand, with mica, etc.	Presence only

Particle Size Identification

Particle Size	Particle dimension
Boulder	12" diameter or more
Cobble	3" to 12" diameter
Gravel	¼" to 3" diameter
Sand	0.005" to ¼" diameter
Silt/Clay (fines)	Cannot see particle

Cohesive Soils

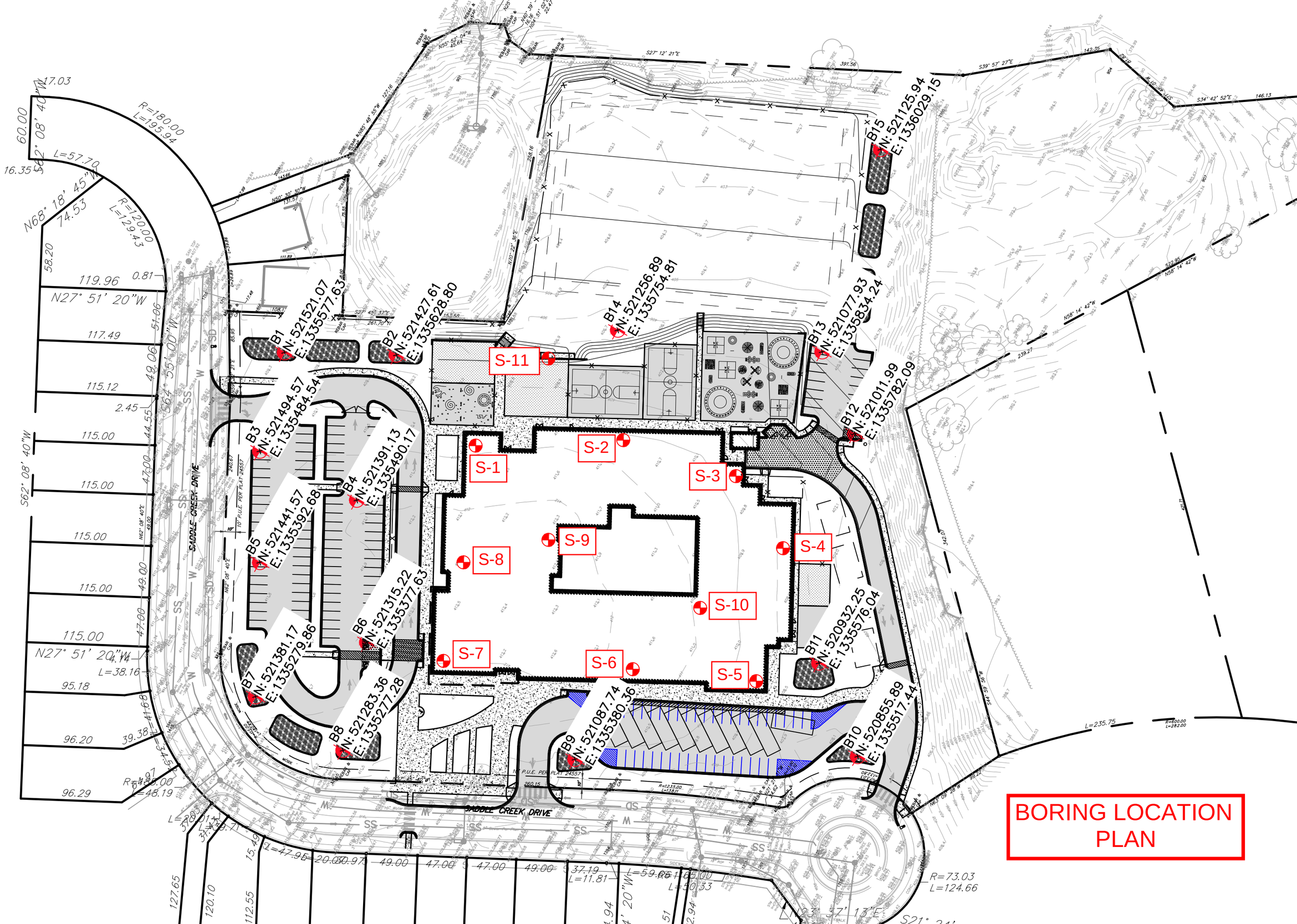
Field Description	No. of SPT Blows/ft	Consistency
Easily Molded in Hands	Less than 2	Very Soft
Easily penetrated several inches by thumb	2 – 4	Soft
Penetrated by thumb with moderate effort	4 – 8	Medium Stiff
Penetrated by thumb with great effort	8 – 15	Stiff
Indented by thumb only with moderate effort	15 – 30	Very Stiff
Indented by thumb only with great effort	Greater than 30	Hard

Granular Soils

No. of SPT Blows/ft	Relative Density
Less than 5	Very Loose
5 – 10	Loose
10 – 30	Medium Dense
30 – 50	Dense
Greater than 50	Very Dense

Other Definitions:

- **Fill:** Encountered soils that were placed by man. Fill soils may be controlled (engineered structural fill) or uncontrolled fills that may contain rubble and/or debris.
- **Saprolite**: Soil material derived from the in-place chemical and physical weathering of the parent rock material. May contain relic structure. Also called residual soils. Occurs in Piedmont soils, found west of the fall line.
- **Disintegrated Rock**: Residual soil material with rock-like properties, very dense, N = 60 to 51/0".
- **Karst:** Descriptive term which denotes the potential for solutioning of the limestone rock and the development of sinkholes.
- **Alluvium:** Recently deposited soils placed by water action, typically stream or river floodplain soils.
- **Groundwater Level**: Depth within borehole where water is encountered either during drilling, or after a set period of time to allow groundwater conditions to reach equilibrium.
- **Caved Depth:** Depth at which borehole collapsed after removal of augers/casing. Indicative of loose soils and/or groundwater conditions.


B1
N: 521521.07
E: 1335577.63
B2
N: 521427.61
E: 1335628.80
B3
N: 521494.57
E: 1335484.54
B4
N: 521391.13
E: 1335490.17
B5
N: 521441.57
E: 1335392.68
B6
N: 521315.22
E: 1335377.63
B7
N: 521381.17
E: 1335279.86
B8
N: 521283.36
E: 1335277.28
B9
N: 521087.74
E: 1335380.36
B10
N: 520855.89
E: 1335517.44
B11
N: 520932.25
E: 1335576.04
B12
N: 521011.99
E: 1335782.09
B13
N: 521077.93
E: 1335834.24
B14
N: 521256.89
E: 1335754.81
B15
N: 521125.94
E: 1336029.15
S-1
S-2
S-3
S-4
S-5
S-6
S-7
S-8
S-9
S-10
S-11
SADDLE CREEK DRIVE
BORING LOCATION PLAN